MIGHTY PEACE WATERSHED ALLIANCE

# Integrated Watershed Management Plan

## PEACE AND SLAVE WATERSHEDS

March 2018

## Acknowledgements

We would like to acknowledge the contributions of all those who participated in the development of the Peace and Slave Rivers Integrated Watershed Management Plan.

The Mighty Peace Watershed Alliance board of directors and staff initiated and led the planning process. The IWMP Steering Committee worked through the process by developing the Terms of Reference, assembling working groups, prioritizing working group recommendations and overseeing the IWMP writing. We thank in particular the members of the working groups, who donated their time and expertise to assess the information on priority issues of concern, formulate and frame the issues and develop a comprehensive suite of solutions. Petra Rowell facilitated working group sessions and Hutchinson Environmental Sciences Ltd., in collaboration with O2 Planning and Design, prepared the IWMP document. West Hawk Associates provided final graphic design, editorial and proofing services.

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March 2018

# Executive Summary

This Integrated Watershed Management Plan (IWMP) is needed to address the complexity of water management issues that transcend landscapes, ecosystems, jurisdictions, and water users in the Peace and Slave Watersheds. It will support and coordinate the efforts of government, residents, stakeholders and communities in effective and sustainable management and use of the water resources in the Alberta portion of the watershed.

The IWMP is non-regulatory and has no statutory authority, but it documents major agreements and decisions of the collaborative group of stakeholders who have direct and substantial influence on the watershed. The recommendations of the Plan will be implemented by others through its influence on regional and municipal statutory plans, Government approvals, resource lease agreements, regulations and others.

The IWMP is part of the mandate of the Mighty Peace Watershed Alliance (MPWA), one of the 11 Watershed Planning and Advisory Councils in Alberta, in an official partnership with Alberta Environment and Parks (AEP). The IWMP provides strategies to achieve the three goals of the Provincial "Water for Life" Strategy: safe secure drinking water, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy.

This Plan contains priority strategies and actions to address the following key issues of concern, as identified from results of the State of the Watershed Report and stakeholder engagement:

- Non-saline groundwater
- Water quality and availability away from the mainstem
- Wetlands and wetland loss
- Peace River flow regime
- Consumptive use of fresh water (groundwater and surface water)

Additional recommendations were recorded and will be considered throughout IWMP implementation.

This IWMP identifies partners in government, non-governmental organizations, industry and institutions to move forward with the implementation of recommendations. An adaptive management approach, including monitoring, reporting and evaluation, will allow for Plan revisions to address newly developing conditions and shifting priorities.

## Figures

# 1

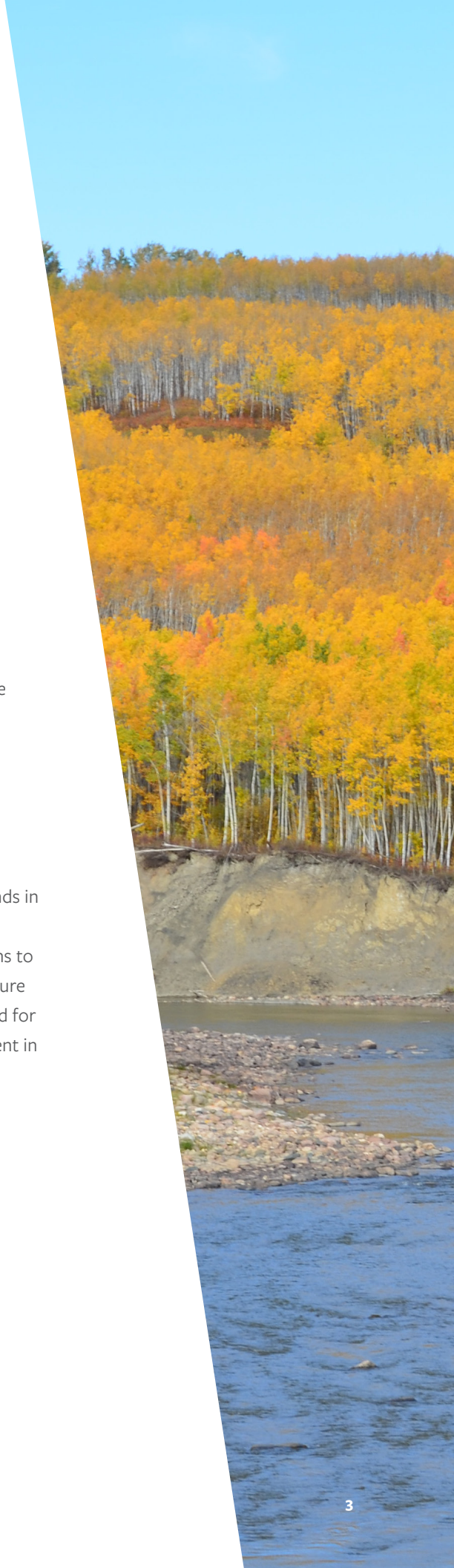
# Introduction

## What is the purpose of the Plan?

This Plan is the first step of a systematic and prioritized adaptive management process at the watershed scale. This Plan supports and coordinates the efforts of governments, residents, stakeholders, and communities in the Peace and Slave Watersheds regarding watershed management.

The purpose of this Plan is to address effective and sustainable management and use of the water resources of the Peace and Slave Watersheds, and to support the maintenance of other benefits provided by the ecological functioning of the watershed. The Plan will ensure that cumulative effects are understood and communicated among all users of the watershed to improve decision-making about human activity in the watershed.

The Plan is built upon an understanding of the present conditions and historical trends in the watershed as described in the State of the Watershed report (MPWA 2015). It identifies key issues and desired future conditions and provides strategies and actions to achieve the desired future. The ongoing monitoring and evaluation necessary to ensure success of the Plan are identified. The Plan identifies the areas with the greatest need for coordinated management and creates a roadmap for ongoing watershed management in the Peace and Slave Watersheds.



# Why is the Plan needed?

A plan to coordinate efforts of watershed management is needed to address the complexity of water issues that transcend landscapes, ecosystems, jurisdictions, and water users in the Peace and Slave Watersheds. Integrated watershed management in Alberta and Canada evolved in response to this complexity. Key drivers for the development of integrated watershed management were described by the Canadian Council of Ministers of the Environment (2016) as follows:

- Recognition that environmental issues such as water are multi-scale. Individual activities in one area often have impacts that are felt in another area (e.g., jurisdiction, watershed, or downstream/upstream in the same watershed), and could additively and cumulatively have significant regional impacts.
- Recognition by federal, provincial and territorial governments that it is neither desirable nor feasible to have a single "water agency" lead all water and land-related resource management. Thus, there is a need to bring together (or integrate) the efforts of several government agencies and non-governmental groups within and, where appropriate, between jurisdictions.
- Consideration of how water is connected through the hydrologic cycle, and how groundwater and surface water must be connected in our management activities (see Figure 5). This type of thinking also suggests that we should connect water resources, and the associated impacts on these resources from activities on land, to the ecosystems and to human health which rely on secure and safe water.
- Increased water use and types of water use, as well as the need to better balance ecosystem requirements with water withdrawals, has led to challenges in achieving effective resolution of conflicting demands. IWM is seen as a way to better manage and resolve water use conflicts among various sectors (e.g., recreation, industries, agriculture, municipalities, energy production, etc.).
- Recognition of the need for participatory or community-based management approaches that could eliminate or reduce user conflicts, and provide a basis for better implementation. These approaches also serve to ensure problems are well scoped and alternative solutions well considered.
- Awareness that funding for water resources management is limited and requires creative approaches to distribute the costs of planning, implementation and monitoring among the many participants including those who use and benefit from water.
- Awareness that climate change will alter what we have come to expect from "normal" and historical climate conditions. Current thinking on IWM best practices recognizes the high level of uncertainty associated with our ability to predict the future, and that we must be prepared for increased variability and change. Thus, adaptive approaches that rely on data collection, analysis and experimentation are an important component of IWM.
- Appreciation that Aboriginal people rely on many water resource services, and need to be involved in the planning and management of those resources.

These key drivers were considered, and integrated where feasible into the IWMP.

***Integrated watershed management*** *(IWM) is a continuous and adaptive process of managing human activities in an ecosystem, within a defined watershed. IWM involves the integration of environmental, social and economic decisions and activities through an inclusive decision-making process to manage the protection, conservation, restoration and enhancement of aquatic and terrestrial ecosystem features, functions and linkages.*

## How will the Plan be used?

This Plan provides advice to governments, agencies and others with decision-making authority for land and resource management. The recommendations of the Plan (**Section 6**) will be implemented by others, through its influence on regional and municipal statutory plans, Government approvals, resource lease agreements, regulations and other land use and planning authorities.

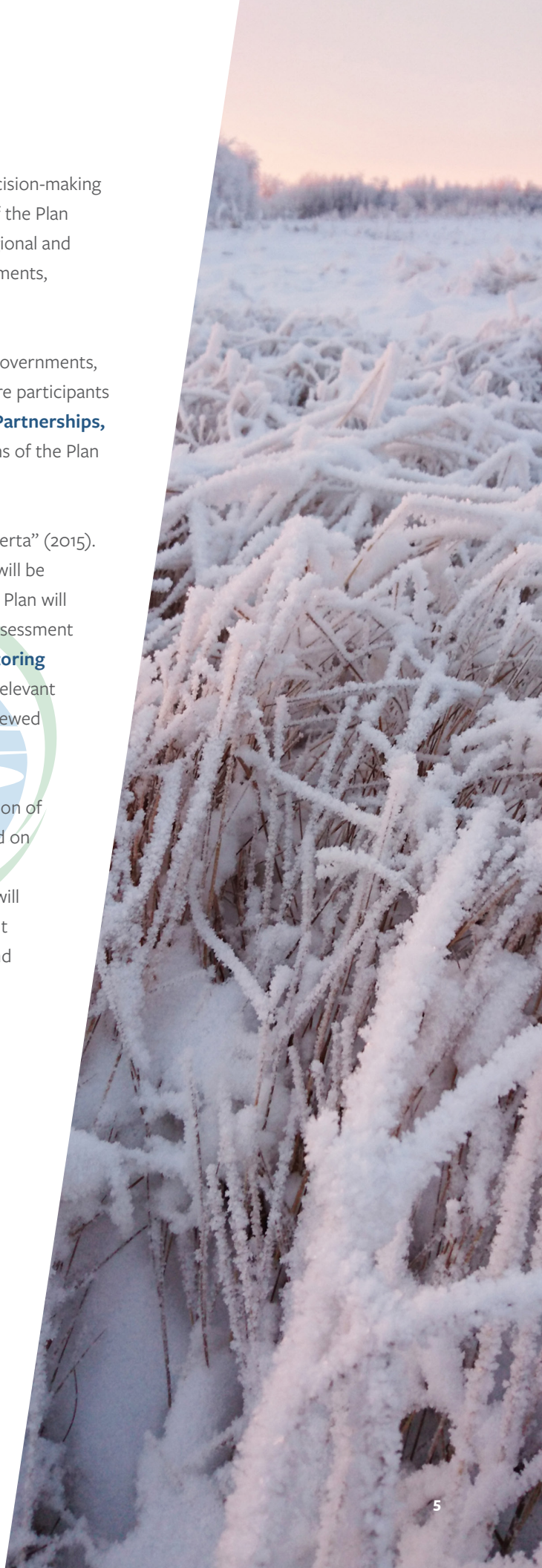
Government and industry resource planners and managers, municipal governments, the Government of Canada, First Nations and Métis, and many others are participants in the Plan, as well as recipients of the recommendations (**Section 7 – Partnerships, Table 2**). All are strongly encouraged to adhere to the recommendations of the Plan they helped develop.

This Plan follows the "Guide to Watershed Management Planning in Alberta" (2015). Consistent with adaptive management principles (**Section 3**), this Plan will be reviewed every 10 years or as otherwise determined by the MPWA. The Plan will be assessed for its effectiveness and relevance and the results of this assessment will guide any necessary future revisions to the Plan (**Section 7 – Monitoring and Reporting Success**). Integral to effective planning is appropriate, relevant and current information; as such the State of the Watershed will be renewed regularly to inform plan revisions.

Implementation is critical to the utility of this work. With the first iteration of the plan complete, implementation challenges will no doubt arise. Based on ongoing stakeholder input, the MPWA will prioritize areas and issues of greatest concern, and consider how best to address them. The MPWA will ensure that recommendations are carried forward to decision-makers. It will encourage the relevant governments, stakeholders, communities and residents of the watershed to work together to support and implement the recommendations of the IWMP.

## What is the Mighty Peace Watershed Alliance?

The Alliance is a multi-sector, not-for-profit society committed to planning for an ecologically healthy watershed while ensuring environmental, economic and social sustainability. Its active stakeholders and communities use consensus, adaptive management and innovation to understand and promote living within the watershed. The MPWA's Board of Directors report on the state of the watershed, lead watershed planning activities, promote best management practices and develop educational programs.



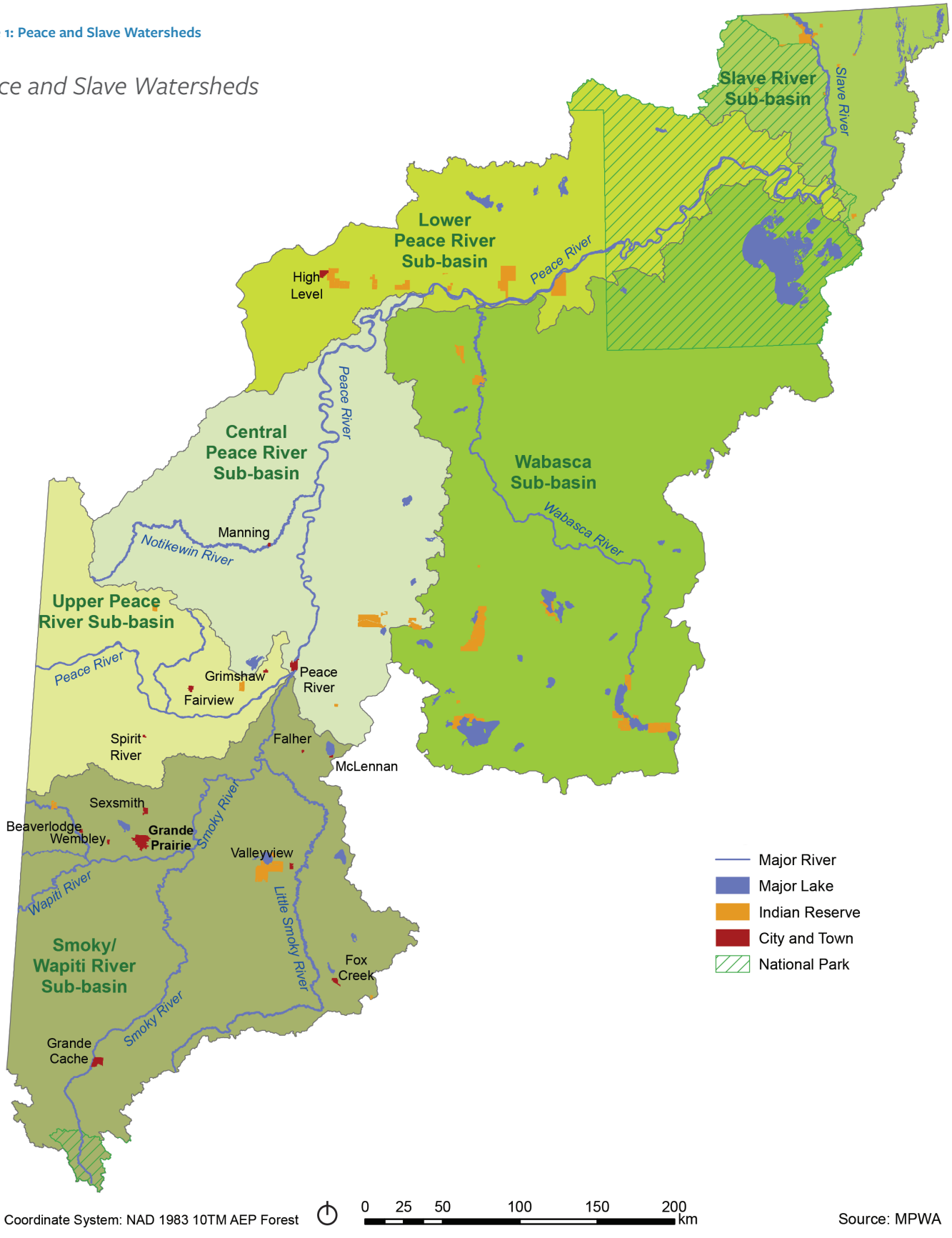
# 2

# The Planning Context

## The Plan Area

The geographic scope of this Plan includes the Alberta portions of the Peace and Slave Watersheds (**Figure 1**). Although this is the defined scope of the IWMP, consideration will also be given to those portions of the Peace and Slave Watersheds that are in British Columbia and significant tributaries if the need arises. The Slave watershed extends into the Northwest Territories, and, although this portion of the watershed is not considered in this Plan, the IWMP recognizes the need to protect downstream uses.

Figure 1: Peace and Slave Watersheds



## Water For Life

The Water For Life Strategy (2003) commits the Alberta Government to the wise management of Alberta's water quantity and quality for the benefit of Albertans now and in the future. While the Government of Alberta, led by Alberta Environment and Parks, will remain accountable and will continue to oversee water and watershed management activities in the province, Water for Life identifies three types of partnerships that are integral to achieving stewardship of our water resources:

1. Provincial Water Advisory Council
2. Watershed Planning and Advisory Councils
3. Watershed Stewardship Groups

Each of these partnerships have different but compatible roles, and each involves interested Albertans in the planning and implementation of improved water and watershed management throughout the province.

To that end, Water for Life is based on the following commitments to Albertans:

- Albertans will be assured their drinking water is safe
- Albertans will be assured that the province's aquatic ecosystems are maintained and protected
- Albertans will be assured that water is managed effectively to support sustainable economic development

The Mighty Peace Watershed Alliance (MPWA) was formed in 2011 as one of the 11 Watershed Planning and Advisory Councils, in an official partnership with Alberta Environment and Parks under the Water for Life Strategy. The MPWA has the mandate to work towards 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, in the Alberta portion of the Peace and Slave Watersheds.

## Alberta's Land-use Framework (LUF)

Alberta's Land-use Framework (LUF) and its supporting legislation, the Alberta Land and Stewardship Act is a province-wide framework to support management and land-use planning on private and public lands in Alberta to achieve long-term economic, environmental and social outcomes. Launched in 2008, the LUF sets out guiding principles and identifies key strategies which will guide future land-use management in Alberta. The LUF established seven land-use regions and calls for the development of a regional plan for each. The Peace and Slave Watersheds straddle two of these regions: the Upper Peace and the Lower Peace.

To date the Government of Alberta has completed two regional plans: the *Lower Athabasca Regional Plan* (Alberta Government 2012) and the *South Saskatchewan Regional Plan* (Alberta Government 2014). The Upper and Lower Peace Regional Plans will be among the next to be developed by the province, in consultation with relevant stakeholders. The IWMP provides an important opportunity to ensure that these Regional Plans are based on an adequate and comprehensive assessment of the values, opportunities and constraints at play in the Peace and Slave Watersheds. By aggregating knowledge, highlighting data gaps, and bringing together communities, stakeholders and other impacted partners, the IWMP will provide the information necessary to develop a robust Regional Plan when the time comes.

For administrative purposes, the province is divided into two broad land use areas: Green Area and White Area. The Green Area (forested portion) comprises most of northern Alberta. In the Green Area, public land is managed for timber production, watershed, wildlife and fisheries, recreation and other uses. Agricultural use is limited to grazing where it is compatible with other uses. The White Area (settled portion) land is primarily privately held. In the White Area, public land is part of the agricultural landscape. It is managed for various uses including agriculture, recreation, soil and water conservation, and fish and wildlife habitat. Métis settlements are managed by the Métis Settlement government.

The government of Alberta owns the bed and shore of most naturally occurring lakes, rivers, streams and wetlands, even when these occur on private lands.

## Regional Planning

To date there is no comprehensive regional plan at the scale of the Peace and Slave Watersheds. Thus, this plan will play a crucial role in bringing together the work of the existing initiatives, some of which are indentified in this section. Furthermore, this plan provides a watershed-specific lens with a multi-stakeholder perspective on water and watershed management planning issues.

## Traditional Land Use Management Framework

The Peace River basin drains Crown lands that are occupied by Aboriginal members of a number of Treaty 8 (1899) First Nations and Métis communities, which collectively have constitutionally protected rights to use these Crown lands and waters to sustain a way of life that is central to their culture. In 2015, an Alberta Land Use Review Panel[1] suggested that regional land use planning processes ought to be guided by development of a "Traditional Land Use Management Framework" capable of ensuring that regional land use plans focus on optimization of the exercise of these constitutionally protected Treaty rights.

The lakes, wetlands and rivers within the basin are central to the way-of-life of these Aboriginal peoples, particularly in the Wabasca, Lower Peace and Slave River sub-basins and in the Peace-Athabasca Delta, where their livelihoods are dependent on wetland-dominated ecosystems. First Nation and Métis peoples make extensive use of these wetlands and waters, relying on these aquatic landscapes to support the cultural and spiritual practices, which connect them to the land and sustain their communities.

By documenting the ecological function and need for conservation of these wetland dominated ecosystems, the Integrated Watershed Management Plan will provide input to development of a robust Traditional Land Use Management Framework. This will help to frame regional land use planning approaches that can optimize opportunities for Métis and First Nation peoples to use Crown lands within the Peace River Basin to sustain their way of life.

[1] *Alberta Review Panel Report, 2015, Lower Athabasca Regional Plan, to the Alberta Land Use Stewardship Minister (subsection 19.2 (2) ALSA, S.A. 2009, c A-26.8)*

## Forest Management Planning

Forest management plans typically consider a 200-year planning horizon and follow the Alberta Planning Standard which is based on the Canadian Council of Forest Ministers' "CAN/CSA-Z809-02 Sustainable Forest Management: Requirements and Guidance" (Canadian Standards Association 2008). In Alberta, forest harvest practices may be used to approximate natural disturbances caused by wildfire with consideration given to sensitive sites such as riparian areas. Any disturbance, including forestry, has the potential to affect water quality and quantity so there is a need to ensure that activities are informed by the IWMP to ensure compatibility with other values and uses. In turn, the IWMP should ensure that it adequately reflects the impact of forestry activities on the watershed.

## Municipal Land Use Planning

While municipal land use plans typically cover only a small fraction of the Peace and Slave Watersheds, they represent intensive land use activities and there is real value in providing municipalities with the context and frame that the Integrated Water Management Plan provides. Municipalities are the direct administrators of land and therefore put a lot of legislation and planning into practice. Identifying upstream impacts and downstream concerns will help guide municipal land use decisions toward more sustainable actions, recognizing the cumulative impacts that might otherwise be lost without a watershed-scale lens.

## Other Decision-Makers

While this IWMP does not have statutory power, it serves as a useful framework for a cumulative impact assessment, which may help to inform or guide collaborative decision-making among other organizations or industry partners. The IWMP development process has paved the way for this, because decision-makers were involved in the development of the recommendations. Please see Appendix C for more planning context.

***Traditional Uses** of wetlands include:*

- *Hunting*
- *Gathering of bog cranberry, labrador tea, cattail root, medicinal plants, waterfowl eggs*

# 3

# The Planning Process

Watershed Management for the Peace and Slave Watersheds will follow an adaptive management approach (**Figure 2**). The Integrated Watershed Management Plan is based on watershed issues identified in the SoW report. The Plan makes recommendations for a course of action which the MPWA will recommend to decision-makers for implementation. After monitoring and reporting on which actions have or have not been implemented by decision-makers and their corresponding success, the Plan will be reviewed, evaluated and updated based on the new information.

***Adaptive Management*** *is a systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices.*

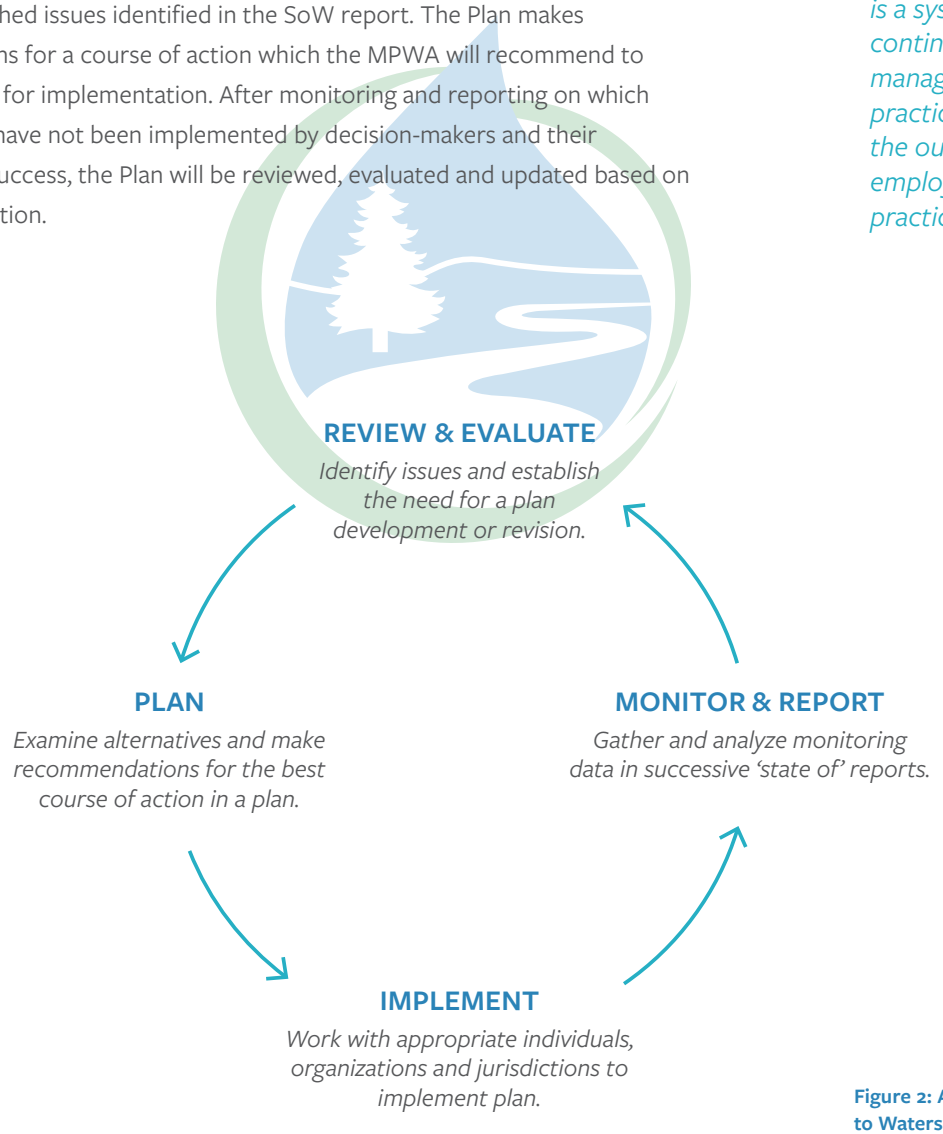



**Figure 2: Adaptive Approach to Watershed Management**
*(Modified from: Handbook for State of Watershed Reporting, Government of Alberta 2008)*

## Previous Work

The MPWA was tasked to report on the State of the Watershed (SoW) and to develop an Integrated Watershed Management Plan (IWMP) for the Peace and Slave Watersheds. After completing a number of initial technical studies that compiled available watershed information (i.e., the Watershed Directory, the State of Drinking Water, Water Supply, and Aquatic Ecosystem Health), the State of the Watershed (SoW) study was completed in 2015.

The SoW provided a comprehensive overview of watershed health and the pressures that act on it. Watershed indicators assessed in the SoW represented the landscape, biological communities, and surface and groundwater quality and quantity (**Section 7 – Performance Monitoring Indicators**). The findings of the SoW formed the basis for defining the issues to be addressed in this IWMP and represent the baseline conditions for future comparison.

Upon completion of the SoW, the public was engaged to solicit feedback from watershed stakeholders to help identify the Issues of Concern that the MPWA should focus on first (see **Figure 3**). As a result, the MPWA identified issues of priority concern for watershed planning:

- Non-saline groundwater
- Water quality and availability away from the mainstem
- Wetlands and wetland loss
- Peace River flow regime
- Consumptive use of fresh water (groundwater and surface water)

This prioritization recognized that water quality and quantity are critical to the functioning of the watershed and to the people depending on water resources.

The IWMP Steering Committee was then struck to lead the development of the IWMP, under direction of the MPWA Board. A "Terms of Reference" document was prepared to kick off and guide the watershed management planning process (Mighty Peace Watershed Alliance 2015). Four working groups, made up of MPWA Board members, subject experts and sector representatives, tackled the issues of priority concern, analyzing the issues, and developing a vision, desired outcomes and recommendations to achieve them.

While all working group recommendations will be constructive means to advance watershed health, they were too numerous to be addressed all at once (see **Appendix B** for a complete list). Therefore the IWMP Steering Committee deliberated on working group recommendations to identify a subset of priority strategies and actions to be considered in this Plan. The main criteria for prioritization included feasibility (fiscally, legally, timelines, existing partners) and impact (likelihood of achieving the desired outcome). Only the recommendations that ranked high on the priority list were included as the recommendations that the MPWA will focus on first (**Section 6**). All recommendations, including non-prioritized strategies and actions, are presented in **Appendix B**.

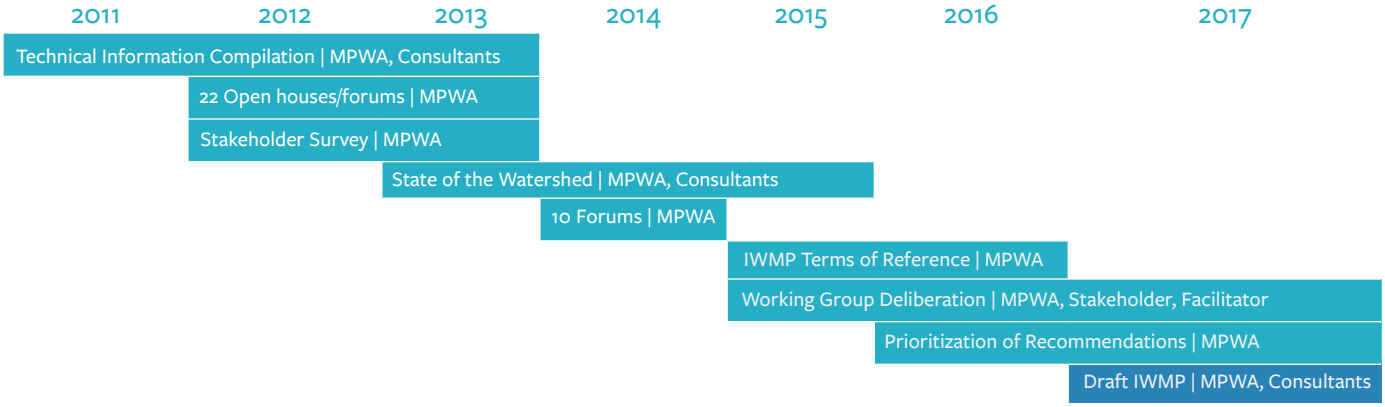



**Figure 3: Plan Development Process**

## General Approach and Methods

Each working group met four to five times, with the help of a facilitator who documented the deliberations. The tasks of the working groups were to review the information provided by the IWMP Steering Committee, to properly frame and define the issues of concern through discussions, and to identify and evaluate potential management options of how to address the issues. To the extent possible, a lead and partners were identified for each management action. The diversity of participant organizations encouraged sharing of sector perspectives and promoted mutual understanding, which was seen by the participants as a positive outcome of the process itself.

Consensus decision-making is how the MPWA Board of Directors operates and this concept was also applied to the IWMP development. This does not mean that each interest represented around the table had every concern addressed exactly as they might wish, but rather that everyone around the table could live with the compromises that were made. In the case that no consensus can be reached, "Those who do not support the direction or decision are expected to explain what they cannot agree to, provide the rationale for their position and offer alternative solutions or changes that would make the idea acceptable" (MPWA process guidelines). If there was still no consensus reached, the group agreed on the remainder of the IWMP, noting the areas and reasons why consensus could not be reached and then accepted the IWMP including caveats with consensus.

## Public and Stakeholder Engagement Process

The MPWA engaged and interacted with the public and watershed stakeholders throughout its work toward this IWMP. Participation in the MPWA Board of Directors and its delegated committees has been the most direct form of stakeholder involvement from a variety of sectors. Routine consultation with Alberta Environment and Parks, the lead agency for implementing "Water for Life," was an integral part of stakeholder engagement.

Communication of MPWA activities through workshops, public forums and the website are ongoing. A discussion paper produced by the IWMP Steering Committee after completion of two working group reports was circulated for public review in the summer of 2016 to inform the IWMP development (MPWA 2016).

An extensive survey at 22 open houses, supported by an online and mailed-out stakeholder survey, was conducted on the results of the SoW. This survey allowed broad input from people across the watershed; including those that may not have been reached previously due to their remote location. Common concerns identified in the survey included the availability and security of drinking water, ecosystem health, and the industrial use of water. Stakeholders also expressed interest in the impacts of dams on the Peace, the effects of agricultural runoff and forestry practices, and the treatment of industrial effluent (MPWA 2015).

# 4

# The Watershed at a Glance

*The watershed is an area of land where water from rain or snow melt drains downhill into a body of water such as a stream, wetland, river, lake or reservoir.*

# The Biophysical Environment

## Overview

The Peace and Slave Watersheds is the largest area under the mandate of an Alberta Watershed Planning and Advisory Council (WPAC). Approximately, 208,834 km² is drained by the Peace and Slave rivers in Alberta. The total drainage area including the area in British Columbia is approximately 326,000 km². It is split into six sub-basins: Smoky/Wapiti, Upper Peace, Central Peace, Lower Peace, Wabasca and Slave River. Approximately 35% of the watershed is considered an "Aquatic Environmentally Significant Area" based on the area's aquatic species, habitat, peatlands, biological connectivity and features supporting water quality and quantity (Fiera Biological Consulting 2010).

## Natural Regions

There are five natural regions within the watershed (**Figure 4**). The Boreal Forest has the largest coverage, spanning the north of the Smoky/Wapiti sub-basin, southeast side of the Central Peace sub-basin and the entire Lower Peace and Wabasca sub-basins. The Parkland natural region covers the Grande Prairie to Peace River corridor and rural surrounding areas. The headwaters are in the Rocky Mountains natural region which is in the southern portion of the Smoky sub-basin. The Foothills natural region is found in the Smoky/Wapiti, Upper Peace and Central Peace sub-basins. In the northeastern side of the watershed there is a small portion of the Slave watershed that is within the Canadian Shield natural ecoregion.

## Major Rivers

There are three major rivers in the Peace and Slave Watersheds: the Peace River, the Slave River and the Smoky River (**Figure 1**). Historically, the Peace River began at the confluence of the Finlay and Parsnip rivers in the Rocky Mountains of British Columbia. The Peace River is regulated by the Bennett Dam in northern British Columbia. It flows into the Slave River at the Peace-Athabasca Delta. The Slave River flows northwards to Great Slave Lake in the Northwest Territories. Major tributaries of the Peace River include the Smoky and Wabasca rivers. The Smoky River originates in the Rocky Mountains in Jasper National Park, Alberta. Tributaries of the Smoky River include the Wapiti and Little Smoky rivers.

## Lakes

There are hundreds of lakes in the watershed, many of which are nutrient rich and have high concentrations of rooted plants and algae. Numerous lakes of recreational value provide areas for fishing, boating and swimming.

## Wetlands

Almost 30% of the watershed is covered by wetlands. The majority (95%) of these wetlands are swamps, bogs and fens. They provide habitat for rare and important species, play an important role in the water cycle and are a resource of cultural and traditional value (see **Section 6 – Wetlands & Wetland Loss**).

## Peace-Athabasca Delta

The Peace-Athabasca Delta is the largest freshwater inland river delta in North America. It is approximately 3,820 km² in area, and contains three river deltas and four freshwater lakes. It is also the largest boreal delta in the world, is under Ramsar protection and is a UNESCO World Heritage site.

***The Mighty Peace**, as it is known to many, is the largest river in Alberta, meandering nearly 2,000 km from its source in the Rocky Mountains of British Columbia until it joins the Slave River near the Northwest Territories. At some points approaching 2 km in width, it drains nearly a third of Alberta.*

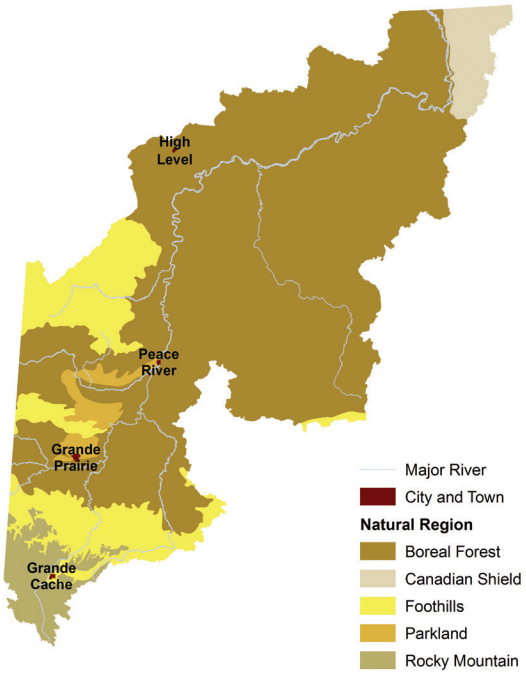



**Figure 4: Ecoregions in the Peace and Slave Watersheds**

## The People

The population of the Peace and Slave Watersheds was 165,000 in 2011; 37% of people lived in rural areas, 33% in Grand Prairie, 23% in smaller towns and villages, 6% on Indian reserves, and 1% in Métis settlements.

The first people arrived in the Peace region more than 10,000 years ago. First Nations still represent 16.7% of the total population, with the proportion ranging from a low of about 10% in the Upper Peace and Smoky/Wapiti sub-basins to 67% in the Wabasca sub-basin.

Major areas of employment include agriculture, oil and gas, forestry, mining, tourism and recreation.

## The Economy

The Peace and Slave Watersheds have a resource-based economy, with the majority of its economic wealth coming from the land. As such, the economy is dependent on the natural features of the watershed.

The Foothills and mixed-wood regions of the Boreal forest support forestry and oil and gas operations. The forestry industry (either directly or indirectly) employs 10% of Northern Alberta workers. The Peace River Oil Sands deposit is one of the three main Alberta oil sands reserves.

Nutrient rich soils of the Parklands support agriculture in the watershed. Agriculture practices are expected to increase in the area as the population increases. Active coal mines are found in the Rocky Mountain headwaters.

To ensure a healthy economy it is important to sustainably manage natural resources. Maintenance of thriving forests, sustainable soils, and sufficient, quality water to serve industry, local consumption and recreation is important to support the resource-dependent economy of the Peace and Slave Watersheds.

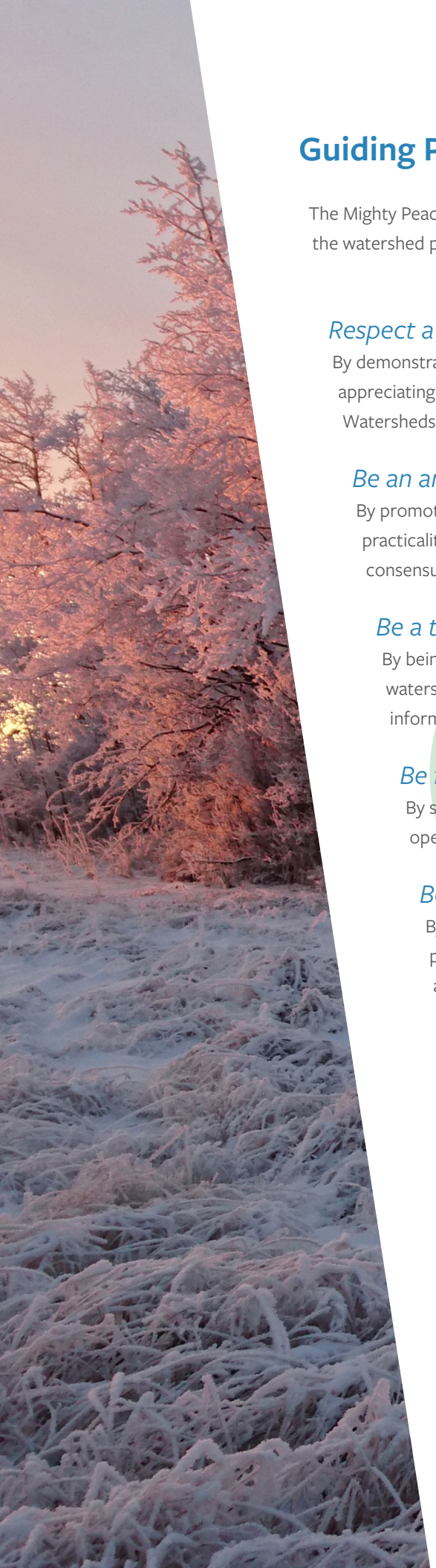
# 5

# Vision, Principles and Core Concepts

## A Vision for the Watershed

The Vision for the IWMP was stated in the Terms of References as follows:

*The Integrated Watershed Management Plan of the Peace and Slave Watersheds balances and supports our social, environmental and economic objectives.*



# Guiding Principles

The Mighty Peace Watershed Alliance recognizes the following shared values which guide the watershed planning process:

### *Respect a diversity of peoples and values*

By demonstrating individual and collective respect for the air, land and water and by appreciating the diversity of values and opinions found in the Peace and Slave Watersheds.

### *Be an ambassador*

By promoting our vision and mission, demonstrating integrity, accountability and practicality, and practicing effective communication, knowledge-building and consensus decision-making.

### *Be a trustworthy and credible source of information*

By being well-informed and providing sound advice through an adaptive watershed approach that integrates traditional local and scientific knowledge in information-gathering and problem solving.

### *Be fair and transparent to all*

By seeking balanced representation and listening to all stakeholders in an open, transparent manner.

### *Be inclusive and collaborative*

By facilitating inclusive and collaborative processes and partnerships, promoting membership and interaction and providing opportunities for all stakeholders to be involved.

### *Be action-oriented and innovative*

By being motivated, resourceful and action-oriented in finding new, innovative ideas and win-win strategies.

### *Foster stewardship*

By encouraging and enabling individuals and organizations to be good stewards of the watershed.

# Core Concepts

## Multi-functional Watersheds and Landscapes

The Peace and Slave Watersheds and landscapes must be managed to provide a wide range of functions and services. Forests need to provide timber, wildlife habitat, hunting and grazing opportunities; energy and minerals will be extracted from landscapes, and crops produced in agricultural areas. These activities support a steady flow of revenue that supports livelihoods, education, health care and social services. Resources such as forests, minerals, wildlife, water, fish, rangeland, public land, and plants need to be managed in a manner that addresses their interdependence and which avoids impacts from their exploitation. At the same time, clean water must be available for drinking, recreation, irrigation, industry and aquatic ecosystem health. Wise use of the watershed, and hence the IWMP, must recognize the multi-functionality of the watershed, where the use of one resource can affect others and actions can lead to both intended and unintended impacts.

## Cumulative Effects

The cumulative effects of population growth, climate change and economic development are increasing pressures on the watershed's air, water, land and biodiversity. The development of watershed policies and management interventions must recognize the connections between different stressors and their interactions. In the absence of this recognition, solving one problem may simply aggravate another problem. Better understanding of cumulative environmental stressors and resultant coordination and integration of policy, planning and decision-making, including adaptive management, is needed in the watershed, given the number and complexity of initiatives and approval processes in the region.

Importantly, a system needs to be in place that has a focus on watershed goals and management, as well as the ongoing regulation and control of individual activities and approvals. An integrated approach to environmental management that considers Cumulative Effects Assessment and Management in the formal planning and decision-making process is needed. This is recognized in the Environmental Management System of the Alberta government (Alberta Environment and Parks 2017), which aspires to be outcome-based, place-based and knowledge-based. Effective cumulative effects management with respect to watershed issues include the documentation of a sound baseline condition, identification of stressors, receptors and associated metrics of impact, identification or prediction of system responses or outcomes, and management objectives and strategies. Taken together, these activities should provide environmental limits that set clear system boundaries that are not to be exceeded along with a monitoring, reporting and adaptive management framework. This IWMP is an important contribution toward a cumulative effects management system in the Peace and Slave Watersheds.

## Ecosystem Goods and Services

Ecosystem services are the benefits that nature provides to people. Ecosystem services have been defined as the delivery, provision, protection or maintenance of goods and services that humans obtain from ecosystem functions.

For the Aboriginal Communities, Ecological Goods and Services are requisite to their way of life. Some Ecosystem Service benefits, such as crops, are familiar and tangible; however, others, such as water filtration and carbon storage, are hard to observe or quantify and are underestimated or unaddressed in decision-making. Ecosystems provide innumerable services that are underrepresented or absent in most economic development decisions; however, these services contribute to development objectives (e.g., scenic quality of the land) and to realizing quality of life goals. For the Aboriginal Communities, Ecological Goods and Services are requisite to their way of life.

Identifying and understanding Ecosystem Services within the IWMP will provide more information to decision-makers, which may help to prevent unintended consequences from development decisions.

***Cumulative effects** are "the combined effects of past, present and reasonably foreseeable land-use activities, over time, on the environment."*

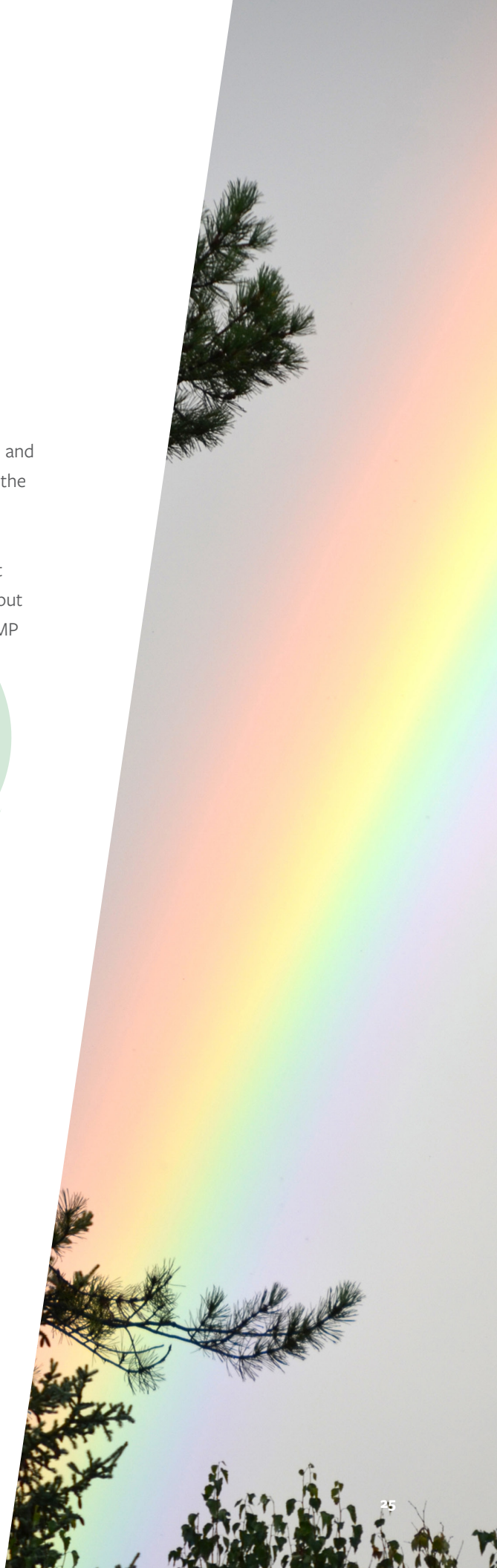
*— Alberta Land-use Framework (2008)*

# 6

# Plan Recommendations: Outcomes, Strategic Directions and Actions

This section represents the "core" of the Plan, i.e., the goals it wants to achieve and the means to get there. The Plan recommendations were taken verbatim from the working group reports and represent a prioritized "short list" of Outcomes, Strategic Directions and Actions that the MPWA wants to address first. Many issues (almost 100) were considered, but through several processes this "short list" was selected. This section is structured by the four working group topics, but does address the five key issues of concern identified in early stages of the IWMP process (see **Section 3 – Previous Work**).

In each of the following sections, the issue is introduced, explaining why it is important to address in the Plan. It is followed by a vision, which is the overarching desired end goal, then a list of the prioritized outcomes. For each outcome, strategic directions and actions to achieve them are recorded, along with responsible partners. The lead organization is highlighted in bold type and abbreviations for the partners are explained in **Table 2 (Section 7 – Partnerships**).



# Water Quality, Availability Away from the Mainstem and Consumptive Use

## Why Is It an Issue?

Water quality is generally good on the Peace River mainstem, with its large volume and relatively few point and nonpoint source pollution inputs. Due to their location throughout the watershed, however, many communities and industries draw from smaller tributaries, lakes or from groundwater that may not provide optimal source quality or volume. Several tributaries, such as the Little Smoky River, where water is withdrawn for municipal and industrial uses, face restrictions on timing and levels of flow when water can be drawn in order to protect ecosystem functions or maintain assimilative capacity. This may result in the need to withdraw at high flows and store water, both of which create an increase in costs for municipalities and residents.

This Plan will explore options for ensuring a sustainable supply of water away from the Peace River mainstem.

Consumptive use of water for oilfield injection and hydraulic fracturing has recently been growing in prominence in the Peace and Slave Watersheds. The discussion about consumptive use is made complex by the source (surface water or groundwater; saline or non-saline), timing of flows and withdrawals (particularly for small, seasonal tributaries and lakes), and the need for timely monitoring of the cumulative effects of multiple withdrawals at multiple diversion points on downstream aquatic health.

This Plan will develop a strategy to better understand the extent of the consumptive industrial use of water.

## Vision

*Water in the Peace and Slave Watersheds is adaptively managed for current and future generations such that the water resource is well understood, quality source and drinking waters are available where and when they are needed and aquatic ecosystems are healthy.*

## Outcomes, Strategic Directions and Actions

**Outcome 1:** Land use and water managers and the public are knowledgeable about the water balance (inputs and outputs, **Figure 5 – Water Cycle**) and share accountability for managing current and future water demands sustainably in the Peace and Slave Watersheds.

**Strategic Direction 1:** Develop an education and outreach strategy that identifies target audiences, key messages and appropriate communication tools.

**Actions**:

- Develop a mainstream media education campaign for a public audience (**MPWA**, GoA)
- Develop an industry-focused campaign promoting compliance, stewardship, best practices, etc. for water haulers, road builders, construction, grader operators, etc. Work through certification and training programs to improve water awareness (**MPWA**, Industry associations, trade schools)
- Develop or tap into existing municipally focused campaigns (**MPWA**, AAMDC, AUMA, ASVA)

**Outcome 2:** Source water yield is recognized as a value to be managed by the Crown ensuring source waters are protected.

**Strategic Direction 2:** Raise awareness and promote the use of source water protection plans for all source waters (existing and new) in the Peace and Slave Watersheds.

**Actions**:

- Define, locate and map source waters (surface and groundwater) in the watershed (**MPWA**, AAMDC)
- Promote existing tools and programs that are currently available to municipalities and private system owners to develop source water protection plans (technical advice, templates) (**MPWA**, AAMDC)

***Source water yield*** *is a concept that conveys how much water a given area contributes to the overall watershed that provides source water. Water that comes upstream from that point at which water is withdrawn is source water and the relative productivity is the water yield.*

*— https://albertawater.com/water-yield-streamflow-analysis/alberta-s-water-yield*

**Outcome 3:** Source water availability is a key consideration of current and future population growth and development.

**Strategic Direction 3:** Identify and support communities with critical water supply and/or treatment issues.

**Actions**:

- Create a list of communities and issues (including First Nations communities with boil water advisories) (**AAMDC**, FCM, GoA, Treaty 8)
- Prioritize communities for action (**AAMDC**, Federation of Canadian Municipalities, GoA, Treaty 8)
- Outline possible actions to improve supply and/or treatment options, in particular looking at regional collaborations (**AAMDC**, Federation of Canadian Municipalities, GoA, Treaty 8)
- Conduct feasibility studies (**AAMDC**, Federation of Canadian Municipalities, GoA, Treaty 8)
- Select an option (**AAMDC**, Federation of Canadian Municipalities, GoA, Treaty 8)
- Seek funding and implement through existing federal and provincial municipal infrastructure programs, where possible (**AAMDC**, Federation of Canadian Municipalities, GoA, Treaty 8)

*See* **Appendix B — page 47**

# Peace River Flow Regime

## Why Is It an Issue?

The Peace is a "regulated" river, because its flow is controlled by dams. The dams have tempered the annual fluctuations in the hydrograph, significantly reducing flows in spring, summer and autumn and significantly increasing them in winter. There is evidence that the modified flow regime has created cultural, social, economic and environmental issues for residents in the Peace and Slave Watersheds, in particular for Aboriginal Communities in the Lower Peace sub-basin. On the other hand, specific effects on aquatic ecosystems and communities, including the Mode of Life of Aboriginal and Métis Communities, as well as flow values required to mitigate these effects, have not been fully characterized.

This Plan will explore the impact of flow regime on the Lower Peace Wetlands, including the Peace Athabasca Delta and recommendations to restore and maintain its ecological functioning. Flow regime will be reviewed in terms of the risk it poses to communities, farmland and infrastructure so that recommendations for their safeguarding can also be made.

## Vision

*The Peace River Flow Regime is healthy, understood and adaptively managed (using both Western Science and Traditional Ecological Knowledge) to deliver optimal social, economic and ecological goods and services (including instream flow needs and wetland health in the Lower Peace watershed), for current and future generations.*

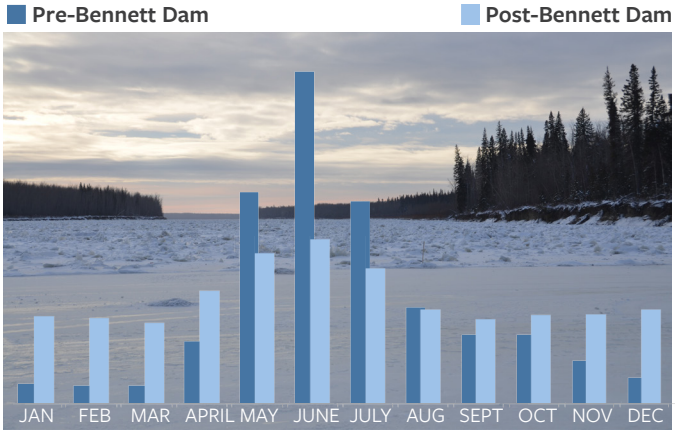
## Outcomes, Strategic Directions and Actions

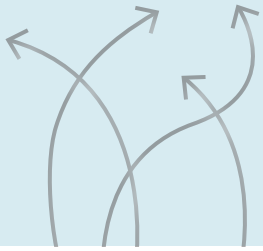
**Outcome 1:** Cultural, social, economic and environmental issues with the current flow regime as well as desired Aboriginal, cultural, social, economic and ecological flow values to guide management of the Peace River and its tributaries are documented, well understood and communicated to decision-makers.

**Strategic Direction 1:** Using traditional ecological and local knowledge, compile an inventory of sites where people, municipalities, or industry experience issues because of river flow regime and identify community flow values to guide water and land managers and decision-makers and share them with other basin initiatives.

**Actions**:

- Conduct a literature search and compile a summary of existing work on flow regime issues and flow values. (**MPWA**, Aboriginal Communities)
- Conduct a survey and/or do interviews with river users and communities along the river on flow regime issues and flow values; compile and provide results to AEP. (**MPWA**, river users)





**Outcome 2:** The current Peace River flow regime and its relationship to the aquatic ecosystem health of other waterbodies (e.g., Delta lakes, Lower Peace and Delta wetlands, groundwater, etc.) is understood.

**Strategic Direction 2:** Collect existing technical information on the Peace River flow regime (including its interactions with associated lakes, wetlands, ponds, channels, groundwater, etc.), synthesize key learnings and identify and fill information gaps.

**Actions**:

- Assess current mainstem and other waterbody monitoring and determine if additional monitoring, mapping or modelling is required to improve our understanding of flow regime relationships, particularly between overbank flooding and wetland integrity in the Lower Peace and Delta. (**AEP**, EC, PC, PADEMP, MPWA, North Peace Land and Water, DUC)
- Organize a technical committee to identify, prioritize and fill data gaps. (Build on existing PADEMP work but extend membership outside of Delta.) (**AEP**, MRBB, EC, PC, PADEMP)
- Undertake a literature review of naturalized to recorded flow comparisons. Then determine instream flow needs (via modelling/naturalizing recorded flows dataset). Compare to current flow regime and identify any issues. (**AEP**, MRBB)
- Review and update the 1980s study (Northern River Basin Studies, NRBS) to evaluate the effectiveness of weirs constructed in the Delta in the 1970s. This should inform if a) maintenance of these structures is required; b) whether these structures were/are still effective; and c) if such structures might provide management options for other areas of the Watersheds. (**AEP**, EC, PC, MRBB)
- Conduct a literature review, and possibly initiate a study, to assess sediment transport/siltation/water-quality issues identified by basin residents. (**AEP**, EC, PC, MRBB)
- Conduct a study to identify the feasibility, optimal conditions and costs of a controlled release to augment flooding, as well as the costs of not doing anything. (**AEP**, EC, PC, PADEMP)

**Outcome 3:** People are aware of the importance of the Peace River flow regime, what it means to basin residents and what it provides.

**Strategic Direction 3:** Develop an education and outreach strategy to raise awareness about the importance of healthy river flow from the headwaters to the Delta (including a focus on how the mainstem flow interacts with other waterbodies such as the Lower Peace wetlands and Peace-Athabasca Delta).

**Actions**:

- Develop the strategy and associated materials. (**MPWA**, AEP, PC, PADEMP, MRBB)
- Distribute materials at meetings around the basin, or via trade shows, newspaper articles, workshops, etc. (**MPWA**, AEP, PC, PADEMP, MRBB)

*See* **Appendix B — page 50**

***Flow regime*** *refers to both volume and timing of flow. Generally flow peaks in spring with snow and ice and then tapers off to flows dominated by base flow that is groundwater inputs, with intermittent precipitation inputs.*

***Naturalized flows*** *are developed by examining the historical recorded flows of the river and then adding the known withdrawals back into the flow. This estimates what the flow would have been before industrial uses.*

# Wetlands and Wetland Loss

## Why Is It an Issue?

Wetlands are a prominent component of the Peace and Slave Watersheds, covering slightly more than 29% (52,898 km²) of the area (not including national parks, for which information was not readily available). Wetlands provide many cultural and ecological benefits for the watershed. They supply food, plants for traditional medicine, and recreational opportunities, and fulfill spiritual and inspirational needs. They store water, mitigate floods and droughts, moderate water flow, stabilize shorelines, and discharge and recharge groundwater. Moreover, wetlands play a critical role in water purification, especially those that contain herbaceous plant species such as cattails (*Typha latifolia*), sedges (*Carex* spp.) and bulrushes (*Schoenoplectus* spp.). Wetlands also moderate weather and climate, and process and store greenhouse gases. The accumulation of carbon in bog and fen sediments is of global importance. Wetlands' high biological productivity and aquatic components provide diverse wildlife habitats. In northern Alberta, wetlands provide key rearing and overwintering habitat for fish and are primary habitats for birds, amphibians, beavers, mink, muskrats, otters and plants. Wetlands provide important habitat for moose, caribou, and songbirds.

Wetlands have therefore been highlighted as essential sources of Ecosystem Goods and Services, upon which human and natural processes are strongly dependent. The current extent of wetland areas is a reflection of the natural land cover and human land use. The regions with high coverage of wetlands correspond with extensive boreal forest areas and little human activity. As the Peace and Slave Watersheds have been developed, wetlands have been converted to agricultural, industrial and urban land uses. This loss and alteration of wetlands in the human-dominated portions of the watershed has led to disruption of natural ecological functioning. The true extent and intensity of these disruptions is difficult to assess, given the lack of data on the historical distribution of wetlands throughout the watershed. For example, a resource road cutting through a wetland complex can affect a large area. The cumulative impact of human disturbance on wetlands is one of the key unknowns in scientific knowledge.

**This Plan presents a strategy addressing the lack of data around wetlands, calls for solutions to address the loss of wetlands, and explores the role of restoration in safeguarding wetlands in the watershed.**

## Vision

*The state and functions of wetlands are well understood and human activities affecting wetlands are mitigated (avoided, minimized or replaced) such that ecological integrity and resilience of wetlands are maintained, and sustained on the landscape for current and future generations.*

## Outcomes, Strategic Directions and Actions

**Outcome 1:** Everyone in the watershed is knowledgeable about wetlands and their social, economic and environmental values.

**Strategic Direction 1A:** Strike an education committee to develop and implement a general wetland education and outreach plan.

**Actions**:

- Model this education and outreach plan on the University of Saskatchewan Delta Dialogues Network. (**MPWA**, Cows and Fish, DUC, ACA, Nature Alberta)
- Provide input to AEP as it reviews and renews the Alberta Education wetland curriculum. (**MPWA**, AEP, school districts, Grande Prairie Environmental Sciences Education Society, other forest education societies)
- Engage post-secondary and professional organizations in the Peace and Slave Watersheds in wetland education and outreach. (**MPWA**, NAIT Boreal Institute)

**Strategic Direction 1B:** Communicate the state of wetlands and wetland trends.

**Actions**:

- Integrate wetland state of reporting into the MPWA state of reporting process. (**MPWA**, AEP, ABMI)

**Outcome 2:** Landowners and land users are incented to be good stewards and conserve wetlands.

**Strategic Direction 2:** Promote stewardship with various users.

**Actions**:

- Work with off-roading/all-terrain vehicle users to promote stewardship. (**AEP**, WPACs, Users, retailers, recreation groups)
- Work with the agriculture sector to improve understanding of the economic benefits of wetlands and the ecological goods and services they provide and to implement BMPs. (**AAF**, municipalities, GoA Agriculture groups, agriculture field men AAAF, Cows and Fish)
- Work with industry to promote stewardship tools such as BMPs, Codes of Practice, biodiversity and conservation offsets. (**GoA**, **WPACs**, Industry, DUC)
- Work with other groups toward wetland and wetland function restoration.

*See* **Appendix B — page 52**

# Non-Saline Groundwater

## Why Is It an Issue?

Groundwater is a crucial source for many residents and communities throughout the watershed. Non-saline groundwater is present throughout the Peace and Slave Watersheds, but the current level of knowledge is limited to some areas within the watershed, while others have none. Until we have a more complete understanding of non-saline groundwater aquifer volumes, as well as an understanding of current and future use, potential risks, cumulative effects, and how climate change will affect this resource, it is challenging to set groundwater management priorities.

Hence the majority of Plan recommendations focus on building better baseline information, and communicating this information to decision-makers in the Peace and Slave Watersheds.

## Vision

*Abundant, uncontaminated groundwater in the Peace and Slave Watersheds is managed with integrity so that the resource is publicly understood, predictable, sustainable and protected to benefit and meet the needs of the basin's inhabitants.*

## Outcomes, Strategic Directions and Actions

**Outcome 1:** Groundwater information required for decision-making is available to all.

**Strategic Direction 1A:** Develop, complete, and continually update a single, centrally located, accessible and shared groundwater database.

**Actions**:

- Form a partnership/working group responsible for database development and maintenance. (**CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA)
- Determine what kinds of data should be included in the database. (**CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA)
- Build on the existing Coal Bed Methane database to develop a single, centrally located, accessible shared groundwater database. (**CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA)
- Identify data gaps on subsurface structure and groundwater inventory and develop a plan to fill gaps with new data and information; consider citizen science. (**MPWA**, AGS, AEP)

**Strategic Direction 1B:** Ensure processes (e.g., licensing, water use, etc.) are designed such that new data are automatically entered into the central shared database (onus is on the applicant to enter data).

**Actions**:

- Improve mandatory licensee "Water Use Reporting System" reporting and make it a subset of the new proposed database. (**AEP**, AER)
- To support AEP's integrated application system, at the application stage, require information such as transmissivity and the information needs identified under Outcome 1 to populate the database. (**AEP**, AER, licensee)

**Outcome 2:** Groundwater users, decision-makers and the public receive credible information about sector groundwater use and how allocation decisions are made.

**Strategic Direction 2:** Share sector information about the Water Allocation System and specific sector water use (including licence requirements, return flows, wastewater treatment, etc.) with the public and other audiences via MPWA state of reporting, and AEP and industry factsheets.

**Actions**:

- Promote existing sector information by linking to relevant industry websites or resources where they exist to make licensing and other information more visible. (**MPWA**, Board member sectors)
- Develop fact sheets that focus on industry groundwater use and practices including case studies of water sharing/ conflict resolution, water re-use between sectors and other innovations. (**MPWA**, Board member sectors)

**Outcome 3:** The groundwater resource is better understood by the general public with time.

**Strategic Direction 3:** Improve general public understanding of groundwater resources (amount, inventory, regulatory process); groundwater–surface water interactions; the cumulative effects of land cover/land use on groundwater quantity and quality; and how groundwater will be affected by climate change.

**Actions**:

- Develop an education plan that identifies appropriate public audiences, messages, communications tools, etc. (**MPWA**, AEP, Inside Education)
- Support the GoA Working Well program as a means to reach landowners with private wells. The MPWA can promote landowner well testing, identification and proper decommissioning of abandoned wells. (**AEP/AHS**, MPWA)
- In conjunction with the next MPWA state of the watershed report, develop a groundwater atlas similar to the Edmonton-Calgary Corridor atlas showing yield, salinity, possible contaminants, etc. (**MPWA**, AEP, AGS)
- Work with municipalities to distribute information to rate-payers. (**MPWA**, AEP, AAMDC)
- Support the Alberta Science Network and get groundwater speakers into schools and other public venues. (**MPWA**, Alberta Education)

# Policy Integration

This Plan lists individual actions and strategies that work toward achieving certain outcomes for selected watershed indicators. Developing this hierarchy and compartmentalizing the work under certain topic areas breaks the work down into doable pieces for the respective subject experts and sectors, which is indispensable for implementation. We need to recognize, however, that many of the proposed actions are inter-related and will work together toward the stated outcomes. The success of one action may depend on the success of another. For example, the restoration of water quality in one river through mitigation of point source pollution may only be successful if non–point source pollution is addressed at the same time.

There are many relationships between watershed components, strategies and actions as the different phases of the water cycle, such as surface water in rivers, wetlands and shallow groundwater, are closely related (**Figure 5**). Sustainable groundwater management (Issue: "Non-Saline Groundwater") will help with source water protection (Issue: "Water Quality"), because surface waters away from the mainstem are fed to a large part by groundwater.

Surface water in return affects the quality of groundwater, at least in shallow surficial aquifers. Hence, what we do on the land, and how we manage risks like contamination, point and non–point source pollution, soil erosion, perviousness and wetlands, can impact the quality and quantity of groundwater. Wetland conservation in the cultivated areas in particular can be a valuable tool to preserve groundwater recharge and improve surface water quality and availability off the mainstem. Wetland health in the Peace-Athabasca Delta (Issue: "Wetlands") depends directly on the flooding frequency and intensity in the Lower Peace (Issue: "Peace River Flow Regime").

Education and outreach are part of the strategies to address every issue discussed in this Plan. There is likely ample opportunity to develop education and outreach strategies about watershed health that address multiple priority issues of concern simultaneously. More so, raising awareness about the interconnections between the different water sources will encourage respect and collaboration between potentially conflicting water users.

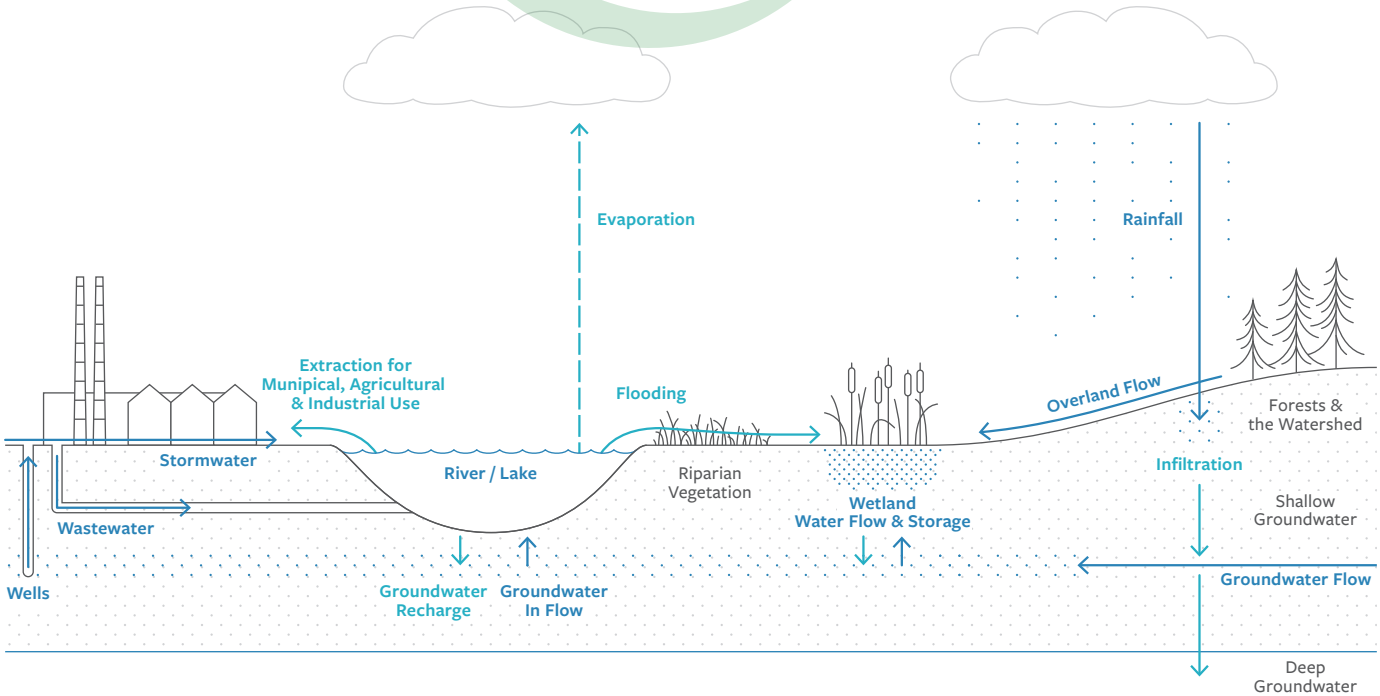



Figure 5: Water Cycle

**Table 1: Existing Watershed Management Plans and Initiatives in the Peace and Slave Watersheds**

| Existing Plan or Initiative | Related Plan Recommendation | | | | Comments |
|---|---|---|---|---|---|
| | Water Quality, Availability & Consumptive Use | Peace River Flow Regime | Wetlands & Wetland Loss | Non-Saline Groundwater | |
| Proposed Community-Focused Management Strategy for the Grimshaw Gravels Aquifer Technical Report | ▨ | | | ▨ | Focus on maintaining water quality and quantifying quantity in aquifer. |
| Heart River Watershed Management Plan Heart River Watershed Restoration Plan | ▨ | | ▨ | | Focus on restoring fish habitat by land use practices that improve water quality and water quantity (less flashiness). |
| Redwillow Watershed Restoration Plan | ▨ | | ▨ | | Focus on restoring fish habitat by land use practices that improve water quality and water quantity (less flashiness). |
| Wapiti River Water Management Plan | ▨ | | | | Focus on ensuring water license needs can be met without comprising aquatic ecosystem integrity. |
| Grande Cache Source Water Protection Plan | ▨ | | | | Focus on protecting water quality in Victor Lake. |
| AER Area Based Regulation Panel | ▨ | | | ▨ | Regulatory recommendations to reduce the use of high-quality non-saline water in the Duvernay play. |
| Little Smoky Water Users Group | ▨ | | | | Focus on communication between municipalities and industry that withdraw from the Little Smoky to facilitate licensees being able to withdraw the needed water. |
| Grimshaw Gravels Aquifer Source Water Protection Plan | ▨ | | | ▨ | This plan will provide protection of water quality in the Grimshaw Gravels Aquifer and look at water quantity. |
| Peace Athabasca Delta Ecological Monitoring Plan | | ▨ | ▨ | | This ongoing study and knowledge collection is designed to better understand the Peace-Athabasca Delta and the functioning of its wetlands. |
| Fish and Wildlife Water Implementation | ▨ | | | | |
| Wetland Policy implementation | | ▨ | ▨ | | This policy works to manage wetlands. |
| Transboundary agreements with NWT and BC | ▨ | ▨ | | | Flow across political borders affects water quality and availability for other jurisdictions and is addressed in the bilateral agreements. Lower Peace wetlands are largely flood dependent and influenced by flow from BC. |
| Tool for assessing Lake and Lake Watershed Risk | ▨ | | | | |
| UNESCO - Reactive Monitoring Mission to Wood Buffalo National Park, Canada 2017 | | | ▨ | | This report looks at the ecological integrity of the Peace-Athabasca Delta. |
| AEP's DRAFT Water Conservation Policy | ▨ | | | | This DRAFT policy examines approaches to conserving water use and this would be applicable to users in the Peace and Slave Watersheds. |

# 7

# Implementation: From Plan to Action

The IWMP will have very little impact if the actions it recommends are not implemented. This section therefore discusses the components and process of successful Plan implementation.

The "Guide to Watershed Management Planning in Alberta" provides a checklist for successful implementation of the IWMP, which can serve as a useful self-evaluation for this IWMP and the process that led to its completion (Government of Alberta 2015). The Guide also recommends striking an implementation committee and developing an implementation workplan that outlines timelines, roles and responsibilities, possible funding resources and technical support and a process to monitor implementation progress.

The following sections present information on potential partners, ways to monitor progress and a tentative schedule to provide a basis for an implementation plan.

# Partnerships

Solving watershed health issues and addressing cumulative effects are complex undertakings. The recommendations from the working groups (**Section 6**, **Appendix B**) demonstrated this complexity, by including actions in education, science, regulatory processes, infrastructure and more. These diverse strategies and actions of the Plan can only succeed if a multitude of organizations work together toward a common goal.

When developing recommendations, the working groups identified partner organizations that could be involved in the implementation of the actions (**Section 6**). When summarizing these organizations (**Table 2**), it becomes clear that partnerships will be a cornerstone of the IWMP implementation. Organizations across all levels of government, non-government organizations as well as industrial, commercial and educational sectors will have a role to play in the diversity of addressed issues and proposed actions.

*If you want to go fast, go alone. If you want to go far, go together.*
*— African Proverb*

**Table 2: Partners Identified in IWMP Recommendations**

| | | |
|---|---|---|
| **Non-Government Organizations** | | |
| Mighty Peace Watershed Alliance (MPWA) | Aboriginal Communities | River Users |
| Alberta Association of Municipal Districts and Counties (AAMDC) | Peace Country Beef and Forage Association | North Peace Land and Water |
| Peace-Athabasca Delta Ecological Monitoring Program (PADEMP) | Ducks Unlimited Canada (DUC) | Mackenzie River Basin Board (MRBB) |
| Cows and Fish | Nature Alberta | Watershed Planning and Advisory Councils (WPACs) |
| Grande Prairie and Area Environmental Sciences Education Society | Forest Education Societies | All-terrain vehicle users |
| Recreation groups | Inside Education | Grimshaw Gravels Aquifer Management Advisory Association (GGAMAA) |
| Alberta Conservation Association (ACA) | | |
| **Provincial Government Agencies** | | |
| Government of Alberta (GoA) | Alberta Energy Regulator (AER) | Alberta Education |
| Alberta Environment and Parks (AEP) | Alberta Geological Survey (AGS) | |
| Alberta Agriculture and Forestry (AAF) | Alberta Health Services (AHS) | |
| **Other Agencies** | | |
| Association of Summer Villages of Alberta (ASVA) | Parks Canada Agency (PCA), Wood Buffalo National Park (WBNP) | Municipalities |
| Federation of Canadian Municipalities (FCM) | Alberta Conservation Association (ACA) | Alberta Urban Municipalities Association (AUMA) |
| Environment and Climate Change Canada (ECCC) | Métis | Treaty 8 |
| Agriculture and Agri-Food Canada (AAFC) | | |
| **Industry/Commercial** | | |
| Canadian Association of Petroleum Producers (CAPP) | Retailers | Board member sectors |
| **Education** | | |
| School districts | NAIT Boreal Institute | Ecosystem Management Emulating Natural Disturbance Project (EMEND) |

# Stewardship

This Plan is non-statutory, implying that it does not have any regulatory power. While regulation is one means to achieve watershed protection from the effects of certain activities, voluntary and cooperative action is another effective way to achieve responsible management of watershed resources that are not that easily addressed by regulation. Many watershed residents are stewards of their land; for example, many farmers take care of their land for sustainable yields for future generations. Formal stewardship groups, such as lake stewardship groups, take care of a specific type or portion of the landscape and encourage protective measures, including best management practices. The MPWA is a facilitator of stakeholder interactions and, as such, a connecting place and an enabling force for stewardship groups. This IWMP provides a roadmap for stewardship of natural resources in the Peace and Slave Watersheds that is based on scientific and traditional knowledge summarized in the SoW.

***Stewardship*** *is the careful and responsible management of something entrusted to one's care.*

# Milestones and Schedule

Each recommendation of the Plan was associated with a timeline: short: 2 years, medium: 5 years or long-term: 10 years (**Appendix B**) after the final IWMP is approved.

Major milestones are defined by the completion of components of the planning cycle (see **Figure 2**). The State of the Watershed reporting may be reviewed every 10 years or as otherwise determined by the MPWA. Subsequently, the progress on IWMP implementation will be reviewed, and the Plan adapted to start a new implementation phase.

# Monitoring and Reporting Success

The progress toward achieving the desired outcomes of the IWMP needs to be recorded to allow evaluating and adjusting the Plan. It is therefore important to periodically review the progress made in implementing the recommended actions and the effect they had on the status of the watershed. This involves performance and implementation monitoring.

Performance monitoring is long-term scientific monitoring of the indicators of watershed health. It answers the question of whether or not watershed health is improving and attaining the stated desired outcomes. The GoA operates ongoing performance monitoring programs, such as the Long-Term River Network for river water quality and the Groundwater Observation Well Network for groundwater quantity and quality, while Environment and Climate Change Canada conducts river flow monitoring at Water Survey of Canada sites. In addition, site-specific compliance monitoring is completed by industry (e.g., Environmental Effects Monitoring) or utilities as conditions of their approval to operate. These data are reported on in various intervals by the program owners, but can also be summarized and synthesized in SoW reporting to gain a comprehensive understanding of the status of watershed health. Many more resources can be used to monitor and report on watershed health, as summarized in the Handbook for State of the Watershed Reporting (Government of Alberta 2008). The SoW and working groups identified certain data and knowledge gaps, which should be considered for improving existing monitoring networks.

Implementation monitoring tracks progress on plan actions to:

- Document and record progress toward implementation of Plan actions as a tracking system so that implementation can be evaluated against the timelines and schedule indicated in the Plan
- Provide feedback to implementers

The MPWA will lead the efforts on monitoring implementation progress on the IWMP.

## Performance Monitoring Indicators

Whereas implementation monitoring tracks how many recommendations have been implemented, performance monitoring tracks how the environment responds to the changes in policy and practice. An environmental indicator is a parameter or a value that describes an aspect of the environment, and has a significance extending beyond that directly associated with any given parametric value.

For the purpose of SoW reporting, the MPWA identified indicators that would be:

- Relevant to the watershed and the people associated with it
- In alignment with their goals, vision and mission statement
- Measurable according to similar standards at future dates
- Accessible in terms of data availability
- Applicable at various scales of watershed
- Likely to contribute to a basic understanding of watershed health

**Table 3: Indicators Evaluated in the State of the Watershed**

| Indicator Category | Indicators | | | |
|---|---|---|---|---|
| **Landscape** | Wetland Area and Status | Riparian Health | Land Use | |
| **Biological Community** | Fish Population | Invasive Species | | |
| **Surface Water Quantity** | Water Level: Peace River Flows | Water Level: Surface Water Away From Mainstream | Allocations and Withdrawals | |
| **Surface Water Quality** | ARWQI | Lake Water Quality | Phosphorus | Coliforms |
| **Groundwater Quantity** | Groundwater Quantity | | | |
| **Groundwater Quality** | Groundwater Quality | | | |

# Next Steps

This Plan is the result of years of work collecting information, establishing collaborations and working toward a set of recommendations that address key watershed health issues. The next steps are to ensure that conditions for successful Plan implementation are met and then to get started.

Throughout this process, ongoing collaboration and awareness of the issues, of the current state of the watershed and of the needs of the different users on the landscape will be central to the work being done by the MPWA and its partners.

Finally, it is important to remember that this Plan is intended as a Living Document. This draft IWMP will be subject to discussion and stakeholder consultation. The final IWMP will be subject to review periodically and allow revisions to address new challenges, changed conditions and priorities or new information. Thresholds, Targets and Limits are ongoing work of the MPWA and will contribute to the development of monitoring approaches. MPWA is working with GoA on this. The monitoring, reporting and evaluation process defined in this document will allow for this flexibility, and will ensure that the Plan will be relevant for generations to come.

# References

## References


Alberta Environment and Parks 2017. Cumulative Effects Assessment in Environmental Impact Assessment Reports Required under the Alberta Environmental Protection and Enhancement Act. http://aep.alberta.ca/lands-forests/land-industrial/programs-and-services/environmental-assessment/documents/CumulativeEffectsEIAReportsUnderEPEA-A.pdf

Canadian Standards Association 2008 (reaffirmed 2013). Sustainable Forest Management. CAN/CSA-Z809-2002.

Canadian Council of Ministers of the Environment 2016. Summary of Integrated Watershed Management Approaches across Canada. PN 1559. http://www.ccme.ca/files/Resources/water/water_conservation/Summary%20of%20Integrated%20Watershed%20Management%20Approaches%20Across%20Canada%20PN%201559.pdf

Fiera Biological Consulting Ltd. 2010. Aquatic Environmentally Significant Areas in Alberta. Report prepared for Alberta Environment, Edmonton, Alberta. Fiera Biological Consulting Report Number 9030-2. Pp. 66. Report Prepared by: Katherine Maxcy and Gillian Holloway.

Government of Alberta. 2003. Water for Life: Alberta's Strategy for Sustainability. http://aep.alberta.ca/water/programs-and-services/water-for-life/strategy/documents/WaterForLife-Strategy-Nov2003.pdf

Government of Alberta 2008 a. Handbook for State of Watershed Reporting. http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/documents/HandbookStateWatershedReporting-Nov2008.pdf

Government of Alberta 2008 b. Alberta Land-use Framework. http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/documents/HandbookStateWatershedReporting-Nov2008.pdf

Government of Alberta 2012. Lower Athabasca Regional Plan 2012-2022. http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/documents/HandbookStateWatershedReporting-Nov2008.pdf

Government of Alberta 2014. South Saskatchewan Regional Plan 2014-2024. https://landuse.alberta.ca/LandUse%20Documents/South%20Saskatchewan%20Regional%20Plan%202014-2024%20-%20February%202017.pdf

Government of Alberta 2015. Guide to Watershed Management Planning in Alberta. http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/documents/GuideWatershedPlanningAlberta-2015.pdf

Mighty Peace Watershed Alliance 2015. State of the Watershed Report. http://mightypeacesow.org

Mighty Peace Watershed Alliance 2015. Terms of Reference for the Peace and Slave Watersheds Integrated Watershed Management Plan. http://aep.alberta.ca/water/programs-and-services/water-for-life/partnerships/watershed-planning-and-advisory-councils/documents/GuideWatershedPlanningAlberta-2015.pdf

Mighty Peace Watershed Alliance 2016. Peace and Slave Watershed Management Discussion Paper. https://www.mightypeacewatershedalliance.org/projects/integrated-watershed-management-plan

# Appendices

# Appendix A: List of Participants

A large number of people participated in working groups and their time, expertise and work is greatly appreciated. Working group members are listed in the working group reports. The table below lists the Members of the MPWA Board of Directors.

| Mighty Peace Watershed Alliance Board of Directors | MPWA Seat |
|---|---|
| Richard Keillor | Public at Large |
| Dave Walty | Public at Large |
| Bob Cameron | Conservation/Environment |
| Jean-Marie Sobze | Research/Education |
| Cathy Newhook | Watershed Stewardship |
| Dave Hay | Tourism/Fisheries/Recreation |
| Shelleen Gerbig | Agriculture |
| Ian Daisley | Forestry |
| Ashley Rowney | Utilities |
| Natalia Rossiter-Thornton | Oil & Gas |
| Sylvia Johnson | Métis Nation of Alberta |
| Alden Armstrong | Metis Settlement General Council |
| Jim Webb | Lower Watershed First Nation |
| Elaine Garrow | Rural Municipality |
| Elaine Manzer | Small Urban |
| Abdi Siad-Omar | Federal-Transboundary Relations |
| Chris Thiessen | Large Urban Municipality |
| Dan Benson | Provincial Government |

# Appendix B: List of all Recommendations

Working group recommendations were too numerous to be addressed all at once. Therefore the IWMP Steering Committee deliberated on working group recommendations to identify a subset of outcomes, strategic directions and actions to be considered in this Plan, as presented in **Section 6**. This Appendix contains a complete list of Outcomes, Strategic Directions and Actions received by the MPWA Board of Directors as recommended by the working groups. These are not prioritized nor have they been vetted through the consensus processes of the Board. These are the basis of the IWMP and may be potential future items of work. **All recommendations, including non-prioritized strategies and actions, are presented in this appendix.**

SHORT TERM = 2 YEARS

MEDIUM TERM = 5 YEARS

LONG TERM = 10 YEARS

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| **Water Quality, Availability Away from the Mainstem and Consumptive Use** | | | | |
| *Accessible, timely and accurate baseline information on water quality, availability and consumptive use supports knowledge-based decision-making and adaptive management such that aquatic ecosystem health and ecological integrity are sustained.* | Develop an accessible water database(s) and/or portals. (Build on existing databases like the water use reporting system, AEP, etc.) | Identify a 3rd party neutral multi-stakeholder database host. (e.g., MPWA, AEP) | **MPWA**, AEP/ academia | SHORT TERM |
| | | Develop a communications strategy to raise awareness of available data. | **MPWA**, AEP | MEDIUM TERM |
| | Find funds for database support and for research to fill data gaps. | Create a database of available funding sources. | **MPWA** | SHORT TERM |
| | | Investigate and leverage existing Water for Life and other provincial initiatives (e.g., AB Innovates, WRRP program) for funds. | **MPWA**, AI, AEP-WRRP, AAF | MEDIUM TERM |
| | | Explore the use of a levy or donation from water users to fund a shared publicly available database. | **MPWA**, water licencees | MEDIUM TERM |
| | | Collaborate with University researchers | **MPWA**, academia | LONG TERM |
| | Decide what parameters, indices will be monitored and assessed for water quality, quantity/use and aquatic ecosystem health (including ecological goods and services). | Survey current indices and parameters and select best fit. | **MPWA**, AEP/ABMI | SHORT TERM |
| | | Standardize collection and assessment methods and timelines. | **MPWA**, AEP/ABMI | MEDIUM TERM |
| | | Establish baseline and begin collecting data for these indices and/or parameters and make findings publicly accessible. | | LONG TERM |
| | | Identify triggers, responses. | | LONG TERM |
| | Promote mandatory water use reporting by all. | Link water use reporting data to the publicly available database and ensure compliance. | **AEP**, MPWA | MEDIUM TERM |
| | Improve our understanding of historical and future flows and demands. | Encourage First Nations and community elders to share traditional and historical knowledge. | **MPWA**, Treaty 8 | MEDIUM TERM |
| | | Back cast the past 100 years of flow data; forecast the next 100 years to gain a better understanding of seasonal flows on smaller tributaries and compare to projected instream and Industry needs, in the face of climate change. | **AER-AEP**, academia, BC Hydro | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *Land use and water managers and the public are knowledgeable about the water balance (inputs and outputs) and share accountability for managing current and future water use demands sustainably in the Peace and Slave Watersheds.* | Develop an education and outreach strategy that identifies target audiences, key messages and appropriate communication tools (e.g., tradeshows, Sister City, school curriculum, etc). | Develop a mainstream media education campaign for a public audience. | **MPWA**, GoA | SHORT TERM |
| | | Develop a more Industry-focused campaign promoting compliance, stewardship, best practices, etc. for water haulers, road builders, construction, grader operators, etc. Work through certification and training programs to improve water awareness. | **MPWA**, Industry associations, Trade schools | SHORT TERM |
| | | Develop, or tap into existing, municipally focused campaigns. | **MPWA**, AAMDC, AUMA, ASVA | MEDIUM TERM |
| | Ensure accountabilities by building processes into the Water Act allocation and licensing system that assure cumulative effects are known and impacts are lessened. | Make it a condition of a licence that the water hauler, or other user, has to prove training/certification, etc . (Many temporary diversion licence applicants note that they have their haulers complete online training at www.surfacewaterdiversion.com.) | **AER/AEP**, Accreditation bodies | MEDIUM TERM |
| | | Ensure and report on compliance with water use reporting, conditions on licences such as monitoring, etc. | **AER/AEP** | MEDIUM TERM |
| | | Put a more formal system in place with resources to monitor/model licence withdrawals and timing of flows on any small tributary with multiple term or temporary diversion licences on it. | **AER-AEP**, applicants | LONG TERM |
| *Source water yield is recognized as a value to be managed by the Crown ensuring source waters are protected.* | Raise awareness and promote the use of source water protection plans for all source waters (existing and new) in the Peace and Slave Watersheds. | Define, locate and map source waters (surface and groundwater) in the watershed. | **MPWA**, AAMDC | SHORT TERM |
| | | Promote existing tools and programs that are currently available to Municipalities and private system owners to develop plans (technical advice, templates, etc.) | **MPWA**, AAMDC | MEDIUM TERM |
| | Mitigate anthropogenic point and non–point source pollution (sediments, nutrients, etc). | Identify current and potential pollutants and sources (both natural and anthropogenic). | **MPWA**, academia | MEDIUM TERM |
| | | Create and implement an education plan about NPSP and how to mitigate its impacts. | **MPWA**, Agriculture Industry | SHORT TERM |
| | | Promote the use of agricultural BMPs (e.g., off-site watering systems) particularly in the Upper Peace and Smoky-Wapiti sub-basins. | **MPWA**, Agriculture | MEDIUM TERM |
| | | Investigate trade-able credits/offsets/cap-and-trade systems for their ability to affect cumulative effects. (See provincial policy on conservation off-sets) | Academia, MPWA | LONG TERM |
| | Promote passive ecosystem management with buffers, setbacks, conservation easements, municipal and environmental reserves, etc. around waterbodies, wetlands, riparian lands, floodplains and aquifer recharge and discharge areas. | Investigate the ALUS or a similar incentive program (ecological goods and service payments) for the Peace. | **AB Land Institute**, MPWA, academia | MEDIUM TERM |
| | | Identify (delineate) Crown lands (bed and shore) on title before land sales (or at the referrals stage) (see the new guide on establishing permanence). | **AEP**, AAMDC | |
| | | Map floodplains and limit development on and restore; see WRRP program. | **AEP**, Town of Peace River | |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *The water allocation system is comprehensive, transparent, efficient and effective and protects aquatic ecosystem health and ecological integrity in the Peace and Slave Watersheds.* | Determine the in-stream flow needs (using the desktop method) for any priority (e.g., over a particular volume) tributary with an allocation licence on it with available data and/or a surrogate. | Determine what needs to be protected for instream flow needs, including wetland/ecosystems and how much water is allocated in each basin; what remains for allocation, seasonal issues, etc. | **GoA-AEP**, MPWA | LONG TERM |
| | Promote the water use reporting system and ensure compliance such that all temporary diversion and term licence-holders (e.g., agricultural users, irrigation, larger licences etc.) are tracking and reporting water use. | Look at current monitoring and compliance systems to ensure water allocations are appropriate through sensitive periods, compliance is 100%, including cumulative effects monitoring (to be defined) and reporting. | **AER-AEP**, Industry | LONG TERM |
| | Understand limits (carrying capacity) for tributaries and manage the cumulative effects of Water Act approvals. | Start a pilot project with smart-meter real-time monitoring in critical areas (to be defined). | **AER-AEP**, Industry, MPWA | LONG TERM |
| *Source water availability is a key consideration of current and future population growth and development.* | Integrate land and watershed planning. | Ensure a MPWA board member sits on the Upper and Lower Peace planning processes. | **MPWA**, AEP | MEDIUM TERM |
| | | Investigate designating the watershed plan as a sub-regional plan. | **AEP**, MPWA | MEDIUM TERM |
| | Forecast future growth and development of the watershed (all future needs) to inform decision-making on all source waterbodies particularly priority source tributaries under demand. | Engage consultant to model watershed (e.g., ALCES) or those tributaries believed to be under pressure. | **MPWA**, Municipalities, Industry | MEDIUM TERM |
| | Identify and support communities with critical water supply and/or treatment issues. | Create a list of communities and issues (including First Nations communities with boil water advisories). | **AAMDC**, FCM, GoA, Treaty 8 | SHORT TERM |
| | | Prioritize communities for action. | **AAMDC**, FCM, GoA, Treaty 8 | MEDIUM TERM |
| | | Outline possible actions to improve supply and/or treatment options, in particular looking at regional collaborations. | **AAMDC**, FCM, GoA, Treaty 8 | MEDIUM TERM |
| | | Conduct feasibility studies. | **AAMDC**, FCM, GoA, Treaty 8 | MEDIUM TERM |
| | | Select on option. | **AAMDC**, FCM, GoA, Treaty 8 | LONG TERM |
| | | Fund and implement through existing federal and provincial municipal infrastructure programs. | **AAMDC**, FCM, GoA, Treaty 8 | LONG TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *Consumptive use of fresh water is managed sustainably and economically.* | Empower water use managers and planners to achieve shared objectives from an agreed-to watershed management plan. | Use incentives and compliance, in the right balance. | **GoA**, Municipalities, Industry, First Nations | LONG TERM |
| | | Monitor and assess (using performance measures) the achievement of objectives. | **GoA**, Municipalities, Industry, First Nations | LONG TERM |
| | | Ensure instream flow needs are set on all waterbodies with allocations to guide decision-making . | **GoA**, Municipalities, Industry, First Nations | LONG TERM |
| | | Set and educate on a common terminology (e.g., waste, unrefined product, etc.). | **GoA**, Municipalities, Industry, First Nations | LONG TERM |
| | | Create a forum for transparent discussions about trade-offs. | MPWA, All stakeholders | LONG TERM |
| | | Promote best available technology, CEP planning, water reuse and recycling of source and wastewaters (to be defined). | **GoA**, AB Innovates | MEDIUM TERM |
| | | Understand demand and timing of demand (instantaneous and annual, and long-term) as well as long-term supply cycles and trends. | **GoA**, Academia, Municipality, Industry | LONG TERM |
| **Peace River Flow Regime** | | | | |
| *People are aware of the importance of the Peace River flow regime, what it means to basin residents and what it provides.* | Develop an education and outreach strategy to raise awareness about the importance of healthy river flow from the headwaters to the Delta (including a focus on how the mainstem flow interacts with other waterbodies such as the Lower Peace wetlands and Peace-Athabasca Delta). | Develop the strategy and associated materials. | **MPWA**, AEP, PCA, PADEMP, MRBB | MEDIUM TERM |
| | | Distribute materials at meetings around the basin, or via trade shows, newspaper articles, workshops, etc. | **MPWA**, AEP, PCA, PADEMP, MRBB | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *The current Peace River flow regime and its relationship to the aquatic ecosystem health of other waterbodies (e.g., Delta lakes, Lower Peace and Delta wetlands, groundwater, etc.) is understood.* | Collect existing technical information on the Peace River flow regime (including its interactions with associated lakes, wetlands, ponds, channels, groundwater, etc.), synthesize key learnings and identify information gaps. Note that the UNESCO strategic environmental assessment may achieve some of this for WBNP. | Assess current mainstem and other waterbody monitoring and determine if additional monitoring, mapping or modelling is required to improve our understanding of flow regime relationships, particularly between overbank flooding and integrity of wetlands in the Lower Peace and Delta. | **AEP**, EC, PCA, PADEMP, MPWA, North Peace Land and Water, DUC | SHORT TERM |
| | Organize a technical committee to identify, prioritize and fill data gaps. (Build on existing PADEMP work but extend membership outside of Delta.) | Undertake a literature review of naturalized to recorded flow comparisons. Then calculate instream flow needs (via modelling/ naturalizing recorded flows dataset). Compare to current flow regime and identify any issues. | **AEP**, MRBB | SHORT TERM |
| | | Review and update the 1980s study to evaluate the effectiveness of the weirs constructed in the Delta in the 1970s. This should inform if a) maintenance of these structures is required; b) whether these structures were/are still effective; and c) if such structures might provide management options for other areas of the Peace and Slave Watersheds. | **AEP**, ECCC, PCA, MRBB | MEDIUM TERM |
| | | Conduct a literature review, and possibly initiate a study, to assess sediment transport/siltation/water quality issues identified by basin residents. | **AEP**, ECCC, PCA, MRBB | MEDIUM TERM |
| | | Conduct a study to identify the feasibility, optimal conditions and costs of doing a release to augment flooding; as well as the costs of not doing anything. | **AEP**, ECCC, PCA, PADEMP | |
| *Cultural, social, economic and environmental issues with the current flow regime are documented, well understood and communicated to decision-makers.* | Using IK/TEK and local knowledge, compile an inventory of sites where people, Municipalities, or Industry experience issues because of river flow regime (e.g., unstable banks, timing of ice bridges, water intake placement, boating/navigation, fisheries, stranded wildlife, drying of wetlands, etc.). | Conduct a literature search and compile a summary of existing work (include TEK reports, EIA consultation processes, interest document work previously done by MRBB, Universities, etc.). | **MPWA**, Aboriginal Communities | SHORT TERM |
| | | Conduct a survey and/or do interviews with river users (ferry operators, trappers, fishers, etc.) and communities along the river; compile and provide results to AEP. | **MPWA**, river users etc. | SHORT TERM |
| *Desired Aboriginal, cultural, social, economic and ecological flow values to guide management of the Peace River and its tributaries are identified and shared by all.* | Continue to identify community flow values to guide water and land managers and decision-makers. | See initial draft Values table in Recommendations. | **MPWA**, Basin residents | SHORT TERM |
| | Share flow values with other basin initiatives. | See table of concurrent initiatives in Recommendations. | **MPWA**, other initiatives | LONG TERM |
| *Potential management options and tools to achieve optimal community flow values are investigated.* | Develop options/scenarios to best achieve optimal community flow values. | Hold a technical workshop to brainstorm and assess the feasibility of a range of potential management tools such as flow changes, weirs, wetland restoration, land management practices, etc. | AEP, ECCC, PCA | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *The management option and/or tools that optimize community shared flow values is communicated to AEP, as they negotiate and manage transboundary water agreements for the Peace, Slave and other transboundary waterbodies.* | MPWA board recommends the desired management regime to AEP's transboundary unit. | | **MPWA**, AEP | LONG TERM |
| *The LUF Upper and Lower Peace regional plans recognize the importance of, and contribute to, the health of the Peace River and its associated tributaries, wetlands and other waterbodies.* | Complete the IWMP and provide it to the LUF Regional Planning staff for consideration in the upper and lower Peace regional plans. | | **MPWA**, GoA | SHORT TERM |
| | Examine the Wetland Policy in relation to the Lower Peace and determine how policy implementation (and the policy valuation framework) will affect wetlands and wetland values within the Peace and Slave Watersheds. | Ask the Wetland Policy Implementation office to make a presentation to the MPWA board to address this question. | **MPWA**, AEP | SHORT TERM |

## Wetlands and Wetland Loss

| | | | | |
|---|---|---|---|---|
| *Baseline information supports knowledge-based decision-making and adaptive management.* | Develop good baseline information including an accessible GIS wetland inventory with both surface water delineation and sub- surface flows (i.e. groundwater connection). | Build on existing MPWA, GoA and GoC (WBNP) wetland inventories to develop complete baseline data for the Peace and Slave Watersheds (and possibly the Hay and Liard watersheds) including information on WBNP, shallow open water, current and historical distribution, type, areas of loss, and areas for restoration. Use Alberta Vegetative Inventory, Lidar, TEK, ground truthing, Industry data, etc. to improve maps. | **MPWA**, GoA-AEP, GoC-WBNP, DUC, Industry, Boreal Forest Conservation Initiative | LONG TERM |
| | Define and monitor wetland health and periodically assess the state of wetlands. | Work with the GoA-AEP, GoC-PC and AEMERA-ABMI to determine criteria, protocols, etc. and incorporate into MPWA state of reporting. | **MPWA**, GoA-AEP, AEP, ABMI | LONG TERM |
| | Set benchmarks and determine management objectives to guide future work in an iterative and adaptive process via the IWMP process. | Determine appropriate time period(s) for benchmarks (e.g., current, pre-settlement, etc.) depending on the questions that need answering. Start in higher impacted sub-basins including the Upper Peace and Smoky-Wapiti. | AEP, First Nations, AAF | SHORT TERM |
| | | Continue to explore wetland management options meaningful to stakeholders going forward perhaps by modelling future disturbance footprint (temporary and permanent loss), climate change, etc. | **MPWA**, all sectors | LONG TERM |
| | Improve our understanding of the ecology of wetlands in the watershed including the goods and services they provide recognizing these might be affected by cumulative effects and climate change. | Determine research priorities (e.g., impact of wetland loss on aquifer recharge or species at risk; carrying capacity, etc.), partners, etc. in a research strategy. Glean learnings from White Area wetland research but encourage new research to focus on the Green Area (boreal) wetlands. | MPWA, AB Innovates, academia, researchers, DUC, Industry | MEDIUM TERM |
| | | Develop a TEK study of wetland uses and importance and historical distribution. | **Tribal Councils/ MPWA**, **GoA**, GoA-Indigenous relations, AEP, GoC-PCA | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *Everyone in the watershed is knowledgeable about wetlands and their social, economic and environmental value.* | Strike an education committee to develop and implement a general wetland education and outreach plan. | Model this education and outreach plan on the University of Saskatchewan Delta Dialogue Network: an example of knowledge building and sharing and knowledge mobilization. Target municipal councils, agriculture service boards, Industry, the public, etc. (take a triage approach to determining sector priorities.) | **MPWA**, Cows and Fish, DUC, ACA, Nature AB | MEDIUM TERM |
| | | Provide input to AEP as they review and renew the Alberta Education wetland curriculum (Webbed Feet Not Required) to focus more on wetland management in a northern context. Assist AEP with curriculum delivery and promotion throughout the Peace. | MPWA, AEP Education and Outreach Group; school districts, Grande Prairie Environmental Sciences Education Society and other forest education societies | LONG TERM |
| | | Engage post-secondary and professional organizations in the Peace and Slave Watersheds in wetland education and outreach. | MPWA, NAIT Boreal Institute, etc. | MEDIUM TERM |
| | Communicate the state of wetlands and wetland trends. | Integrate wetland state of reporting into the MPWA state of reporting process. Include wetlands in MPWA state of reporting. | **MPWA**, AEP, ABMI | LONG TERM |
| | Ensure wetland education and outreach products are available. | | **MPWA**, DUC | SHORT TERM |
| *Everyone in the basin is aware of the provisions of the Water Act, Public Lands Act and the Wetland Policy and all other legislation (e.g., SARA) related to managing human activities around wetlands.* | Develop a more specific awareness campaign around the new Wetland Policy and policy implementation tools targeted specifically at sectors operating in the Peace and Slave Watersheds. | Identify priority target audiences (e.g., Municipalities, peat mining, road building, agriculture and Industry associations, etc.), key messages and appropriate communication tools (e.g., field extension, social media, etc). Resource campaign implementation with wetland offset dollars. | **GoA (AEP, AAF)**, Municipalities, Industry, professional associations, consultants, etc. | MEDIUM TERM |
| | Ensure landowners and land users operating in the watershed are knowledgeable about and comply with legislation. | Develop an education, compliance and enforcement program. | **AEP**, **AER**, **AAF**, Agriculture, Industry | MEDIUM TERM |
| | | Work with agriculture and Industry to set shared wetland objectives in an IWMP that they can achieve (carrot rather than the stick) above the regulatory backstop. Ensure there is awareness of existing and new incentive programs. | **MPWA**, Industry and Agriculture | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *Landowners and land users are incented to be good stewards and conserve wetlands.* | Promote stewardship with various user groups. | Work with off-roading/all-terrain vehicle users to promote stewardship. See Tread Lightly on the Tundra model. | **AEP**, WPACs, users, retailers, recreation groups | SHORT TERM |
| | | Work with agriculture sector to improve understanding of the economic benefits of wetlands and the ecological goods and services they provide and to implement BMPs. | **AAF**, Municipalities, GoA (Agriculture groups and AAAF fieldmen), Cows and Fish | MEDIUM TERM |
| | | Work with Industry to promote stewardship tools such as BMPs, Codes of Practice, biodiversity and conservation offsets, etc. | **GoA**, **WPACs**, Industry, see DUC BMP work | MEDIUM TERM |
| *In areas of high wetland loss or degradation, wetlands are restored.* | Understand the relationship between the Peace main stem flow regime, the health of wetlands in the PAD, and the quality of life of local inhabitants and promote the operation of flows to preserve this relationship. | Create a multi-stakeholder committee to provide its perspective and advice to the AB-BC Transboundary Negotiation teams. | **GoA**, **GoC (PCA, EC)**, MPWA, First Nations, AB-BC Transboundary Negotiating teams | MEDIUM TERM |
| | | Examine pre- (natural), post-dam and current desired flow and develop potential options/scenarios to manage the flow of the Peace for the health of people and wetlands in the PAD. | **GoA**, GoC (PCA, EC), MRBB, bilateral negotiators, etc. | MEDIUM TERM |
| | Define what is meant by "areas of high wetland loss" in the Peace-Slave basin context and map the occurrence of any such high loss areas. | From the baseline maps developed in Outcome 1, look at historical loss. Using a triage approach, define and map areas of high loss. The definition could be number of wetlands, areal cover, loss of functions, etc. It could also be different in different sub-basins, depending on the regional context. Work should be started in the sub-basins with the highest footprint (Upper Peace, Smoky Wapiti). | **DUC**, MPWA | MEDIUM TERM |
| | Partner with land trusts and other land stewards (DUC, TNC, ACA, Parks Canada, First Nations, forest Industry, etc.) to conserve wetlands. | Strengthen communication between forestry and FN (re: operational planning). | Forestry Sector, First Nations | MEDIUM TERM |
| | | Promote and support land trusts by encouraging them to operate in the Peace and Slave Watersheds and linking them to potential donors. | MPWA, MPWA partners | SHORT TERM |
| | Conduct a regional strategic environmental assessment as a tool to model scenarios/ management options to achieve outcomes. | Modelling scenarios will likely be a part of the LUF regional planning processes, and hopefully will include stakeholder input into what are culturally and environmentally significant areas and features in the Peace and Slave Watersheds. | **GoA**, ENGOs and Industry, GoC, Municipalities | MEDIUM TERM |
| | Explore a conservation offset strategy (tie carbon sequestration, biodiversity, etc.) | Explore FN collaborative involvement as stewards of offsets ( i.e. examine the option of managing lands complementary to existing tenures for conservation values where we could fund First Nations to manage lands for biodiversity and other conservation values). | **GoA**, FN, ENGOs, Industry | MEDIUM TERM |
| | Develop a runoff/non–point source strategy to mitigate the impacts on receiving waterbodies including wetlands. | Encourage the use of tools like riparian setbacks, environmental reserves and incentives as a means of managing erosion and surface water run-off (NPSP) for the protection of source water quality and to protect high value wetlands. | **MPWA**, MPWA partners, GoA | LONG TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *Exceptional wetlands that are socially, economically and/or environmentally significant are protected.* | Define what is an exceptional wetland (develop criteria) and inventory where they are including delineation and ownership. | With a group of stakeholders, research other jurisdictions to see if criteria already exist before setting Peace-Slave specific criteria. | **MPWA**, Industry, FN, Municipalities, ENGOs | SHORT TERM |
| | | Apply criteria to baseline data developed in Outcome 1 to identify and map exceptional wetlands. Alternatively, explore a nomination process approach similar to Alberta's Special Places 2000 program. | **MPWA**, GoA-AEP | MEDIUM TERM |
| | Work with governments, land trusts, landowners, etc. to protect exceptional wetlands. | Provide incentives to landowners to protect private lands around designated exceptional wetlands possibly through programs such as ALUS, tax relief, conservation easements, Growing Forward II, etc. | **DUC**, MPWA, AAF, Conservation agencies | LONG TERM |
| | | During environmental impact assessments of project proposals that have potential impacts on exceptional wetlands, assess project specific and cumulative impacts against pre-development baseline conditions. | **AER**, GoC, GoA, Industry | LONG TERM |
| **Non-Saline Groundwater** | | | | |
| *Groundwater information required for decision-making is available to all.* | Build on the existing Coal Bed Methane database to develop a single, centrally located, accessible shared groundwater database. | Form a partnership/working group. | **CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA | MEDIUM TERM |
| | | Determine what kinds of data should be included in the database (e.g., data on water use, water levels, water quality, etc.). | **CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA | MEDIUM TERM |
| | | Work with each partner agency to locate and review existing data, reports, etc. and analyze for relevance, digitize it and enter existing data (e.g. AHS well data, PFRA inventories, licensing, AGS, GOWN, municipal, etc.) into the database. (MPWA can promote this project in the north). | **CAPP**, AER, AGS, AHS, PFRA (AAFC), MPWA | MEDIUM TERM |
| | Identify data gaps on subsurface structure and groundwater inventory and develop a plan to fill gaps with new data and information. | Consider citizen science as a means of groundwater flow and well-water quality data collection (See Rocky View Well Watch program) | MPWA, AGS, AEP | MEDIUM TERM |
| | Ensure processes (e.g., licensing, water use, etc.) are designed such that new data are automatically entered into the central shared database (onus is on the applicant to enter data into the designated system that all users can access). | Improve mandatory licensee WURS reporting and make it a subset of the new proposed database. | **AEP**, AER | MEDIUM TERM |
| | | To support AEPs integrated application system, at the application stage, require information like transmissivity, etc. to populate the database. | **AEP**, AER, licensee | SHORT TERM |
| | | Undertake work to better understand household use, agricultural registrations, and water well quality for state of reporting by incorporating this information into the central database (e.g., number of private wells, typical consumption, etc.). | **AHS**, AEP, AGS, MPWA | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *The groundwater resource is better understood by the general public with time.* | Improve general public understanding of groundwater resources (amount, inventory, regulatory process); groundwater – surface water interactions; the cumulative effects of land cover/ land use on groundwater quantity and quality; and how groundwater will be affected by climate change. | Develop an education plan that identifies appropriate public audiences, messages, communications tools, etc. | **MPWA**, AEP, Inside Education | SHORT TERM |
| | | Support the GoA Working Well program as a means to reach landowners with private wells. The MPWA can promote landowner well testing; identification and proper decommissioning of abandoned wells. | **AEP/AHS**, MPWA | MEDIUM TERM |
| | | In conjunction with the next MPWA state of the watershed report, develop a groundwater atlas similar to the Edmonton-Calgary Corridor atlas showing yield, salinity, possible contaminants, etc. | **MPWA**, AEP, AGS | MEDIUM TERM |
| | | Work with Municipalities to distribute information to rate-payers. | **MPWA**, AEP, AAMDC | SHORT TERM |
| | | Support the AB Science Network and get groundwater speakers into schools and other public venues. | **MPWA**, AB Education | SHORT TERM |
| *Groundwater users, decision-makers and the public receive credible information about sector groundwater use and how allocation decisions are made.* | Share sector information about the Water Allocation System and specific sector water use (including licence requirements, return flows, wastewater treatment, etc.) with the public and other audiences via MPWA state of reporting, AEP factsheets, Industry factsheets, etc. | Promote existing sector information by linking to relevant Industry websites or resources where they exist to make licensing and other information more visible. | **MPWA**, Board member sectors | SHORT TERM |
| | | Develop fact sheets that focus on Industry groundwater use and practices including case studies of water sharing/conflict resolution, water re-use between sectors and other innovations. | **MPWA**, Board member sectors | MEDIUM TERM |
| *The Groundwater Allocation system is efficient and effective.* | Promote groundwater BMPs and Conservation, Efficiency and Productivity planning for each sector throughout the watershed. | Create a sector BMP expectation agreement or charter and promote through board member sectors. | **MPWA**, Board member sectors | MEDIUM TERM |
| | | Have each water using sector present their CEP plan to the MPWA board. | **MPWA**, Board member sectors | MEDIUM TERM |
| | Encourage improved AEP/AER communications and collaboration in order to continue building the Integrated Approvals Process for new applications that incorporates continuous improvement from policy to on-the-ground practice. | Evaluate how well new policies are applied and achieved (e.g., guide to groundwater authorizations, area based regulations, etc.). | **AEP**, AER, Industry, Municipalities | LONG TERM |
| | | Look at how well policies and regulations are achieving cumulative effects management. | **AEP**, AER, Industry, Municipalities | LONG TERM |
| | | Look at how well policies and regulations are forward-looking and able to address future areas of interest/hot-spots (e.g., Fox Creek). | **AEP**, AER, Industry, Municipalities | LONG TERM |
| *Groundwater management is integrated and adaptive such that it addresses cumulative effects and climate change and is sustainable, now and in the future.* | Improve communication processes between groundwater stakeholders. | Share groundwater learnings between sectors by making sector presentations to the MPWA board or holding a groundwater forum. | **MPWA**, AEP, AGS, Industry, academia | MEDIUM TERM |
| | Ensure collaboration between municipal and provincial governments for sustainable groundwater management. | Facilitate periodic stakeholder forums (including Peace Regional Economic Development Alliance, Water North Coalition, Agriculture Service Boards, etc.) to share issues and concerns about sustainable groundwater management. | **MPWA**, AEP | MEDIUM TERM |

| Outcomes | Strategic Directions | Actions | Partners | Timeframe |
|---|---|---|---|---|
| *A management standard for protecting aquifers is known and utilized.* | Develop a standard for aquifer management that identifies roles and responsibilities, assesses risks, provides a process for collaborative management, local stewardship and conflict resolution and implement it for aquifers and/or groundwater areas of concern (e.g., Grimshaw Gravel, Fox Creek, etc.) | Use the Grimshaw Gravel Aquifer as a test case to develop, implement and test an aquifer management plan including source protection and best management practices to be used as a template for other aquifers. | GGAA, MA, MPWA | MEDIUM TERM |
| | | Develop case studies showcasing collaborative water management in Alberta. | **AEP**, AER, Industry, AAMDC, etc. | MEDIUM TERM |
| | Be on the look out for emerging issues on individual aquifers. | Via state of reporting and writing and implementing the IWMP, document groundwater issues as they are identified and pass such information on to decision-makers. | MPWA, AEP, board member sectors | LONG TERM |

# Appendix C: List of Related Regulations, Legislation and Policies Reviewed During the IWMP Process

- Canada National Parks Act (S.C. 2000, c. 32) – Parks Canada
- Environmental Protection and Enhancement Act (R.S.A. 2000) – AEP
- Fisheries (Alberta) Act (R.S.A. 2000) – AEP
- Fisheries Act (R.S.C. 1985, c. F-14) – Department of Fisheries and Oceans
- Forests Act (R.S.A. 2000, c. F-22) – AEP
- Forest Reserves Act (R.S.A. 2000, c. F-20) – AEP
- Migratory Birds Convention Act (S.C. 1994, c. 22) – Environment and Climate Change Canada
- Municipal Government Act (R.S.A. 2000) – Alberta Municipal Affairs
- Navigation Protection Act (R.S. 1985, c. N-22, s. 1; 2012, c. 31, s. 316.) – Transport Canada
- Provincial Agricultural Operations Practices Act (RSA 2000 Chapter A-7) – Alberta Agriculture and Rural Development
- Provincial Safety Codes Act (R.S.A. 2000, c. S-1) – Alberta Municipal Affairs
- Provincial Parks Act and Wilderness Areas, Ecological Reserves, Natural Areas and Heritage Rangelands Act – Alberta Tourism, Parks and Recreation
- Provincial Wildlife Act (R.S.A. 2000, c. W-10) – AEP
- Public Lands Act (R.S.A.2000, c. P-40) – AEP
- Regional Health Authorities Act (R.S.A. 2000, c. R-10) – Alberta Health
- Soil Conservation Act (R.S.A. 2000, c. S-15) – Alberta Agriculture and Rural Development
- Species at Risk Act (S.C. 2002, c. 29) – Environment and Climate Change Canada
- Water Act (R.S.A. 2000, c. W-3) – AEP
- Willmore Wilderness Park Act (R.S.A. 2000, c. W-11) – AEP
- Athabasca Watershed Council
- Alberta Wetland Policy (2013)
- Land-use Framework (2008)
- Municipal Government Plans
- Wapiti Corridor Management Plan
- Water for Life: A Renewal (2008)
- Framework for Water Management Planning (n.d.) and Framework for Watershed Management Planning (2008)
- Water Conservation Objectives
- Wapiti River Water Management Plan
- Heart River Watershed Management Plan
- The Mackenzie River Basin Transboundary Waters Master Agreement, 1997
- Mackenzie River Basin Bilateral Water Management Agreement, 2015
- Métis Elders Knowledge Gathering Workshop
- Constitution Act (1982); Section 35

# Appendix D: Abbreviations

| | |
|---|---|
| **AAF** | Alberta Agriculture and Forestry |
| **AAAF** | Association of Alberta Agricultural Fieldmen |
| **AAFC** | Agriculture and Agri-Food Canada |
| **AAMDC** | Alberta Association of Municipal Districts and Counties |
| **ABMI** | Alberta Biodiversity Monitoring Institute |
| **ACA** | Alberta Conservation Association |
| **AEMERA** | Alberta Environmental Monitoring, Evaluation and Reporting Agency |
| **AEP** | Alberta Environment and Parks |
| **AER** | Alberta Energy Regulator |
| **AGS** | Alberta Geological Survey |
| **AHS** | Alberta Health Services |
| **AI** | Alberta Innovates |
| **ARWQI** | Alberta River Water Quality Index |
| **ASVA** | Association of Summer Villages of Alberta |
| **AUMA** | Alberta Urban Municipalities Association |
| **BMP** | Best management practice |
| **CAPP** | Canadian Association of Petroleum Producers |
| **CEP** | Conservation, efficiency and productivity |
| **DUC** | Ducks Unlimited Canada |
| **ECCC** | Environment and Climate Change Canada |
| **EIA** | Environmental impact assessment |
| **EMEND** | Ecosystem Management Emulating Natural Disturbance Project |
| **ENGO** | Environmental non-governmental organization |
| **FCM** | Federation of Canadian Municipalities |
| **FN** | First Nation |
| **GGAMAA** | Grimshaw Gravels Aquifer Management Advisory Association |
| **GoA** | Government of Alberta |
| **GoC** | Government of Canada |
| **GOWN** | Groundwater Observation Well Network |
| **IK** | Indigenous knowledge |
| **IWM** | Integrated watershed management |
| **IWMP** | Integrated Watershed Management Plan |
| **LUF** | Land-use Framework |
| **MPWA** | Mighty Peace Watershed Alliance |
| **MRBB** | Mackenzie River Basin Board |
| **NAIT** | Northern Alberta Institute of Technology |
| **NPSP** | Non–point source pollution |
| **NRBS** | Northern River Basin Studies |
| **PAD** | Peace-Athabasca Delta |
| **PADEMP** | Peace-Athabasca Delta Ecological Monitoring Program |
| **PC** | Parks Canada |
| **PCA** | Parks Canada Agency |
| **PFRA** | Prairie Farm Rehabilitation Administration |
| **SoW** | State of the Watershed |
| **TEK** | Traditional ecological knowledge |
| **TNC** | The Nature Conservancy |
| **UNESCO** | United Nations Educational, Scientific and Cultural Organization |
| **WBNP** | Wood Buffalo National Park |
| **WPAC** | Watershed Planning and Advisory Council |
| **WRRP** | Watershed Resiliency and Restoration Program |
| **WURS** | Water Use Reporting System |