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UNIVERSITY OF CALGARY

An Examination of Alberta's Wetland Management Program

by

Jennifer Marie Dubon

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
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Abstract

Wetlands play a crucial role in buffering the effects of climate change and supporting climate adaptation and resiliency. Sustainable wetland management practices require integration into the water sector to address economic, social and environmental factors, and to address urgent contemporary complex environmental problems such as climate change. Canada's boreal forest and boreal region affect the health of the environment worldwide by storing carbon, purifying air and water, and regulating the climate. This thesis examines Alberta's *Wetland Policy* (2013) design and implementation to assess the policy's potential to effectively conserve, restore, protect, and manage Alberta's wetlands in order to sustain the benefits they provide to the environment, society, and economy. Transition to a province-wide wetland policy requires a foundation that integrates water resources management—made possible by the Government of Alberta's regional land-use planning framework. An analytical framework was derived from and applied to the Alberta context (as described in Alberta government documents, supplemented by key informant experience) to examine the policy and its implementation in relation to the wise use of wetland management practices. Results indicate that Alberta tends to opt for mitigation and compensation for wetland development rather than wetland retention. There is potential for increasing the conservation of wetlands. The policy and legislative framework could support the wise use of wetlands, but there are substantial gaps in implementation. Recommendations will stress the need for functional integration across government ministries to identify ecological threshold limits and better communication with, and support for, municipalities and landowners, particularly agriculturalists.

Key Words: *wetland policy, wetland management, Ramsar, wise use of wetlands, water governance, integrated water resources management, Alberta, natural resource management, public policy, environmental planning, administrative policy, sustainable development, policy assessment, policy implementation*

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Dedication

I dedicate this thesis to my son Julian and to all the creatures who live, play or holiday in wetland habitats.

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List of Abbreviations (Glossary)

ABMI-Alberta Biodiversity Monitoring Institute
ABWRET-A - Alberta Wetland Rapid Evaluation Tool Actual
ACA-Alberta Conservation Association
ACO -Aboriginal Consultation Office
AEP-Alberta Environment and Parks
AER-Alberta Energy Regulator
AG – Alberta Agriculture
AIS-Aquatic Invasive Species
ALSA – Alberta Land Stewardship Act
AWC-Alberta Water Council
AWCS-Alberta Wetland Classification System
AWMD- Alberta Wetland Mitigation Directive
AMWI-Alberta Merged Wetland Inventory
AUMA-Alberta Urban Municipalities Association
AWP-Albert Wetland Policy
AWRD- Alberta Wetland Restoration Directive
AWT – Alberta Water Tool
Alberta NAWMP-Alberta North American Waterfowl Management Plan
BMF – Biodiversity Management Framework
CBD – Convention on Biological Diversity
CEPA – Communication, Education, Participation, Awareness
CSREM - Commitment to Sustainable Resource and Environmental Management
CP-Contracting Party
DUC-Ducks Unlimited Canada
EPEA-Environmental Protection and Enhancement Act
FMFN-Fort McKay First Nation
FMSD-Fort McKay Sustainability Department
FWMP-Framework for Water Management Planning
GA – Green Area
GOA-Government of Alberta
GWP-Global Water Partnership
HAE - Healthy Aquatic Ecosystems
IRMS - Integrated Resource Management System
IAS-Invasive Alien Species
IWRM – Integrated Water Resources Management
KI-Key Informant
LARP-Lower Athabasca Regional Plan
LUF – Land-use Framework
MA – Millennium Ecosystem Assessment
MGA – Municipal Government Act
NAWMP-North American Waterfowl Management Plan
OECD - Organisation for Economic Co-operation and Development
PAEA - Protecting Alberta's Environment Act
PWM – Participatory Water Management
PHJV – Prairie Habitat Joint Venture
RAC-Regional Advisory Council
RAMSAR-Ramsar Convention on Wetlands or Ramsar Convention Secretariat
RPs – Regional Plans
RWV -Relative Wetland Value
RWVAU-Relative Wetland Value Assessment Unit
SDG – Sustainable Development Goal
SSRB – South Saskatchewan River Basin
SSRP-South Saskatchewan Regional Plan
WA – White Area
WAIR- Wetland Assessment and Impact Report
WAIF-Wetland Assessment and Impact Form
WDRP – Wetland Database and Reporting Tool
WUR – Water Use Reporting system
WPAC – Watershed Planning and Advisory Councils
WRRP – Watershed Resiliency and Restoration Program
WSG – Watershed Stewardship Groups

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Chapter 1 Introduction

"Wetlands are among the most important ecosystems on Earth. In the great scheme of things, the swampy environment of the Carboniferous period produced and preserved many of the fossil fuels on which our society now depends."

- William J. Mitsch and James G. Gosselink

This thesis delves into what wetlands are, why they matter, and how our relationship to wetlands has shifted toward a better understanding of their functions and values within the earth system. While this work touches on the relationship between wetlands and human beings at different scales, the goal is to communicate the ways in which the Province of Alberta in Canada is advancing their relationship to wetlands through a shift toward improved water governance and informed wetland management initiatives. Most importantly, this research aims to highlight the fact that wetland ecosystems provide vital life-sustaining functions on our planet and that they ought to be managed as an important ecological resource.

1.1 Earth's kidneys and nature's supermarkets

Wetlands are found in almost every part of the globe except for Antarctica. They are part aquatic, part terrestrial landscapes, "making them different from each yet highly dependent on both" (Mitsch & Gosselink, 2015, p.28). The many types and classes of wetlands found across such a large geographical extent have made it difficult to pin down a precise definition of these ecosystems. Even though local and regional wetland definitions vary across the globe,¹ the primary factor that distinguishes wetland ecosystems is the characteristic vegetation of aquatic plants adapted to the unique hydric soil (Burton & Tiner, 2009). The most inclusive and widely accepted definition of wetlands, developed by the Ramsar Convention on Wetlands, states that wetlands:

[...] are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (Fritz, Cid, & Autrey, 2017, pg.480)

This definition is referred to in North America, but it is not necessarily applied because it includes rivers and lakes as freshwater wetlands. In the USA and Canada, wetland definitions do not include areas of lakes or streams that are greater than two metres deep unless they

¹ As a consequence of the unique legal and regulatory environments in which the wetlands occur.

support persistent emergent plants such as Cattails, Woolly bulrush, Reed Canary grass, etc. (Burton & Tiner, 2009). Simplifying the definition of wetlands to accommodate legal boundaries and land-use management is a common practice because developing a single definition for wetlands has been the subject of debate in scientific and political arenas responsible for water, land, regulatory and governance decisions (Heimlich et al., 1998).

Wetlands can be valuable for a multitude of ecological services and functions. For example, wetlands receive and process water and waste from both natural and human sources, which has often earned them a description as the “kidneys of the landscape” (Mitsch & Gosselink, 2015). Wetlands have also been referred to as “nature’s supermarkets” because of their ability to support an extensive food chain and to facilitate richness in biodiversity. It is important to mention that “not all wetlands perform all functions nor do they perform all functions equally well” (Novitski et al., 1997). This does not imply that wetlands should be ignored, but rather it suggests that wetlands be acknowledged, studied, and better understood. The following list is a general summary of the many ways in which wetlands are now known to be valuable to humanity, wildlife, and the functioning of earth’s natural systems. According to the Millennium Ecosystem Assessment (MEA 2005), wetlands are known to:

1. Temporarily store water and reduce damage from floods.
2. Recharge groundwater.
3. Provide wildlife habitats that are reservoirs of biodiversity.
4. Retain or transform nutrients, sediments, and toxic materials that enter them and, thereby, protect drinking water supplies and downstream systems from pollution.
5. Provide opportunities for fishing, hunting, and bird watching that can increase tourism.
6. Produce a large amount and variety of food and natural products for human use.

The ecosystem services that wetlands provide have not always been valued as important environmental processes. In the past, wetlands were considered a nuisance to land development. Many settlement policies encouraged the drainage and alteration of lands that were saturated with water (Mitsch & Gosselink, 2015). Although there has been a global movement toward the improved management of water resources, the degradation of freshwater ecosystems continues to occur, and this is especially true of wetland ecosystems (Weber et al., 2017; Mitsch & Gosselink, 2015; Pankratz, 2010; Rubec & Lynch-Stewart, 1998). Even after wetlands have been identified as having high intrinsic and functional values as an ecosystem, they continue to be drained and degraded for other land uses at a rate faster than any other ecosystem on earth (Ramsar Convention Secretariat, 2010f) because their economic value is simply not reflected in market pricing. As a result of this conflict between economy and environment,

More than 50% of global wetland area has been lost over the last 200 years resulting in losses of habitat and species diversity as well as decreased hydrologic and biogeochemical functionality (Van Meter & Basu, 2015).

1.1.1 Wetlands in Canada

Wetland area in Canada makes up approximately 16% of Canada's total area (Locky, 2011). Canadian land use practices are often selected for the purpose of provisional services such as food production (Dias & Belcher, 2015). Since European settlement, approximately 20 million hectares of Canadian wetlands have been lost to agricultural development alone (Pankratz 2010; Rubec & Lynch-Stewart 1998). This trend generally comes at the expense of environmental conservation and protection (Poirier & De Loë, 2011). van Vuuren and Roy (1993) found that while the social net benefits from wetland preservation exceed those from conversion to agriculture, private net benefits from conversion exceed those from preservation.

This means that individual landowners reap an economic gain from destroying wetlands on their privately-owned lands, whereas retaining them also pays, but these benefits do not accrue to the owner. This social-net benefit vs. private net-benefit problem is alive and well in the prairie provinces of Canada, "where the private net costs of wetland preservation have been shown to be a strong incentive to farmers to convert wetlands resulting in the decreased provision of wetland [ecosystem services] in agricultural landscapes" (Dias & Belcher, 2015, pg.36). There are a number of modern approaches in which agricultural landowners can shift their practices toward conservation and preservation of wetlands on their landscape, including but not limited to stewardship, holistic farming, and participation in programs that incentivize wetlands conservation and restoration. These modern approaches are designed to address the common problem of wetland loss and degradation in Alberta, Canada and around the world.

1.1.2 Wetlands in Alberta

Alberta has experienced and continues to experience heavy wetland losses due to agricultural and land development practices. Complicating matters further was the way that land management split in Alberta into the White Area (WA) and the Green Area (GA) despite recent advances toward a regional planning system (See Figure 1.1). The province houses 11% of Canada's total wetlands inventory. 93% of wetlands in the province are *peatlands* in the GA (mostly Boreal Forest), whereas the remaining wetlands are *sloughs* in the WA². Although peatlands and sloughs are both technically wetlands, they were managed separately until 2013 when the province rolled out the *Alberta Wetland Policy (2013)*, a regional wetland policy that

² WA wetlands are also part of the Prairie Pothole Region of North America that contains millions of wetlands and spans three provinces in Canada and the at five states in the USA (Millett, Johnson, & Voldseth, n.d.).

applied to all wetlands in the province. It is not clear if the regional approach will continue to require separate management areas.

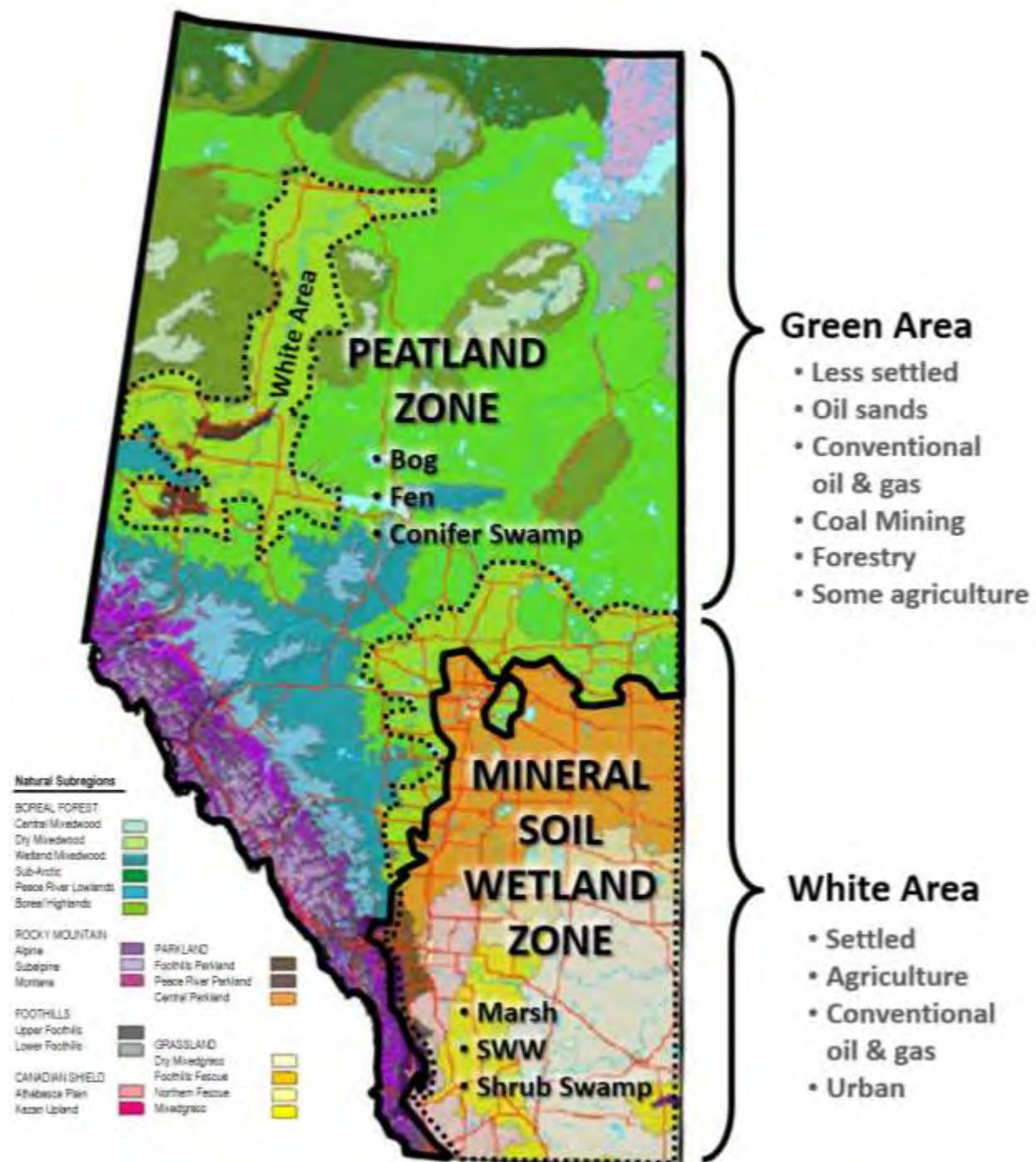


Figure 1.1 Alberta's Peatland Zone and Mineral Soil Wetland Zone delineated by bold lines and overlain the Natural Regions and Subregions. Primary wetland types are listed below each zone. The two regions generally coincide with Alberta's unsettled green area and settled white area (dotted lines) except for the two components of the Dry Mixedwood Subregion (light green), which are in the Peatland Zone. SWW is

the shallow water wetland class (Locky, 2011, pg.4). Map reproduced by permission from David Locky on April 2, 2018.

1.1.3 Wetland loss in Alberta

Wetlands are increasingly recognized and appreciated for their contribution to the health and wellness of Alberta's aquatic environment by

- Protecting water quality
- Providing water storage and infiltration
- Providing habitat for wildlife, fish and plants
- Sustaining biodiversity

Simultaneously, wetland drainage continues to make room for development and land use changes for profits. Land losses have earned Alberta a “hot spot” designation in NASA’s Land-Cover and Land-Use Change program. The MEA has also identified the western prairie provinces as “hot-spots”³ for future environmental degradation because of the combined effects of climate warming and human activity (Schindler & Donahue, 2006).

In southern Alberta, also known as the WMA, a 70% loss of wetlands is generally accepted; however, this number is based on 1970s data. In northern Alberta, the true extent of wetland losses is unknown. The rate and size of industrial activity in the region have already created the unresolved problem of tailings ponds. Efforts to protect wetlands in Alberta by means of an official policy have been slow compared to the rate of land development for other uses such as agriculture, urbanization, and resource development. The intention and subsequent actions to protect these resources have not resulted in significant acreage gains, and unpermitted drainage of wetlands remains a major issue (Clare & Creed, 2014). The issue of land development versus wetland protection is not unique to Alberta. Still, there is a sense of urgency to restore wetlands eradicated from the WMA and protect ancient boreal forest wetlands.

1.2 Wetland Management Approaches

Wetland conservation and protection are possible through policy, management plans, and various regulatory assessments that simultaneously balance the development and conservation of these freshwater resources for environmental, social, and economic reasons. The conservation and protection of wetlands is a significant water management and planning issue. The nature of water and wetland management requires an interdisciplinary approach to solving complex water quality and quantity issues that affect a diverse range of people, plants,

³ Hot spots are defined as “existent or potential change to a region or area through land cover and land use change that has regional to global implications” (NASA, 2018). These areas are measured in the context of pressing factors, such as climate change, biodiversity, human health, and sustainability

animals and environments. In this sense, qualitative and quantitative research are equally important. Despite this knowledge, wetland management is generally an afterthought, and as a result, is separate from water management planning.

The Ramsar Convention on Wetlands, an organization whose mission is the conservation and wise use of all wetlands through local and national actions and international cooperation, contributes toward global sustainable development goals by providing education, resources and strategies to achieve the *wise use of wetlands*⁴ (Ramsar, 2010). According to Ramsar and other water policy experts, wetland policy and management should be under the umbrella of water management planning. Integrated Water Resource Management (IWRM) is the most appropriate management approach that water and wetland managers should be utilizing. To conserve and protect freshwater wetland ecosystems to achieve *wise use* of the functions and resources they provide, it is of vital importance that water management efforts also integrate wetland policy and wetland management practices. Otherwise, wetlands will continue to be ignored in practice.

1.2.1 Canadian Wetland Management Approaches

The Government of Canada announced the *Federal Policy on Wetland Conservation* (FPWC) on March 9, 1992. Canada was the first government in the world to announce a wetland policy. It focuses on sustainability and purposely aligns with the *wise use of wetlands* principles developed by the Ramsar Convention. The objective of the FPWC is to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future. The Policy promotes a non-regulatory, cooperative approach. The guiding principles and supporting strategies set out the direction to manage wetlands on federal lands and support effective wetland science and public awareness actions nationally and internationally. The dominant approach in Canadian provinces has been the use of policy to achieve wetland conservation. By preparing provincial, territorial and federal wetland policies and programs, a common focus on the global themes of sustainable development and partnerships has emerged. Rubec (1994) writes that wetland and waterfowl conservation are inseparable from sustainability goals at the international, national, regional, and local levels and that the Canadian government is invested in wetland conservation.

⁴ The Convention defines *wise use of wetlands* as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" (Ramsar, 2010, pg.26)

1.2.2 Alberta Wetland Management Approaches

Water and land are managed differently in the province because the Crown owns all water, but land can be privately or publicly owned. You can imagine the problems that arise when you have an unruly ecosystem such as wetlands that neither identifies as solely land or solely water, but a little bit of both. Regardless, wetlands are governed through *Water Act* applications. Authorizations (i.e., approval, license, or notice) under the *Water Act* are required when an activity will impact a water body or when it will divert and use surface or groundwater unless the activity is exempt under the *Water Act's* Water (Ministerial) Regulation. Both Alberta Environment and Parks (AEP) and the Alberta Energy Regulator (AER) grant approvals, licences, and codes of practice through the *Water Act*. The AER has authority over energy resource activities, while AEP has authority over all other sectors. In addition to *Water Act* authorizations, two additional provincial authorizations are required when a proposed activity may have impacts on a wetland(s):

- A Public Lands Disposition or Approval/Authorization, where the activity that may impact a wetland is either located on public land or is a permanent and naturally occurring body of water under Section 3 of the Public Lands Act.
- An authorization under the *Environmental Protection and Enhancement Act* regulates the proposed activity that will impact a wetland.

In addition to provincial requirements, municipalities manage their lands under the *Municipal Government Act* (MGA). The MGA gives municipal governments control and management over watercourses and bodies of water within their municipality. The government's past efforts to manage the province's natural resources culminated in the 2011 Land-Use Framework (See Figure 1.2). The framework is a systems approach to land-use policy in the province that consists of seven strategies to improve land-use decision making. The framework incorporates the province's water, air, and climate change strategies: *Water for Life, Clean Air Strategy for Alberta, and Alberta's 2008 Climate Change Strategy*. In 2013, the province released the *Alberta Wetland Policy*. The 2013 wetland policy in Alberta captures a shift in the way we think about wetlands. Although it is a step toward an improved wetland management program, it is not clear whether the policy will conserve and protect the integrity of Alberta's wetlands' ecological functions while balancing the social and economic needs of the province as recommended by the Ramsar Convention on Wetlands.

1.3 Research Purpose

The purpose of this research is to develop a framework that articulates the critical elements required to enable the *wise use of wetlands* into effective wetland management. I will subsequently use the framework to examine the extent to which *wise use of wetlands* is implemented by the wetland policy and management program in Alberta.⁵ The development of this framework may also lead to recommendations about integrating the *wise use of wetlands* in a regional setting. To accomplish this purpose, it was necessary to integrate principles and concepts from water management, including good water governance, IWRM, and watershed management, and guidance from the Ramsar Convention on Wetlands, to develop a method for assessing wetland management. Accomplishing the purpose involved identifying what elements are essential for sustainable wetland management and conservation and adapting these elements to a regional context. To integrate aspects of water management with wetland management in a regional context, I explore the concept of *wise use of wetlands* as it relates to current water and wetland management practices in Alberta. As an international standard, the Convention recognizes the need to better integrate the *wise use of wetlands* into water management in order to provide a management framework that adequately considers environmental, social, and economic goals simultaneously. Through the *wise use of wetlands*, the conservation and protection of these freshwater resources will improve, if not fully achieved.

1.3.1 Research Question

The research question that guides this project asks: To what extent does wetland management planning in Alberta manage, conserve, and/or protect wetland ecosystems in the context of *wise use of wetlands*? This research project then aims to achieve four research objectives:

1. To determine and define what elements should be included in wetland management planning and assessment so that the *wise use of wetlands* is integrated into the management and planning process. An evaluative criteria framework will be developed (based on Alberta's context and global precedents).
2. To identify what elements have been (or have not been) incorporated into Alberta's current wetland management planning and assessment regime and assess the current level of implementation of these elements.

⁵ Wetland policy refers to a clearly published statement by the Government of Alberta that may include measurable goals, timelines and commitments plus budgets for action (Ramsar Convention Secretariat, 2010c). Wetland management refers to the process(es) that enable mechanisms to achieve a common understanding or agreement between the various managers, owners, occupiers and others whose activities link to, or are affected by the wetland. In Alberta, wetland management is conducted through permitting activities enabled through the *Water Act*.

3. To identify barriers to and opportunities for integrating and protecting wetlands through wetland management planning and to identify corresponding implementation gaps.
4. To develop recommendations to improve wetland management planning and assessment in the context of *wise use of wetlands*. Identifying specific mechanisms for implementing recommendations is beyond this research project's scope and would require further research.

1.3.2 Conceptual Framework

The following diagram represents the conceptual framework that guided this research (Figure 1.2). A conceptual framework, typically developed during the literature review, identifies the main factors and variables to be studied and the potential relationships between them (Miles & Huberman, 1984). I aim to evaluate the *wise use of wetlands* based upon wetland management planning and assessment in Alberta. Through a literature review, I identified key elements that need to be in place before wetland management planning and assessment can be effective at achieving the *wise use of wetlands*. These elements include principles of water governance that are effective, efficient, and support trust and engagement among stakeholders, focusing on achieving the *wise use of wetlands* in a regional setting. The conceptual framework shows the integration of the Organisation for Economic Co-operation and Development's (OECD) principles on water governance and Ramsar's guidance on achieving wise use:



Figure 1.2 Conceptual framework adapted from OECD principles on water governance and Ramsar wise use. The middle ring comprises the OCED principles divided into three categories defined by differing shades of blue: effectiveness, efficiency, trust and transparency. The outer ring comprises the Ramsar wise use handbook categories. I integrated the Ramsar wise use categories into the OECD water principles to visualize what an integrated water and wetland management framework could look like for a regional setting.

1.3.3 Methodology

This research project combines descriptive and evaluative design methods. The descriptive portion of the research requires discovering and describing the past and the present context in Alberta concerning wetland management planning and assessment. The evaluative portion aims to assess, based upon the description of the context, the extent to which wetland management planning and assessment successfully achieve the *wise use of wetlands*. The design portion of this research project combines the descriptive and evaluative portions to develop recommendations to improve, if necessary, adherence to the *wise use of wetlands* through wetland management planning and assessment.

1.3.3.1 Descriptive Method

The descriptive portion of the research provides the context for developing a set of evaluative criteria applicable to Alberta's regional framework. The development of an evaluative criteria framework supports the research goal. The framework's application to the Alberta context demonstrates that the framework's criteria could be adapted and applied to other regional settings. For example, provinces that may be in the nascent stages of wetland policy and management planning. The framework's development consisted of a literature review and synthesis from several different disciplines, including wetland ecology, environmental law, environmental science, environmental policy and planning, water governance, participatory management, water policy and management, wetland policy and management.

When conducting the literature review, the following search terms were used: integrated water resource management, water management, water management planning, wetland management, wetland management planning, wetland policy, *Alberta Wetland Policy*, participatory water management, natural resource management, and *wise use of wetlands*. These terms were searched on the University of Calgary's Libraries and Cultural Resources database and Google Scholar. The selection criteria for including articles in the synthesis were articles that discussed:

- Principles of water governance, or watershed management planning,
- Examples of water or wetland policy and management planning and assessment,
- Issues of water or wetland management planning and assessment,
- *Wise use of wetlands*,
- Any articles integrating those concepts.

Discussions of implementation requirements were also included because the literature review identified the need to implement plans in order to successfully achieve policy goals to conserve and protect wetland resources.

Gray literature was also included in this synthesis. This included documents from: government and non-governmental organizations' documents, including documents from the:

- Government of Canada,
- Government of Alberta,
- Environmental Law Centre,
- Organisation for Economic Co-operation and Development (OECD),
- Ramsar Convention on Wetlands.

In addition, any exemplary cases of wetland management planning and assessment, including *wise use of wetlands*, that were identified during the literature review were also used in the synthesis to develop the evaluative criteria framework.

The systemic review outlined by Koleyak (2012), summarizing Pullin & Stewart (2006), was utilized to guide the formulation of the framework. Koleyak (2012) applied Robson's (1993) method for utilizing matrices in qualitative research, which was useful in this research to sort and analyze the collected qualitative data. This method was employed in conjunction with the guidelines for research synthesis (Koleyak, 2012).

The gray document review and analysis were conducted to gather information about the Alberta context of wetland policy and management planning and assessment. These documents included background documents on Alberta's water and wetland management: planning documents from the Alberta Water Council, any related regional planning documents, and government documents that guide water and wetland management planning and assessment. These documents were identified through a publication search on the Open Alberta government website for documents relating to water, watershed and wetland management or through interviewees identifying what documents were used as guidance. All documents used are publicly available on government or non-governmental organization websites.

Data analysis methods included thematic and evaluative analysis. All interviewees were surveyed using an online survey service or sent a personalized document via email, in accordance with the University of Calgary Conjoint Ethics Board Approval. The online survey was collected and analyzed using the online service and database analysis software. From the analysis, common trends and themes were identified by reading, summarizing, and making notes in the software, then grouping the notes into a spreadsheet or word document to identify any minor or major similarities or differences, and lastly, developing a coherent set of categories (Koleyak, 2012). The follow-up emails were analyzed using a similar but more manual approach.

The data collection methods included KI interviews (Appendix 1a, 2-6) and document analysis (Appendix 1b). KI interviews were conducted because the descriptive portion of the research relied on the information and experience of experts in the field in Alberta. A combination of purposive and snowball sampling was used to identify KIs (Creswell, 2003). Purposive sampling allows researchers, using their own discretion, to identify who may have the information required by the research (Creswell, 2003; Gray, 2004). Snowball sampling enables other KIs to be identified by people in the field stating who would have the information that the researcher is requesting (Creswell, 2003; Gray, 2004). Snowball sampling can result in only talking to people who have similar opinions; therefore, the researcher must be careful to ensure

that a wide range of potential viewpoints is attained. Data saturation of KI interviews occurred once KIs provided no new information during interviews.

This research included 10 KIs from various sectors, including education, government, private, NGO, and law, in order to obtain answers for the same type of information from a variety of viewpoints (Appendix 1a). All people interviewed were professionally involved to some extent in wetland policy management planning and assessment in Alberta. Several other people were contacted for interviews but did not respond. These included private landowners, Government of Alberta employees, and other regional planners. The interviews were conducted online via surveys and two follow-up email questionnaires. This ensured consistency between interviews while simultaneously offering them the opportunity to provide commentary from their own experience. This, and the use of open-ended questions, provided unique information or opinions held by the people being interviewed (Gray, 2004).

1.3.3.2 Evaluative Method

From the common trends and themes, an evaluative rating of Alberta practices was made based on its alignment with the OECD principles of water governance and Ramsar's *wise use of wetlands*. This evaluation gives a better sense of the extent to which each evaluative element is incorporated into wetland management planning and assessment in Alberta. Based on Koleyak's (2012) approach, the documents were evaluated for each evaluative criteria element by rating each element as high, medium, low, or none. The 'high' rating indicated that the element was mentioned, defined, and a clear implementation plan for including the element was present. The 'medium' rating was given if the element was mentioned and defined, but there was no direction or guidance for implementation. The 'low' rating was given if the element was mentioned, but no definition or further elaboration was given. 'None' indicated that the element was not mentioned.

From the evaluation of the documents, common trends were identified for each evaluative criterion, in the same way in which trends were identified in the interview analysis. The trends from the document analysis and the interview analysis were then combined to determine a final ranking, as well as to provide triangulation to check the accuracy and validity of the results (Creswell 2003).

1.3.3.3 Design of Recommendations

Following these exercises, barriers and opportunities to implement the *wise use of wetlands* through water and wetland management planning and assessment in Alberta were identified to facilitate a discussion on recommendations. This design aspect is a direct approach

with barriers, opportunities, and recommendations being derived from KI responses, literature review and data analysis.

The following is a summary of the steps involved in the collection of data using a different method of data collection in each phase. Interpretive policy analysis seeks to understand the values, beliefs and feelings of the various audiences who are directly affected by a policy. Data were collected as follows:

1. A review and analysis of existing literature. The literature review identified the key features of wetland conservation, reviewed policies and legislation used in other jurisdictions and identified key components of wetland policy according to Ramsar's wise use principles.
2. An online questionnaire of KIs from lead organizations involved in wetland management and/or conservation. The survey collected views and opinions about the past, present and future of wetland policy in the province. It identified strengths, weaknesses and potential gaps in the existing policy and assessed the potential of the policy to restore prairie sloughs and conserve boreal peatlands.
3. Two follow-up emails to KIs to obtain supplemental information on the views and opinions expressed in the online survey and to get their response to my subsequent findings.

1.4 Relevance to Alberta Wetlands

Persistent high levels of industrial development and resource extraction activity have increased concerns over the social, economic, and environmental impacts on wetlands, with implications for water supply management (Foote, 2012). Environmental regulations and laws designed to protect both the public and the environment are often cumbersome;⁶ lag the diffusion of technology;⁷ or be over-ridden by political pressure to allow industrial development.⁸ While it is clear that industrial development and resource extraction can adversely affect aquatic environments, freshwater resources like wetlands in Alberta are most at risk from agricultural activities on private lands and industrial development activities on federal and crown lands. Wetlands continue to be altered despite federal and provincial legislation designed to offer protection and conservation guidance, and partnerships with the *North American Waterfowl*

⁶ Environmental Impact Assessments are costly and may take years to complete.

⁷ For instance, in-situ oil recovery has made it possible for previously unrecoverable oil sands reserves to increase availability of bitumen. Meanwhile, the size and number of tailings ponds created by oil sands mining are increasing with no foreseeable means of reclamation or remediation.

⁸ Abandoned wells on private lands – original operators were not forced to leave a remediation deposit and have since been abandoned, leaving the cleanup costs to taxpayers.

Management Plan (NAWMP) and the *Prairie Habitat Joint Venture* (PHJV) have supported conservation and protection efforts for a number of decades.

The *Alberta Wetland Policy* (2013) aims to achieve province-wide uniformity in the way wetlands are managed, but it is not clear whether the policy and its regulatory tools will be able to protect remaining wetlands in the province and restore degraded wetlands back into functional wetland ecosystems. The need to manage this uncertainty is also required considering current and future water concerns. By integrating the OECD's principles of water governance, the *wise use of wetlands* concept, and internationally recognized sustainable wetland management practices, the potential to achieve social, economic, and environmental sustainability with respect to water and wetland management may increase. But the lack of integration between how wetland management is integrated into water management in Alberta is currently missing from the discussion on wetland conservation and protection in Alberta. The *wise use of wetlands* is a useful principle to analyze wetland management as a component of water management. Moreover, wetland ecosystems are among the most degraded freshwater ecosystems yet continue to provide some of the most important ecological functions to humans and wildlife. It is only a matter of time until the limit of these ecosystems is reached. We must do the work to find out what these limits are before we reach a tipping point.

Alberta provides a useful location to assess the *wise use of wetlands* since the regional policy was officially introduced in 2013 as the province's major policy on wetland management. Alberta's water policies, legislation, and regulatory tools indicate the government's commitment to protecting the aquatic habitat; however, illegal drainage, unpermitted activities, and wetland degradation continue in the province. Therefore, it is useful to evaluate the *wise use of wetlands* in Alberta's wetland management planning and assessment program to identify how water and wetland management planning could improve to conserve, protect, and restore wetlands and their functions.

Living entities require fresh water to survive. The value of wetland ecosystems on the landscape needs to be properly acknowledged and accounted for. This is recognized by the *Alberta Wetland Policy* (2013). Wetland drainage and degradation will only worsen with the current model of the global economy based on economic growth and ever-increasing human consumption. In Alberta, we have a real opportunity to educate landowners and the public about this ecologically valuable natural resource and invest in wetland biodiversity research and expand restoration and conservation efforts.

Chapter 2 What are Wetlands and Why Do They Matter?

2.0 Introduction

Wetlands are a unique and diverse type of landscape made up of part aquatic and part terrestrial environments. The blending of terrestrial and aquatic landscapes makes wetlands different from yet highly dependent on land and water environments (Mitsch & Gosselink, 2015, pg.28). Wetlands are also dynamic systems that influence and are influenced by a complex range of environmental variables and undergo cycles of wetting and drying over a range of temporal and spatial scales (Department of Environment and Science, 2015). Extensive research about wetlands has shown that their natural hydrological and biogeochemical processes provide many ecosystem services to the environment and directly benefit humanity (Amani et al., 2019). Historically it has been challenging to classify wetlands into meaningful, discrete types; however, the classification of wetlands into relevant types or groups that are more like each other than others are necessary and useful for their management, monitoring and regulation. This chapter will explore what wetlands are, the ecosystem services they provide, and what threatens their existence. Each section begins with a global perspective, followed by a Canadian perspective, and concludes by setting up Alberta's ecological wetland context. Within each section, you will discover what wetlands are and why they matter.

2.1 What are wetlands? A global perspective

Wetlands are complex ecosystems adapted to their unique environment. Part terrestrial and part aquatic wetlands have a significant range of hydrologic conditions and are found in every part of the world except Antarctica (Mitsch and Gosselink, 2015). The primary factor that distinguishes wetland ecosystems from other ecosystems is the characteristic vegetation of aquatic plants adapted to the unique hydric soil (Burton & Tiner, 2009). The vague description is a direct result of the wide variation among wetland classes and types. In other words, wetlands are difficult to fit into clear categories because they are dynamic ecosystems; some wetlands even vary seasonally. But it is necessary to define and classify wetlands despite how difficult it may be, so that they can be managed according to the legal and regulatory context, and prevailing management practices. Table 2.1 exemplifies diversity among wetland definitions at different scales and levels of organization. It also exemplifies different approaches to classification systems. For example, at the international level, the Ramsar convention defines wetlands in the most inclusive manner and applies a holistic classification system that includes all known wetland types found in the world. At the national level, the USA works with two definitions: the US Environmental Protection Agency (EPA) includes a temporal description,

whereas the US Fish and Wildlife Service (FWS) focuses on water quantity. The FWS applies the *Cowardin Classification System* to classify wetlands based on their landscape position, vegetation cover and hydrologic regime resulting in five major wetland types: Riverine, Lacustrine, Palustrine, Marine and Estuarine (Tidal). At the regional level, Alberta exemplifies a definition that is suited to a localized context because it offers a more precise description than what is offered at the national level in Canada. The province's classification system is specifically designed to classify wetlands in the province of Alberta by incorporating and merging information from existing wetland classification systems including the *Canadian Wetland Classification System*, *Stewart and Kantrud System*, *Cowardin Wetland Classification System*, and ecosite guides for the province (see section 2.3 for more details).

As outlined in Table 2.1, the Ramsar Convention on Wetlands developed a universal wetland definition. The definition is broad on purpose to capture all types of wetlands that exist on the global landscape. Once a wetland definition is officially adopted, wetland classification delves into wetland types. Classification systems vary depending on the location and political and economic context of the surrounding environment. Ramsar was the first organization to attempt an internationally accepted wetland classification scheme, a major undertaking since there is a history of disagreement about what even constitutes a wetland. We can ultimately gather from this that wetlands are complex ecosystems that require management at different scales and for different reasons. Uncoordinated, incoherent, or unaccountable multi-level processes can threaten the sustainable management of wetlands.

Source	Wetlands are:	Classification system
Ramsar Convention on Wetlands	Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.	42 types, grouped into three categories: Marine and Coastal; Inland; and Human-made (Table 2.2)
Environmental Protection Agency (EPA)	Areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.	References US Fish and Wildlife Service
Fish and Wildlife Service	Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or land is covered by shallow water	Cowardin system: landscape position, vegetation cover, hydrologic regime (Table 2.3)
Government of Canada	Submerged or permeated by water permanently or temporarily and are characterized by plants adapted to saturated soil conditions.	Canadian Wetland Classification System (CWCS) (Warner & Rubec, 1997) (Section 2.2)
Government of Alberta	Land saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic (water tolerant) vegetation, and various kinds of biological activity that are adapted to a wet environment.	CWCS; Stewart and Kantrud Cowardin system (ESRD, 2015) Table 2.3

Table 2.1 Wetland Definitions: Global to Regional Examples

Ramsar Typology of Wetlands by Finlayson (2018)		
Category	Code	Wetland type
Marine/ coastal	A	Permanent shallow marine waters in most cases less than 6 m deep at low tide; includes sea bays and straits
	B	Marine subtidal aquatic beds; includes kelp beds, seagrass beds, tropical marine meadows
	C	Coral reefs
	D	Rocky marine shores; includes rocky offshore islands, sea cliffs
	E	Sand, shingle, or pebble shores; includes sand bars, spits, and sandy islets; includes dune systems and humid dune slacks
	F	Estuarine waters; permanent water of estuaries and estuarine systems of deltas. Intertidal mud, sand, or salt flats
	G	Intertidal marshes; includes salt marshes, salt meadows, salttings, raised salt marshes; includes tidal brackish and freshwater
	H	Intertidal forested wetlands; includes mangrove swamps, nipah swamps, and tidal freshwater swamp forests
	I	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	J	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	K	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	Zk(a)	Karst and other subterranean hydrological systems, marine/coastal
Inland	L	Permanent inland deltas
	M	Permanent rivers/streams/creeks; includes waterfalls
	N	Seasonal/intermittent/irregular rivers/streams/creeks
	O	Permanent freshwater lakes (over 8 ha); includes large oxbow lakes
	P	Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes
	Q	Permanent saline/brackish/alkaline lakes
	R	Seasonal/intermittent saline/brackish/alkaline lakes and flats
	Sp	Permanent saline/brackish/alkaline marshes/pools
	Ss	Seasonal/intermittent saline/brackish/alkaline marshes/pools
	Tp	Permanent freshwater marshes/pools; ponds (below 8 ha), marshes, and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season
	Ts	Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes
	U	Non-forested peatlands; includes shrub or open bogs, swamps, fens
	Va	Alpine wetlands; includes alpine meadows, temporary waters from snowmelt
	Vt	Tundra wetlands; includes tundra pools, temporary waters from snowmelt
	W	Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils
	Xf	Freshwater, tree-dominated wetlands; includes freshwater swamp and seasonally flooded forests, wooded swamps on inorganic
	Xp	Forested peatlands; peatswamp forests
	Y	Freshwater springs; oases
	Zg	Geothermal wetlands
	Zk(b)	Karst and other subterranean hydrological systems, inland
Human-made	1	Aquaculture (e.g., fish/shrimp) ponds
	2	Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha)
	3	Irrigated land; includes irrigation channels and rice fields
	4	Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture)
	5	Salt exploitation sites; salt pans, salines, etc.
	6	Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha)
	7	Excavations; gravel/brick/clay pits; borrow pits, mining pools
	8	Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
	9	Canals and drainage channels, ditches
	Zk(c)	Karst and other subterranean hydrological systems, human-made

Table 2.2 Ramsar Wetland Classification System (Finlayson, 2018)

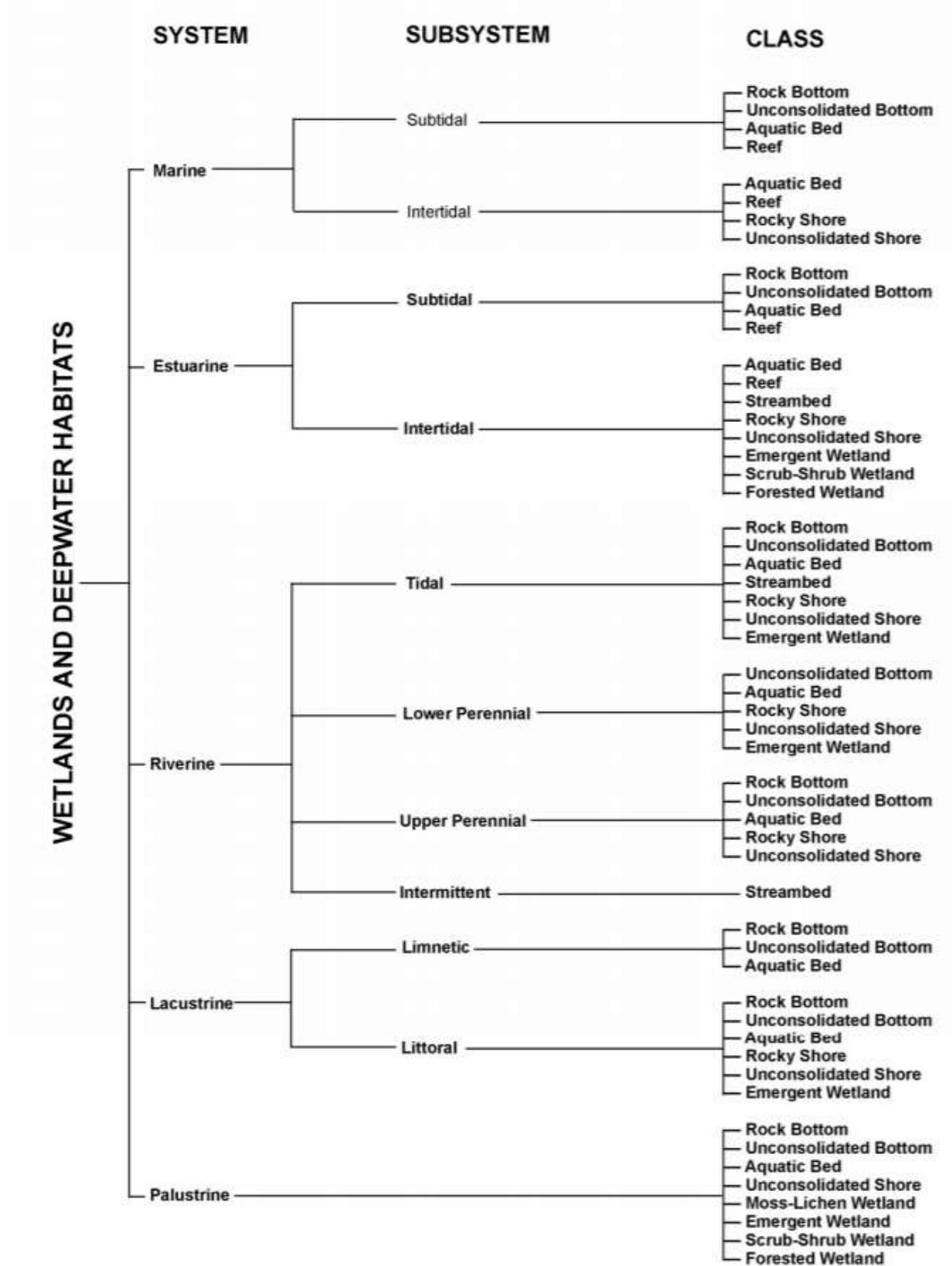


Table 2.3 Wetlands and deep-water habitats classification hierarchy in the USA (Cowardin et al., 1979)

2.2 Canadian Perspective

Canada's land mass is categorized into 15 ecological zones (Figure 2.1), 53 ecoprovinces and 194 ecoregions. An ecozone is an area of Earth's surface representing large, generalized ecological units. Each ecozone is characterized by its unique interaction between geologic, climatic, vegetative, wildlife and human activity factors. Ecozones, ecoprovinces and ecoregions are useful units for reporting and planning purposes at, respectively, the national, provincial and regional levels. Ecozones are the broadest classification type for forests.

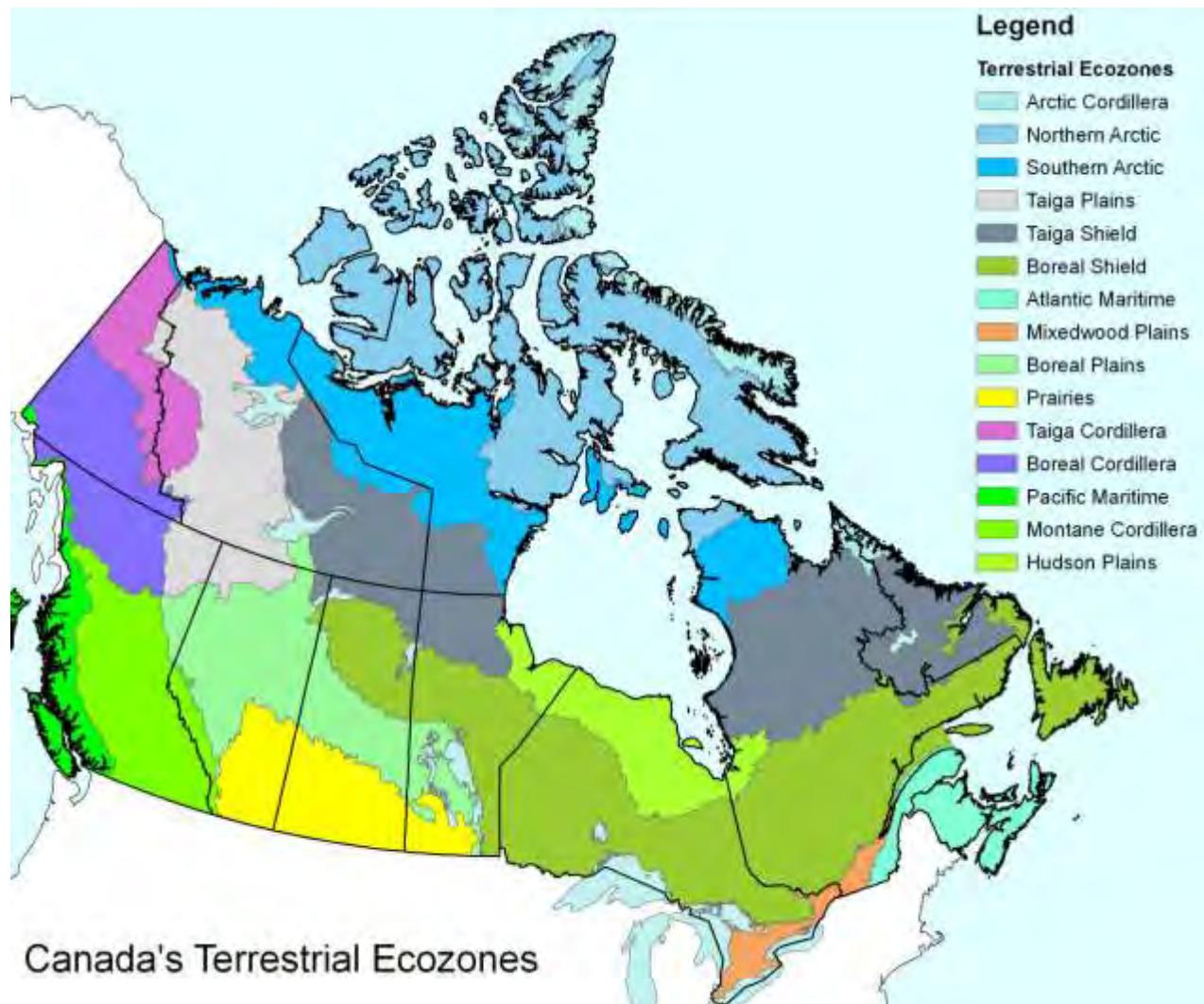


Figure 2.1 Canada's Terrestrial Ecozones (Wiken, 1986)

The *National Forest Inventory*, a collaborative project between the federal, provincial and territorial governments, details information for Canada's terrestrial forested ecozones. The information provides the basis for reporting on the extent, state and sustainable development of Canada's forests. The inventory classifies Canada's forests by ecozone, forest region, forest composition, and plant hardiness zone. Together these classifications give forest managers a

science-based foundation for making decisions at the national, provincial/territorial and regional levels.^{9,10} Forest classification and forest management practices can be useful for managing boreal wetlands.



Figure 2.2 Canada's Forest Regions. A forest region is a geographic zone, or belt, whose vegetation cover is characterized by a fairly uniform dominant species and stand type (Nature Conservancy of Canada, 2020). Alberta forest regions are mainly boreal forest and the non-forest grassland region.

Canada's boreal forests are linked to boreal wetlands in many ways including surface and sub-surface water flow. Functioning wetlands are important for maintaining healthy forests and sustainable forest management is important for maintaining functioning wetlands (Forest Management and Wetland Stewardship Initiative, 2019).

⁹ The boreal forest is culturally significant to Canada's Indigenous communities. 70% of Aboriginal communities are located in forested regions.

¹⁰ The boreal zone is often referred to as circumpolar because it circles the Northern Hemisphere and there are other countries with forests and land in the boreal zone including the United States, Norway, Sweden, Russia, and China (Government of Canada, 2020a).

Canada is home to approximately 25% of the world's wetlands, or 1.29 million km² of wetland cover according to the Government of Canada (1991). Wetland cover is distributed disproportionately across the country, with most wetlands occurring in the Boreal Shield, Boreal Plains, and Hudson Plains (Figure 2.3). A different map shows wetlands in Canada by EcoDistrict¹¹ (Figure 2.4). Both maps identify the highest concentration of wetlands in the boreal forest region. Ducks Unlimited developed a remote sensing-based *Boreal Plains Wetland Classification System* "to outline an approach that incorporates information at various observation levels (ground, aerial, and satellite) into a comprehensive [system] that can be used for field identification as well as for mapping purposes" and "to overcome the many challenges to mapping boreal wetland systems (e.g. extent, abundance, diversity of forms, complexity, and logistics)" (Smith et al., 2007). The boreal-specific wetland classification system speaks to the specific management needs of boreal wetlands compared to prairie wetlands.

The Canadian Wetland Classification System (CWCS) has four levels, each level defined by various ecological, environmental, morphological, physiognomic or floristic features (National Wetlands Working Group, 1997). Level 1 consists of five major wetland classes: bog, fen, marsh, swamp and shallow open water. Level 2 subdivides wetland classes into wetland forms based on slope and/or basin morphology, topographic position and surface patterns. Level 3 is based on the broad physiognomy of vegetation. Such units as treed fens, forested bog islands, dry bog hummocks and flats, and wet bog hollows are physiognomic types that comprise the wetland form. Level 4 is the lowest level of the wetland classification and recognizes the needs of particular disciplines.

Ducks Unlimited Canada (DUC) found that "[u]nlike most developed nations, Canada does not have a comprehensive wetland inventory for the entire country" (2018). Thus, organizations like DUC, the North American Wetlands Conservation Council (NAWCC) in Canada, Wildlife Habitat Canada, the North American Waterfowl Management Plan (NAWMP), and many others are working together to bridge the gap. Currently, DUC, NAWC, Environment Canada, and the Canadian Space Agency are working together to complete a Canadian wetland inventory. The remaining inventory is planned to be completed once funding is secured.

¹¹ Ecoregions, of which there are 194 in Canada, a further subdivided into Ecodistricts. EcoDistricts are "characterized by relatively homogeneous biophysical and climatic conditions" and are differentiated by "regional landform, local surface form, permafrost distribution, soil development, textural group, vegetation cover/land use classes, range of annual precipitation, and mean temperature" (EcoRegions Working Group, 1989). See Wetlands by Ecodistrict Figure 2.4.

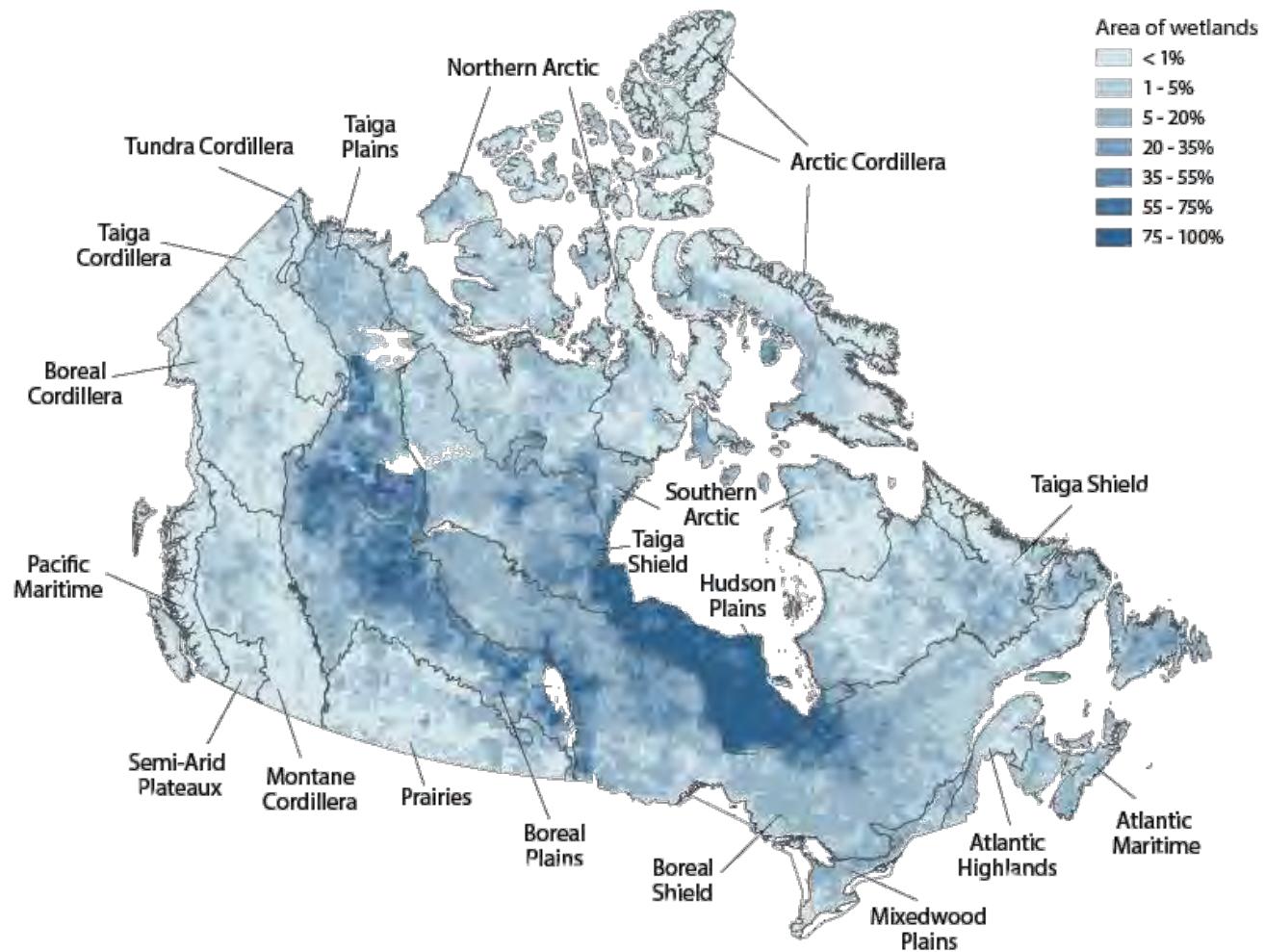


Figure 2.3 Proportion of Wetlands Across Canada Wetlands Across Canada (Canadian Wildlife Service, 1996).

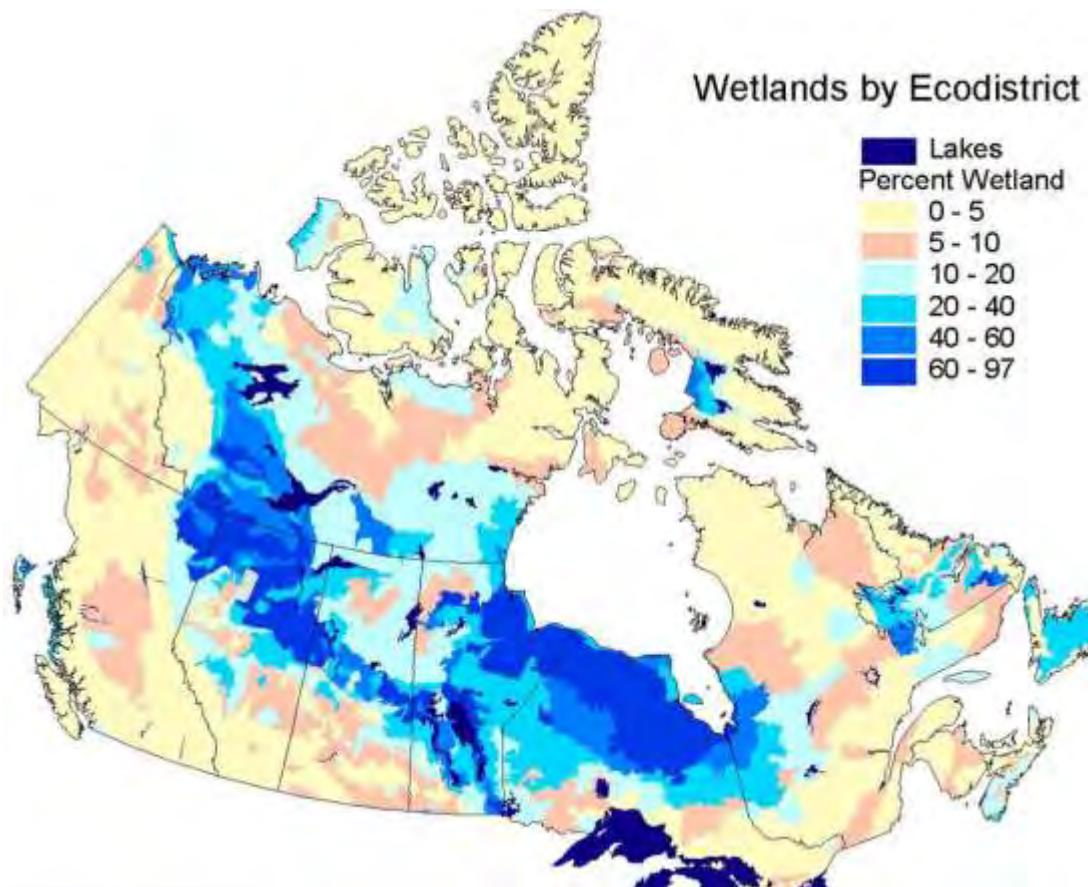


Figure 2.4 Canadian Distribution of Wetlands by EcoDistrict (National Wetland Dataset, Environment Canada)

2.3 Wetlands in Alberta

Alberta's land mass contains six of the 15 ecozones in Canada: Boreal Plain, Boreal Shield, Montane Cordillera, Prairie, Taiga Plains, and Taiga Shield (Figure 2.5). The largest ecozones in Alberta are the Prairie and Boreal Plains ecozones. Wetlands in Alberta were formed following the last Ice Age. As a result of "varying physiographic and climatological conditions across the province, these wetlands are characterized by a diverse array of form and function" (where form?). The diversity of wetlands in the province requires specialized skills in order to properly identify, delineate and classify them. In the past, wetland management in the province applied different approaches in the Green Area for boreal peatlands than in the White Area for sloughs and marshes. Specifically, the White Area had an interim wetland policy, whereas the Green Area relied on "[a] cautious approach to the use and development of peat resources" (Alberta Water Resources Commission, 1993).

Wetland classification in Alberta has previously relied on at least four different classification systems. The *Canadian Wetland Classification System* (National Wetlands

Working Group, 1997) has been used extensively in the central and northern parts of the province, where peatlands are more prevalent (ESRD, 2015). The *Stewart and Kantrud System* has been widely used in southern Alberta to classify prairie pothole wetlands (ESRD, 2015). The *Cowardin Wetland Classification System* and eco site guides for Alberta have also been applied to classify wetlands for varying purposes in Alberta (ESRD, 2015). Currently, the GoA developed its own classification system specifically designed to apply to all wetlands in the province and “incorporates and merges information from existing wetland classification systems” (Alberta, 2014). The intent of the *Alberta Wetland Classification System* [AWCS] (See Table 2.3) is to standardize wetland classification in the province, i.e., move away from the White and Green Area approaches, specifically it is designed to: Provide a consistent system for classifying wetlands across the entire province; Promote a consistent understanding of wetlands; Apply classification keys that relate to provincial wetland characteristics associated with hydrologic, biogeochemical and biotic processes; Be compatible with existing wetland classification systems and inventories; Be aligned with legislation and policies that may affect wetlands, such as the Water Act, Public Lands Act and Alberta Wetland Policy; and, Can be applied to Canadian geographic information system (GIS) databases and inventories.

The move toward a standardized classification supports the GoA’s direction of establishing a regional wetland policy. However, when it comes to managing wetlands at an operational level, effective wetland management in Alberta may require additional information. Particularly, wetland management in Alberta is in a state of transition from the 1993 interim policy to the Alberta Wetland Policy (2013), so it remains unclear whether or not the current classification system is sufficient in helping to achieve the policy goal “to conserve, restore, protect and manage Alberta's wetlands to sustain the benefits they provide to the environment, society and economy” (Government of Alberta, 2013a). The intent to standardize wetland management requires the knowledge that classification is a dynamic field so scientists and taxonomists may be required to reassess classifications (Science Learning Hub – Pokapū Akoranga Pūtaiao, 2009). If wetland management in Alberta intends to conserve, restore, and protect, rather than just manage wetlands, decision-making could be supported by integrating an ecological infrastructure¹² approach such as the one developed for the Calgary Regional Partnership. Tyler et al. (2008) write,

Regional growth management must protect the spatial or landscape connectivity of critical ecological infrastructure in order to maintain the resilience of ecological processes and

¹² Ecological infrastructure is the system of structural and functional terrestrial and aquatic landscape features, interrelationships and processes that produce ecological goods and services (such as clean water and habitat) at a regional scale (Tyler et al., 2008).

the flow of ecological goods and services in the face of increasing population growth and land use intensification.

Thus, the regional wetland management policy and tools must incorporate ecological processes at some point in the wetlands management decision-making stream if it truly intends to keep wetlands on the landscape.

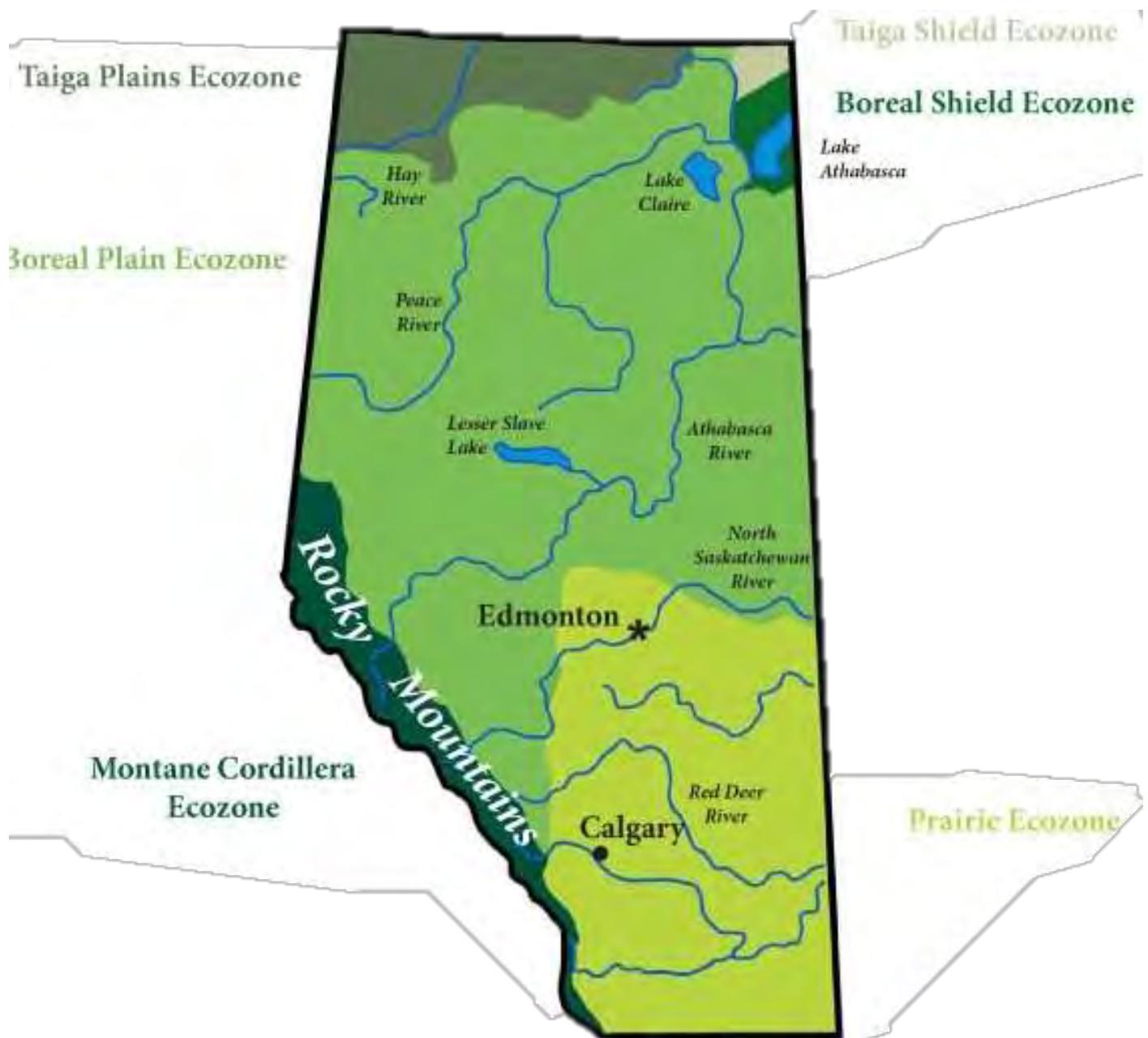


Figure 2.5 Alberta Ecozones (Amsel, 2005) shows size of Boreal Plain Ecozone and Prairie Ecozone in the province of Alberta

CLASS	FORM	Types		
		Salinity	Water permanence ¹	Acidity-alkalinity
Bog [B]	Wooded, coniferous [Wc] Shrubby [S] Graminoid [G]	Freshwater [f]	--	Acidic [a]
Fen [F]	Wooded, coniferous [Wc] Shrubby [S] Graminoid [G]	Freshwater [f]	--	Poor [p]
		Freshwater [f]	--	Moderate-rich [mr]
		Freshwater [f] to slightly brackish [sb]	--	Extreme-rich [er]
Marsh [M]	Graminoid [G]	Freshwater [f] to slightly brackish [sb]	Temporary [II]	--
		Freshwater [f] to moderately brackish [mb]	Seasonal [III]	--
		Freshwater [f] to brackish [b]	Semi-permanent [IV]	--
Shallow Open Water [W]	Submersed and/or floating aquatic vegetation [A] or bare [B]	Freshwater [f] to moderately brackish [mb]	Seasonal [III]	--
		Freshwater [f] to sub-saline [ss]	Semi-permanent [IV]	--
		Slightly brackish [sb] to sub-saline [ss]	Permanent [V]	--
	[A]	Saline [s]	Intermittent [VI]	--
Swamp [S]	Wooded, coniferous [Wc] Wooded, mixedwood [Wm] Wooded, deciduous [Wd] Shrubby [S]	Freshwater [f] to slightly brackish [sb] ²	Temporary [II] ²	--
		freshwater (f) to slightly brackish [sb] ²	Seasonal [III] ²	--
		moderately brackish [mb] to sub-saline [ss] ²	Seasonal [III] ²	--

Table 2.4 Wetland Classification System in Alberta (ESRD, 2015)

2.4 Wetlands are Key Life Support Systems

There is a growing sense of urgency about the importance of wetlands to both human and ecosystem well-being (Durigon et al., 2012, Foote, 2012; Horwitz & Finlayson, 2011; Millennium Ecosystem Assessment, 2005; Mitsch & Gosselink, 2015; Peimer et al., 2017). Wetlands provide many ecosystem services to the environment, including water purification, protection from natural hazards, soil and water conservation, and shoreline protection (Bortolotti et al., 2016; Gustavson & Kennedy, 2010; van Vuuren & Roy, 1993). These benefits result from the natural hydrological and biogeochemical processes occurring within wetlands (Bortolotti et al., 2016). Wetlands are capable of significant water storage and can serve as a form of natural

flood control. Wetlands can transform and retain several environmental toxins (Amani et al., 2019). Wetlands also support biodiversity levels at rates disproportionate to their area by providing a habitat for numerous species of plants and animals (Cherry, 2011). Despite the many benefits to biodiversity provided by wetlands and the disproportionate number of ecosystem services they provide, these ecosystems are continually at risk because their ecological value does not translate into economic benefits immediately or at all. Land use changes and other anthropogenic disturbances are a global driver of wetland loss.

2.5 Wetlands and Millennium Ecosystem Assessment (MA)

The 2005 MA meets the need for information about the consequences of ecosystem change for human well-being. Its purpose was to strengthen the link between scientific knowledge and decision-making by providing both a review and assessment of our ecosystems' current state and the many services they support and provide to people. The MA has allowed us to enhance our understanding of the direct drivers of change to wetlands. Moreover, it provides a series of scenarios and analyses of future challenges and response options that could help us maintain the wetland ecosystem services on which we all depend.

2.5.1 Ecosystem Services Provided by Wetlands

The MA report *Ecosystems and Human Well-Being: Wetlands and Water* (MA, 2005) summarizes the wide range of ecosystem services delivered by wetlands, including biodiversity, water supply, water purification, climate regulation, flood regulation, coastal protection, fibres, cultural (spiritual and inspirational), and tourism. The report also explains that wetlands play a key role in economic activity linked to transportation, food production, water risk management, pollution control, fishing and hunting, leisure and the provision of ecological infrastructure. The synthesis summarizes the ecosystem services provided by wetlands, organizes them into categories and provides examples of each.

Provisioning	Regulating
Food Freshwater Fiber and fuel Biochemical Genetic materials	Climate regulation Water regulation (hydrological flows) Water purification and waste treatment Erosion regulation Natural hazard regulation Pollination
Cultural	Supporting
Spiritual and inspirational Recreational Aesthetic Educational	Soil formation Nutrient cycling

Table 2.5 Ecosystem services provided by or derived from wetlands. Adapted from MA 2005.

2.5.2 Threats to wetland ecosystems and functions

At the global scale, the MA (2005) found that inland and coastal wetland ecosystems were being lost at a rate faster than that of any other ecosystem. The primary indirect drivers of wetland degradation and loss are population growth and change in economic activity. The primary direct drivers of degradation and loss are infrastructure development, land conversion, water use, eutrophication and pollution, overharvesting, overexploitation of wetland resources, climate change and invasive alien species.

2.6 Conclusion

In this section, I described what wetlands are and why they matter within the context of this research paper. There are important resources that detail these topics, including Locky, 2011; Mitsch & Gosselink, 2015; Mitsch et al., 2013. This chapter aimed to provide the environmental context within which government and other organizations make decisions about wetlands. The next section discusses the relationship between water and wetlands regarding their management and how other countries with similar economies to Canada manage wetlands within their boundaries.

Chapter 3 Precedents in Wetland Management and Policy

3.0 Introduction

The need for innovative approaches in the sustainable management of water resources parallels the growing recognition of the multiple values and functions of wetland ecosystems (Amezaga & Santamaría, 2000; Güл et al., 2017). Sustainable development has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). To achieve sustainable development, it is crucial to harmonize three core elements: economic growth, social inclusion, and environmental protection. The United Nations Sustainable Development Goals (SDGs) provide targets for significantly improving the three core elements by 2030 (United Nations, 2015). The focus of SDG 6 is *Clean Water and Sanitation*. The targets for achieving SDG 6 include improving access to safe drinking water, improving water quality, increasing water-use efficiency, capacity-building and involving local communities in water management issues. The most applicable target for this research is target 6.6 that aims to “protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes” by 2020. Although the target date is over now over, there are many projects in place for meeting the goal. For example, more than 850 river flow restoration projects are now underway in at least 50 different countries (The Nature Conservancy, 2005), and water supply planners in the US are proactively addressing the water needs of aquatic ecosystems by reserving environmental flows for ecosystems such as wetlands to prevent ecological damage (Richter et al., 2006).

In Alberta, the link between wetlands and water quality and quantity is not a prominent feature of the *2013 Wetland Policy*. Still, the concept is acknowledged as an important part of the *Water for Life* strategy. As wetland science improves, so will our understanding of how to better manage these freshwater ecosystems in Alberta. Eventually, however, water management and the management of wetlands must account for wetland ecosystem needs. In the following paragraphs, I will touch on water management in the context of wetland management, and I will summarize concepts and approaches important to wetland management and policy in today’s sustainable development era.

3.1 Water and Wetlands

Wetlands are an essential component of sustainable water management because wetland ecosystems are adapted to the prevailing hydrological regime; however, wetlands are often perceived as competing water users rather than an essential component of sustainable

water management. For example, it is known that an improved understanding of the distribution of hydrological regimes in inland valley wetlands of tropical environments can improve water management planning for agriculture, but there remains an inadequate level of knowledge on the distribution of soil moisture and shallow groundwater (Gabiri et al., 2018). Natural hydrological processes are complex and variable. They are influenced by physical factors summarized as climate and subsurface conditions (Zhang et al., 2016). Hydrological regimes¹³ or the history of flow patterns organize and define river ecosystems by influencing ecosystem processes, groundwater and surface water interactions, sediment regime, nutrient delivery, water quality and ecological status (D'Ambrosio et al., 2017; Poff et al., 1997). Hydrological processes become even more complex with the added dimension of human demand for freshwater use for domestic, agricultural, fisheries, industries, and hydroelectric power (Alberti, 2008); however, natural and anthropogenic hydrological processes can be considered a factor in maintaining hydrological regimes for the protection of environmental values (Environmental Protection Authority, 2018). Considering the complex and variable dimensions of natural hydrological processes plus the added dimension of human demand for water, the sustainable use of wetlands and water resources requires management approaches that incorporate the complex spatial and temporal interconnections among different aquatic ecosystems (Amezaga & Santamaría, 2000; Mersha et al., 2018; Zhang et al., 2016). The result is an urgent need to improve water governance.

3.2 Water Governance

The Organisation for Economic Co-operation and Development (OECD) found that the water crises in OECD countries are primarily a governance crisis (OECD, 2012). Serious water shortages in countries such as the USA (Curmi et al., 2013), South Africa (Mena Report, 2016), and India (Chintalapudi et al., 2017) are evidence that water scarcity can happen in developed or developing nations. The United Nations World Water Development Report forecasts a 40% shortage of drinking water in the world by 2030 (Manju & Sagar, 2017). In Canada, the Western Prairie Provinces are at risk of water shortages if water resources continue to be mismanaged and climate change ignored (Schindler & Donahue, 2006). Responses to water governance crises and the resulting water shortages must be adapted to the local environment and considered in their own context (OECD, 2012). Thus, a “one-size fits all” approach to water

¹³ Hydrological regimes are the variations in the state and characteristics of water bodies which are regularly repeated in time and space (REFORM, 2010).

governance will simply not work due to vast differences in things such as location, culture, government structure, and environment.

3.2.1 Principles of Water Governance & Water Resources Management

Water governance principles and water management concepts can provide the general guidance necessary to improve water governance. For this research, I will apply the OECD's *Principles on Water Governance* and the strategies to implement them in the context of wetland management (See Table 3.1). Moreover, three approaches recognized and implemented worldwide as the solution to water management problems are also relevant to this project: integrated water resources management, participatory water management, and good water governance (Kruif & Özerol, 2013; OECD, 2015).

OECD Principles of Water Governance		
EFFECTIVENESS	EFFICIENCY	TRUST AND TRANSPARENCY
Appropriate scales within basin systems	Increased capacity for water management complexity	Monitoring and Evaluation
Access to high-quality water data information	Innovative Governance	Proper regulatory frameworks
Clear roles and responsibilities	Mainstream integrity and transparency practices	Responsible and timely mobilization of financial resources
Coherent cross-sectoral coordination	Manage trade-offs through water governance frameworks	Stakeholder engagement

Table 3.1 *OECD Principles of Water Governance* are now available as a self-assessment toolkit. See Table 6.2 to see comparison between Alberta water management principles and the OECD principles.

3.2.2 Integrated Water Resources Management (IWRM)

The IWRM concept is fundamental to improving water resource management because it promotes necessary changes in water management practices. For example, IWRM emphasizes the idea of integration, decentralization, participation, and economic and financial sustainability, and with the basin as the unit for decision-making (Giordano & Shah, 2014; Ramsar Convention Secretariat, 2010d). IWRM is internationally accepted as the way toward "efficient, equitable and sustainable development and management of the world's limited water resources and for coping with conflicting demands" (UNDESA, 2014). IWRM is also recognized as a strategy to

implement the Dublin Principles.¹⁴ The goal of IWRM is to coordinate the development and management of water, land and related resources by maximizing economic and social welfare without compromising the sustainability of vital environmental systems (Baril et al., 2006; Rogers & Hall, 2003). IWRM attempts to address the complexity of managing water resources by placing water governance in a larger context, often through consensus building and multi-stakeholder engagement. For example, river basins are the natural unit of management for IWRM. The hydrology-based approach sets hydrological boundaries because it recognizes water as a critical determinant of the character and health of ecosystems. However, applying a hydrology-based approach does not resolve fundamental political questions about where the boundaries should be drawn, how participation should be structured, and to whom decision-makers within a watershed are accountable (Blomquist & Schlager, 2005).

3.2.3 Participatory Water Management (PWM)

Freshwater management involves many public, private and non-profit stakeholders in the decision-making process because the water sector holds intrinsic characteristics that make it highly sensitive to and dependent on multi-level governance (OECD, 2015). Engaging many stakeholders across multi-levels for managing water resources is the definition of PWM (Kruif & Özerol, 2013). The participation of the public and organized stakeholders is crucial for reaching the sustainable development goals set out in international agreements. The benefits of participatory management include better quality decisions, better acceptance of decisions, and social capital development (von Korff et al., 2012). Collaborative measures can also be problematic, impractical, and perhaps even illegal, raising issues of boundary setting in the consensus process (Blomquist & Schlager, 2005). McEachern (2008) warns against an overarching emphasis on consensus where “the rise of and regulatory reliance on public advisory groups has resulted in a democratization of science where increasingly we are asking non-specialists to make decisions of a technical nature” (pg.S17). Blomquist and Schlager (2005) agree that “(w)atershed decision making on any participatory basis that extends beyond watershed residents raises risks of decisions being taken by people who—quite literally—do not know what they are doing” (pg.107). These groups can be prone to decision-making where the environment ultimately loses by being bartered for consensus (Peterson et al. 2005). At the same time, participatory approaches allow people who otherwise would not have a voice to interact with and express their opinion on the way a resource is managed that may directly

¹⁴ The *Dublin Statement on Water and Sustainable Development* recognizes the increasing scarcity of water due to conflicting uses and overuses of the resource. The declaration sets out recommendations for action at local, national and international levels to reduce water scarcity through four guiding principles (ICWE, 1992).

impact them. The positive and negative outcomes of PWM speak to the need for practice, awareness, technical expertise and education in the participatory process.

3.2.4 Good Water Governance

Good governance is one of the uses derived from the concept of governance. Toikka (2011) suggests that many governance schemes do not rely on changes in the policy-making process. Instead, the shift revolves around the inclusion of multiple actors, whether private or public, into the process. Derived uses of "governance" generally imply that there is an "increased involvement of non-governmental actors in decision-making processes and the extension of the stakeholder range along the institutional and jurisdictional levels (Kruif & Özerol, 2013). The shift from *governance* to *good governance* implies an evaluative standard with which multiple actors can govern because it aims to define the normative agenda of what proper water governance should look like (Kruif & Özerol, 2013).

An analysis of multi-level governance in OECD countries to identify *good* practices for managing interdependencies between the many stakeholders involved in water management found that the Canadian model is based on fewer central government actors compared to a multitude of subnational actors (OECD, 2012). The Canadian model of water management is considered one of the most decentralized in the world. Challenges to effective coordination and implementation of water policies in Canada stem from the fragmentation of responsibilities at national and sub-national levels and a lack of institutional incentives for horizontal coordination between different policy fields (OECD, 2011). Water issues in Canada would benefit from greater harmonization, which implies a coordinating role for the federal involvement. Fragmentation of water management could be improved by coordinating water policy at the provincial level and between levels of government using tools such as performance measurements, water information systems and databases, financial transfers, inter-municipal collaboration, citizen participation and innovative mechanisms (OECD, 2012). In Canada, it could mean ensuring equality among provinces or guaranteeing a certain level of protection by the federal government (Hill et al., 2008). The effectiveness of decentralized governance hinges on accountability (von Korff et al., 2012)

3.3 The Ramsar Convention on Wetlands

3.3.1 The Convention and its Mission

The Ramsar Convention (*Convention*) is an international treaty that focuses on the conservation and wise use of all wetlands. The convention was held in 1971 in Ramsar, Iran, to provide a framework for the *Convention's* mission: to achieve the conservation and wise use of

all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world. The 170 nations that are signatories to the *Convention* have committed to, among other things, executing the “Three Pillars” of the convention: 1. Work towards the wise use of all their wetlands; 2. Designate and manage *Wetlands of International Importance* (Ramsar sites); 3. Cooperate internationally on transboundary wetlands, shared wetland systems and shared species.

3.3.2 Wise Use of Wetlands

The *wise use of wetlands* is a philosophy promoted by the *Convention* and adopted by all its signatories. The Convention defines the *wise use of wetlands* as:

[T]he maintenance of [wetland] ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development (Ramsar, 2010c, pg.16)

When contracting parties agree to the convention, they commit to carrying out *wise use* principles and applying them to all the wetlands and water resources in their region through national plans, policies and legislation, management actions and public education (Ramsar, 2010). So, although the convention only protects designated sites, it encourages member countries to integrate water and wetland management at local, regional, national and international levels. The *wise use* concept is realized in practical handbooks suitable for any wetland manager. Twenty handbooks bring together resolutions and guidance adopted by the convention, supplemented by additional material from information papers, case studies and other publications to exemplify the guidelines' key aspects. Thirteen of them are relevant to Alberta. Applying *wise use* principles to wetland management practices enables countries worldwide to work toward a common goal. The wise use principle and its associated guidance handbooks are a normative road map built on scientific and technical data to improving the conservation, protection, and sustainable use of wetlands across the globe (See Table 3.2).

3.3.3 Wetlands of International Importance

Each signatory country, also known as a Contracting Party (CP), is to designate suitable wetlands within its territory for inclusion in the *Wetlands of International Importance* list. The list is based on the vision to develop and maintain an international network of wetlands that are important for the conservation of global biological diversity and sustain human life through the ecological and hydrological functions they perform. Wetlands included in the list acquire status at the national level and the international community as a significantly valuable resource for the country and humanity. The basis for wetlands selection depends on their ecology, botany, zoology, limnology, or hydrology.

3.3.4 International Cooperation and Establishing National Wetland Policy

The *Convention* also mandates CPs to adopt national wetland policies, produce wetland inventories, conduct wetland monitoring and research, raise public awareness of wetlands, and develop integrated management plans for wetland sites on the list of important wetlands.

National wetland policy is a vital feature of the *Convention's* vision for the implementation of wise use. Although nations worldwide began devising regulatory strategies to establish wetland management systems, achieving the goal of national policies that effectively promote wetland conservation and management has not been fully realized by all signatories (Durigon et al., 2012; Ramsar, 2010).

Ramsar Handbooks for <i>Wise use of wetlands</i>		
Pillar 1: Wise Use		Alberta Context
1	<i>Wise Use of Wetlands</i>	Applicable
2	National Wetland Policies	Not applicable
3	Laws and institutions	Applicable
4	Avian influenza and wetlands	Beyond scope
5	Partnerships	Applicable
6	Communication, Education, Participation, and Public Awareness	Applicable
7	Participatory skills	Applicable
8	Water-related guidance	Applicable
9	River basin management	Applicable
10	Water allocation and management	Applicable
11	Managing groundwater	Applicable
12	Coastal management	Not applicable
13	Inventory, Assessment, Monitoring	Applicable
14	Data and information needs	Applicable
15	Wetland inventory	Applicable
16	Impact assessment	Applicable
Pillar 2: Ramsar Sites Designation and Management ¹⁵		
17	Designating Ramsar Sites	Beyond scope
18	Managing Wetlands	Beyond scope

¹⁵ There are four Ramsar sites in Canada and they are managed at the federal level and that is why these handbooks are out of scope for this project. This section could be applied in the future to ecologically important wetlands managed by the province.

19	Addressing change in wetland ecological character	Beyond scope
	Pillar 3: International Cooperation	
20	International cooperation	Beyond scope

Table 3.2 Ramsar handbooks and their applicability to Alberta's regional context for this research

3.4 Ramsar and other international agendas

The *Convention* “was adopted as the first of the modern global nature conservation conventions and, today, is a highly regarded and active multilateral environmental agreement”(Government of Canada, 2020b). The convention collaborates with global partners, including biodiversity-related conventions, project-funding bodies, UN agencies, non-governmental organizations, and the private sector. For this research, the following discussion focuses on the convention’s relationship with the *Convention on Biological Diversity* (CBD) and the *Millennium Ecosystem Assessment* (MA) because of their ability to inform sustainable wetland management practices for the *wise use of wetlands*.

3.4.1 Ramsar and the Convention on Biological Diversity (CBD)

The CBD is a multilateral treaty that was drafted and signed by 1993. In 1996, at the 3rd meeting of the CBD, it was decided to

[...] invite [Ramsar] to cooperate as a lead partner in the implementation of activities under the Convention related to wetlands, and, in particular, requests the Executive Secretary to seek inputs from the [Ramsar], in the preparation of documentation concerning the status and trends of inland water ecosystems [...] (UNEP/CBD, 1996)

The main goals of the CBD are (1) the conservation of biodiversity, (2) the sustainable use of its components, and (3) the fair and equitable sharing of benefits arising from genetic resources. The objectives are like that of the Ramsar Convention in developing national strategies for conservation and sustainable use; however, its focus is on biological diversity. The CBD document is an essential document regarding sustainable development. CBD’s *Strategic Plan for Biodiversity 2011-2020* includes the Aichi Biodiversity Targets.¹⁶

3.4.2 Ramsar and the Millennium Ecosystem Assessment (MA)

The *Convention* recognizes that the MA provides CPs with new understanding and insights into how best they can meet the *Convention*’s objectives. Moreover, the bodies of the convention, including the Standing Committee (SC), the Secretariat, and the Science and Technical Review Panel (STRP), have supported and contributed to the work of the MA in the assessment and subsequent reports. The coordinated efforts align with the priority areas

¹⁶ The Aichi objectives are a set of 20 global targets under the CBD’s Strategic Plan for Biodiversity 2011-2020

outlined in the 4th *Strategic Plan*. These include prioritizing the integration of information about ecosystem functions and the ecosystem services they provide to people and nature into national development plans; and improving the effectiveness of communication about ecosystem functions and the ecosystem services they provide to people and nature.

The MA also produced a report entitled *Ecosystems and Human well-being: Wetlands and Water Synthesis*. The report amalgamates the MA findings on inland, coastal, and near-shore marine wetlands. The synthesis findings emphasize the link between wetlands and water and support the *Ramsar Convention*'s mission and vision. The MA amalgamates its conceptual framework with the Convention's central concept of wise use of all wetlands (See Table 3.3.). The conceptual framework provides a structure for the delivery of the *wise use* concept. The MA findings confirm the importance of raising awareness about the role of wetlands in securing sustainable water supplies and providing a range of other vital ecosystem services.

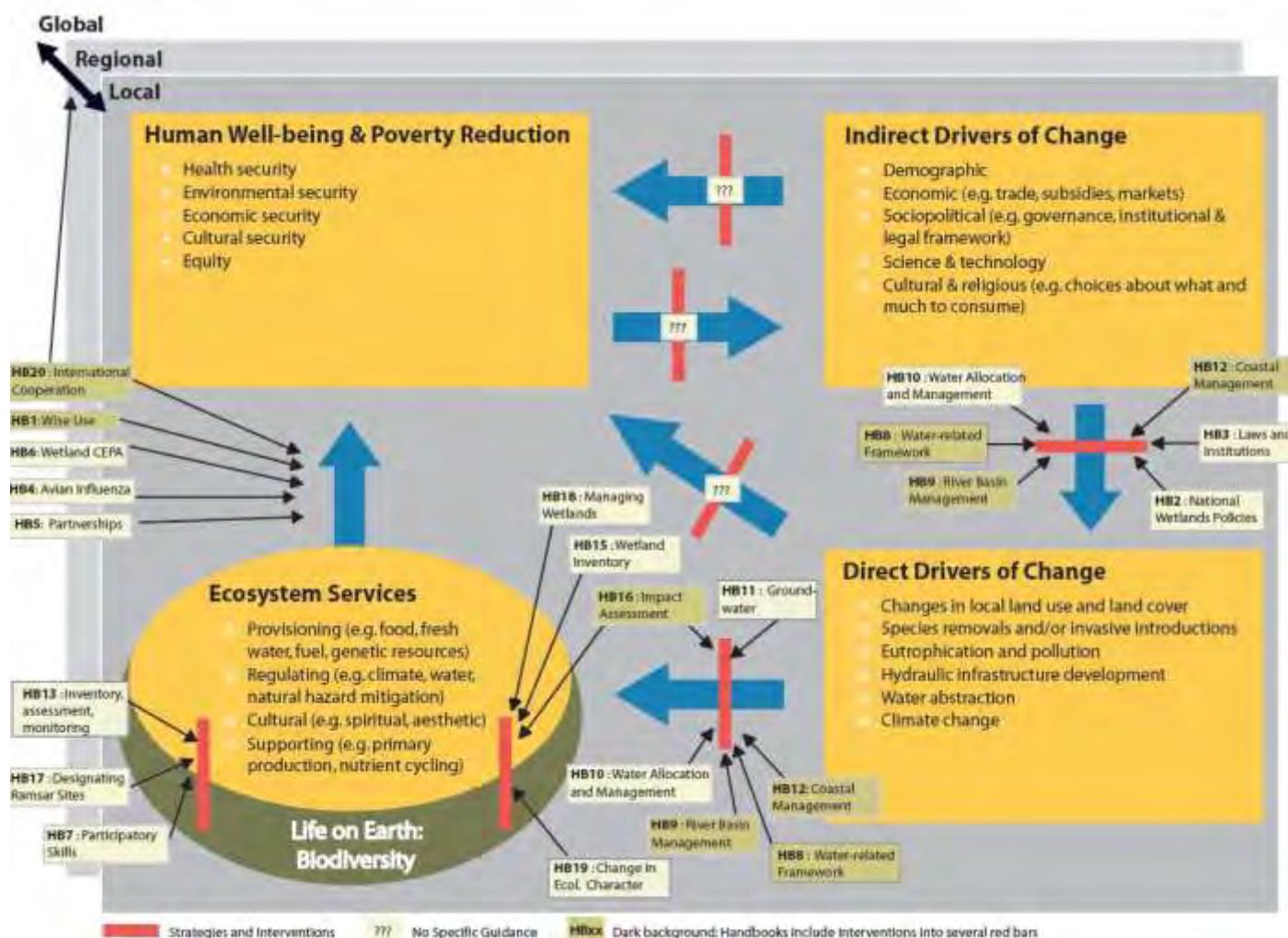


Figure 3.1 Ramsar Wise Use Framework Integrated into MA Conceptual Framework (Millennium Ecosystem Assessment, 2005)

3.5 Ramsar's 4th Strategic Plan (2016-24)

The *Strategic Plan* (SP) for 2016-24 reaffirms the Convention's mission and vision. It sets out three strategic goals, one operational goal, and 19 targets for achieving them (See Section 3.5.1). The SP also outlines how it plans to contribute to the SDGs and its synergies with CBD targets. The SP acknowledges the vital ecosystem services provided by water and wetlands to people and nature through their natural infrastructure. The *Ramsar Convention* identifies seven factors to enable the SP's implementation for the 2016-24 period (See Table 3.4). Below are two tables outlining Ramsar's enabling conditions, goals, and targets for implementing the 4th Strategic Plan and how they apply to the Alberta context.

Enabling Conditions for the Successful Implementation of the 4 th Ramsar Strategic Plan		Applicability to the Alberta Context
Resource Mobilization	Effective mobilization of additional resources for wetland conservation and wise use, and for engaging with drivers of wetland degradation and loss, is required at local, national, regional, and global levels.	Resource mobilization will be discussed at regional and local levels.
Outreach & Promotion	Enhance communications, including CEPA (communications, education, participation, and awareness-raising)	CEPA will be integrated into the evaluative criteria for the Alberta context.
Partnerships	The <i>wise use of wetlands</i> and their resources involves various actors at local, national, regional, and global levels. Existing partnerships should be strengthened, and new partnerships with civil society and the business sector forged.	Partnerships in Alberta among NGOs, citizens, and government agencies drive wetland conservation in the province.
International Cooperation	Consolidate existing arrangement for international cooperation	Applicable to the federal government level, but not the Alberta regional context.
Regional and Bilateral Cooperation	Promote and support regional and bilateral cooperation, capacity-building, technology and knowledge exchanges, wetland-related information, communications, and mobilization of financial resources.	Ramsar regional initiatives could be explored for the Alberta context but not for federally managed Ramsar sites.
Capacity Building	Address capacity-building needs of Parties and stakeholders in a range of wetland fields, including inventory, management, status monitoring and assessment, communicate and promote functions and values, scientific and technical knowledge and guidance, and technology exchange.	Capacity will be explored for the regional needs of Alberta

Languages	The use of additional languages by the Convention may constitute an essential means for extending its reach and visibility in regions of the world where an understanding of the work and value of the Convention is currently not well known.	This could benefit the Alberta context but will not be addressed in this research. The resources are accessible through the convention but would need revision for the regional context.
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Table 3.3 Enabling Conditions for Successful Implementation Identified by the Convention

Integrating the conditions above into everyday governance practices is expected to enable the goals and targets set out in the *4th Strategic Plan*. The conditions, goals, and targets set out in the *4th Strategic Plan* of the convention guide this research and its examination of Alberta's Wetland Policy context.

3.5.1 Goals and Targets of the Ramsar Convention's 4th Strategic Plan

Developing the evaluative criteria for the Alberta context required testing the applicability of the four goals and 19 targets from the Ramsar Convention's 4th Strategic Plan to the Alberta regional wetland management context:

Goal 1. Address Drivers of Wetland Loss and Degradation			
Target	Details	Key Terms	Alberta Context
1	Wetland benefits are featured in national/local policy strategies and plans relating to key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture, fisheries at the national & local level.	<i>Wetland benefits, policy strategies, key sectors</i>	<i>Applicable and will be formatted to fit the regional context.</i>
2	Water use respects the water needs of wetland ecosystems to fulfil their functions and provide services at the appropriate scale.	<i>Water policy integrates wetland ecosystem needs</i>	<i>Applicable</i>
3	The public and private sectors have increased their efforts to apply guidelines and acceptable practices for the wise use of water and wetlands.	<i>Integrate wise use guidelines and practices at public & private sector levels</i>	<i>Applicable</i>
4	Identify and prioritize invasive alien species and pathways of introduction and expansion, priority invasive alien species are controlled or eradicated, and management responses are prepared and implemented to prevent their introduction and establishment.	<i>Identify the source of and limit the expansion of invasive species</i>	<i>Applicable</i>
Goal 2. Effective Conservation and Management of Ramsar Site Network			

5	The ecological character of Ramsar sites is maintained or restored through effective planning and integrated management.	<i>Effective planning and integrated management</i>	<i>Beyond the scope of this research. Ramsar sites are managed federally.</i>
6	There is a significant increase in area, numbers and ecological connectivity in the Ramsar Site network, significantly under-represented types of wetlands including in under-represented ecoregions and Transboundary Sites.	<i>Increase Ramsar Site Network</i>	<i>Beyond the scope of this research. Ramsar sites are managed federally.</i>
7	Sites that are at risk of change of ecological character have threats addressed.	<i>Address risks to Ramsar Sites</i>	<i>Beyond the scope of this research. Ramsar sites are managed federally.</i>
Goal 3. Wise Use of All Wetlands			
8	National wetland inventories have been initiated, completed, or updated and disseminated and used for promoting the conservation and effective management of all wetlands.	<i>Identify and address the status of national wetland inventory</i>	<i>Applicable and will be adapted to the regional context.</i>
9	The <i>wise use of wetlands</i> is strengthened through integrated resource management at the appropriate scale, among other things, within a river basin or coastal zone.	<i>Wise Use, Integrated resource management, Appropriate scale</i>	<i>Applicable and will be adapted to fit the regional context.</i>
10	The traditional knowledge, innovations and practices of indigenous peoples and local communities relevant for the <i>wise use of wetlands</i> and their customary use of wetland resources are documented, respected, subject to national legislation and pertinent international obligations, and fully integrated and reflected in the implementation of the Convention, with the full and effective participation of indigenous peoples and local communities at all appropriate levels.	<i>Fully integrate TEK for Wise Use and customary TEK, including indigenous peoples in the wetland management process.</i>	<i>Applicable but out of scope for this project as resources are limited to the publicly available information.</i>
11	Wetland functions, services and benefits are widely demonstrated, documented, and disseminated.	<i>Promote/publicize functions and values to more people</i>	<i>Applicable</i>
12	Restoration of degraded wetlands. Prioritize wetlands for biodiversity conservation, disaster risk reduction, livelihoods, climate change mitigation and adaptation.	<i>Restore ecological integrity on important but damaged wetlands</i>	<i>Applicable</i>

13	Address and improve the sustainability of critical sectors such as agriculture, water, energy, mining, tourism, urban development, infrastructure, industry, forestry, aquaculture and fisheries. Identify ahead of time wetlands that contribute to biodiversity conservation and human livelihoods and protect their ecological integrity.	<i>Identify sectors impacting wetlands; Ensure capacity to maintain their ecological character.</i>	<i>Applicable but out of scope for this project as resources are limited to the publicly available information.</i>
Goal 4. Enhancing Implementation			
14	Develop scientific guidance and technical methodologies at global and regional levels. Make them available to policymakers and practitioners in an appropriate format and language.	<i>Develop and disseminate scientific guidance and technical data</i>	<i>Applicable</i>
15	Reinforce and develop Ramsar Regional Initiatives with the active involvement & support of the Parties in each region into practical tools to assist in the full implementation of the <i>Convention</i> .	<i>RRI's will be effective tools to assist in the implementation of the Convention.</i>	<i>Applicable</i>
16	Mainstream wetland conservation practices and wise use principles through communication, capacity development, education, participation, awareness.	<i>Mainstream wetland conservation through CEPA</i>	<i>Applicable</i>
17	Financial and other resources for effectively implementing the 4th Ramsar Strategic Plan 2016 – 2024 from all sources are made available.	<i>Funding is available and accessible</i>	<i>Financial resources are limited to the publicly available information.</i>
18	Strengthen international cooperation at all levels.	<i>Improve international cooperation</i>	<i>Not applicable.</i>
19	Capacity building for implementation of the Convention and the 4th Strategic Plan is enhanced.	<i>Enhance capacity for implementation of the strategic plan.</i>	<i>Capacity will be addressed but limited to publicly available info.</i>

Table 3.4 Ramsar strategic goals and targets applied to the Alberta context.

3.6 Ramsar in Canada and Alberta

The convention provides countries like Canada with a national framework for action that has provincial implications for the conservation and *wise use of wetlands* and their resources. Canada has 37 Ramsar sites (Lynch-Stewart, 2008), four of which are in Alberta (Alberta Parks, 2018): Beaverhill Lake Heritage Rangeland; Hay-Zama Lakes Wildland Park; Peace-Athabasca Delta (Wood Buffalo National Park); and Whooping Crane Summer Range.

3.7 Criticism of Ramsar and the *Wise Use of Wetlands*

The *wise use of wetlands* is the recommended approach by the convention. Some experts argue that designating a wetland policy as a “wise use” policy does not guarantee the protection of wetland ecosystems, nor does it ensure that wetland management occurs equitably or sustainably (Peimer et al., 2017). Walker (2001) writes that the *wise use* ‘doctrine’ is designed to exclude environmental and community interest groups. Furthermore, implementing the wise use concept requires additional resources, capacity, and political support. Improving a nation’s ability to interpret and apply the guidance will avoid the counterproductive application of its objectives (Sellamuttu et al., 2012). The Ramsar literature acknowledges these issues by allowing signatories to join as a voluntary endeavour and access all of the support available to signatories through the convention. Signatories should be prepared to fully commit to their CP responsibilities, including implementing the *wise use of wetlands* at the national level and supporting their local areas to do the same.

Despite these criticisms, in the context of the Convention, the wise use principle is a marked shift from the perception of wetlands as a nuisance to development and human progress. Wetlands are not a nuisance to humans. Instead, they are essential life-sustaining and biologically productive ecosystems. The work of uniting the world in the conservation and wise use of wetlands is a necessary step toward conserving and protecting wetland habitats and meeting biological diversity and sustainable development goals.

3.8 Wetland Policy and Management

Wetland management occurs for several reasons, including the production of natural resources, environmental protection, conservation, restoration, recreation, and aesthetics. Still, wetlands were not always managed, let alone for the reasons noted above. The environmental protection and conservation of wetlands is a relatively recent occurrence. Since the 1970s, there has been a global uptake in regulations, policies and standards to conserve wetland habitats. Still, wetland habitats continue to be destroyed and converted to other land uses more rapidly than any other ecosystem (Millennium Ecosystem Assessment, 2005; Ramsar, 2010b, Bartzen et al., 2015; Clare & Creed, 2014; Clare et al., 2011; Myers et al., 2013; Nielsen et al., 2012; Poulin et al., 2016). The increase of wetland protection and conservation initiatives worldwide is in contrast to the continued conversion of wetlands to other land uses—which signals a discrepancy between wetland policy and wetland policy outcomes.

Integrating wetland conservation into broader environmental and natural resource programs and policies is a step in the right direction (Magyera & Genskow, 2012). Some experts

argue that multi-objective water and wetland policies should be designed to build interconnections between many levels of people and policymaking (Russi et al., 2013, Sebastiá-Frasquet et al., 2014), but in reality, governance practices tend to be defined by the chosen economic market direction of nations, which directly influences the direction of policy goals and outcomes of water and wetland management. For example, Durigon et al. (2012) found that countries with strong-market economies tend to subjectively and objectively characterize wetlands vaguely and indirectly. In contrast, countries with weaker-market economies are more inclined to portray wetlands directly and distinctly. Sebastiá-Frasquet, Altur, & Sanchis (2014) found that local governments tend to support the realignment of boundaries to facilitate economic development when there is a conflict between conservation and infrastructure projects. Regardless of a country's economic direction, *Ramsar* states that "A key requirement for wetland conservation and wise use is to ensure that adequate water of the right quality is allocated to wetlands at the right time" (Ramsar Convention Secretariat, 2010a). In the following sections, I will explore wetland policy and management practices that embody the *Convention's* international standards. The concept of *wise use* is reflected in the following policies and management practices of three countries with similar free-market economies: Australia, USA, and Canada.

3.9 International Wetland Management Program: Australia

The conservation and *wise use* of Australia's wetlands is guided and mandated by international agreements and Australian laws. There is no legislation in Australia at either the Commonwealth level or the state or territory level specifically for wetland rehabilitation or protection. Instead, Australian wetlands are impacted by numerous pieces of legislation at various levels of government. A listing of Australia's important wetlands was published in 1993. As of 2018, the Directory of Important Wetlands in Australia (DIWA) lists over 900 important wetlands. Wetlands that meet DIWA criteria are protected under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (Environment Australia 2001). The most relevant international agreement for wetlands in Australia is the *Convention*.

Australia adopted the Ramsar definition of wetlands in the document *Wetlands Policy of the Commonwealth Government of Australia* and adapted it to fit the Australian context (Environment Australia, 1997). Since it is a Commonwealth government policy, it only applies to areas under Commonwealth control—which has resulted in different agencies at different levels of government applying “different definitions of wetland to meet particular purposes and the requirements of individual pieces of legislation” (Adam, 2001). It is not uncommon that the

definition of wetland varies worldwide because it generally means that the definitions are adapted to the local environment.

The federal government works in partnership with state and territory governments to implement the Ramsar Convention. The *Department of the Environment* is the administrative authority within Australia for the Ramsar Convention. According to the national report submitted to the *Convention*, the Australian government meets its obligations under the Ramsar Convention by providing: National wetland policy leadership and direction; Coordination through the *Standing Council on Environment and Water*; Implementation of the *Environment Protection and Biodiversity Conservation Act*; and continued development of programs to improve the management of wetlands (Environment Australia, n.d.).

Comparable to Canada, Australian state and territory governments have primary legislative and policy responsibility for natural resource management. As a result, state governments have developed wetland conservation policies independent from the federal government. The five states in the country either adopt a formal wetland policy or a management strategy. Legislation, policies, and management plans implemented by regional governments that impact wetland ecosystems are executed daily by wetland managers, including volunteers, farmers, national park rangers, and researchers.

Comparable to Alberta, the primary responsibility for managing wetlands and their associated flora and fauna is vested in the landholders and/or land managers. Unlike Canada and the rest of the provinces, where the Crown holds all water rights, Australia has actively engaged in water markets,¹⁷ which means that ecosystems, like wetlands, compete with other users for water allocations (Ramsar Convention Secretariat, 2010d). However, Canada may not be far behind as research into a Canadian water market is well underway and nascent in provinces like Alberta (Brandes, Nowloan, & Paris, 2009). Water trading in Australia has become an essential business tool for water rights holders because it provides “[...] an effective way of managing changing use requirements, climate variability and reallocating water during prolonged periods of drought” (Government of South Australia, 2020), but it could also be effective at creating a bias against conservation.

3.9.1 Australian Water Market in the Murray-Darling Basin

The Murray-Darling Basin (MDB) is a connected water resource covering parts of South Australia, New South Wales (NSW) and Victoria. The majority of the MDB's water use is for

¹⁷ The philosophy of water markets is that trade allows water to flow to where it can be used most productively, or has the highest value, through the redistribution of water rights including water licences, water access entitlements and water allocations (Government of South Australia, 2020)

agriculture. According to the Parliament of Australia, crops such as vegetables, fruit and nuts yield relatively high prices for low levels of water use, but rice crops produce lower value for high levels of water use. Many environmental issues affect the MDB, including salinity, erosion, water quality and invasive species. In the year 2000, a decade-long drought caused significant damage, which ended in 2010 with widespread flooding that also caused damage but allowed many species to recover from the effects of the drought.

The southern-connected MDB is one of the most mature water markets in the world and is based on a *cap-and-trade* system. The ‘cap’ represents the total pool of water available for consumptive use, and water in the total pool can only move among licence holders, and to new businesses, by trade. The basin is exemplary of water entitlements, including environmental entitlements, traded on the free market and using a system of real-time water accounting (Ramsar Convention Secretariat, 2010d).

In 2016 and 2017, allocation prices in the major southern MDB trading zones increased by up to 200 percent (Aither, 2017, 2018). A major concern now is that as surface water becomes scarcer and more expensive, the value of and demand for groundwater entitlements are increasing. The MDB is an example of water allocation management that can effectively work to protect ecosystems, but the management program requires valuation tools that can value ecosystem goods and services in the same context and currencies as commercial or other uses where water extraction is required (Ramsar Convention Secretariat, 2010d). It also requires a sophisticated water market and pricing strategies (Ramsar Convention Secretariat, 2010d). Naturally, the question of how water markets account for environmental values needs to be explored. According to (Bark et al., 2011):

More than 60 studies have estimated use and non-use values of the natural capital assets and the ecosystem services these assets supply across the Murray–Darling Basin. For example, the willingness to pay to restore the Coorong and Lower Lakes of the Murray River is estimated to be \$5.8 billion. Interestingly, while such attempts to put an economic price on the intrinsic values of water ecosystems are fraught with uncertainty, the revealed values for the Murray–Darling Basin are of the same magnitude as the \$10 billion that is being spent by the Australian Government, with community support, to restore the environmental health of the Basin. Support for such levels of government expenditure is another indicator of the importance society places on these ecosystems. Whether that ecological restoration should come at a significant cost to irrigation water use, however, is being contested through reactions to the Murray–Darling Basin Plan [MDBP].

Prime Minister John Howard proposed a \$10-billion 10-year *National Plan for Water Security* in 2007 in response to the drought and the continued over-allocation of MDB water resources by the states (McCormick, 2013). He initially called for the MDB states to transfer their powers to enable the Commonwealth to oversee the management of the MDB, but many

states refused. Since an agreement could not be reached, the Commonwealth legislated to achieve its aims using only Commonwealth powers through the national *Water Act 2007* (McCormick, 2013). The Act established the MDBA as the authority responsible for preparing the Basin Plan¹⁸ for the Minister. Under the national plan, programs such as *Restoring the Balance in the Murray-Darling Basin* program will invest up to \$3.1 billion to address over-allocation in the MDB, including through water entitlement buy-back programs. In 2008, all Basin states agreed to refer their powers to the Commonwealth.

3.9.2 Wetland Restoration on Private Lands in the Murray-Darling Basin

A decline in biodiversity as a result of intense agriculture has contributed to a major decline in wetland ecosystems in the MDB. In 2001, the NSW Murray Wetlands Working Group (MWWG)¹⁹ conducted a project using existing irrigation infrastructure to bring water to otherwise droughted land.

The land had been dry for decades due to levee banks and river regulations designed to prevent floodwaters from reaching these natural floodplain wetland habitats. The project required extensive cooperation between the irrigation corporation, State agency groups and volunteer landholders. Over a short period of time, the project produced flourishing wetland fauna and a wide range of wetland plants on 11 previously desiccated floodplain wetland sites after receiving a total of 600,000 litres of additional water through irrigation infrastructure.

According to the MWWG, the project was designed as an adaptive management project rather than a controlled experiment.²⁰ Monitoring of the vegetation and bird communities occurred before treatment and for six months afterwards. The project was an opportunity to improve biodiversity on private properties and gauge landholder and community attitudes and commitment to enhancing wetland habitats. The most surprising result was the positive response from private landowners, all of whom volunteered time, effort and resources. They did not expect to see the results they did after such a short period of time and were happy to have participated in the project. In Alberta, a project like the one in NSW could be realized by the provincial and federal governments' investment in irrigation infrastructure in 2020 (GoA, 2020).

¹⁸ The Act requires the Basin Plan to include: long-term average Sustainable Diversion Limits (SDLs) for the amount of surface water and groundwater that can be taken from Basin water resources; an environmental watering plan; a water quality and salinity management plan and rules about trading of water.

¹⁹ The NSW MWWG was established as an initiative of the Murray and Lower Murray-Darling Catchment Management Committees to acknowledge the continuing loss and degradation of wetlands along the River Murray and to develop and implement well-researched, technically sound and community-endorsed management programs for wetlands.

²⁰ Chapter 7 delves into adaptive management in more detail as part of the summary of findings. There you will find that adaptive management is quite simply "learning by doing" which is essentially an experimental approach.

3.10 Wetland Management and Policy Program: United States

There are eighty-five distinct ecoregions in the 48 contiguous states (Garber, Rosa-Joynt, & London, 2018). Implementing national ecosystem management strategies at this scale requires harmonizing efforts across federal agencies, state agencies, and NGOs that are responsible or involved in the management of the different types of resources within each of these geographical areas. The federal government protects wetlands directly and indirectly through regulation, acquisition, or incentives and disincentives. There are also national programs that encourage wetland conversion for development. Over 50 federal programs implemented by 18 different agencies have significant effects on wetlands (Fretwell, Williams, & Redman, 1996). Section 404 of the *Clean Water Act* is the primary vehicle for federal regulation to control the discharge of dredged or fill materials into wetlands and other waters of the United States (Fretwell et al., 1996).²¹ The Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) share responsibility for administering section 404.²²

The US Fish and Wildlife Service (FWS) is the principal federal agency tasked with providing detailed information to the public about the abundance, characteristics, and distribution of wetlands in the USA (U.S. Fish and Wildlife Service, 2020). FWS estimates that since 1780, 53% of wetlands have been lost in the lower 48 states. An estimated 104 million acres (420,873 km²) of wetlands remain in the conterminous United States as of 1980 (Dahl, 1990); if Hawaii (51,800 acres) and Alaska (175 million acres) are included, the total wetland acreage increases to 274 million (1,108,838.7 km²) (ASWM, 2015; Blount, 2018). The impact humans have had on wetland loss becomes evident when we compare the remaining wetland inventory of a low-population state like Alaska to the remaining wetland inventory of the other 48 states.

3.10.1 U.S. National Wetland Inventory

A wetland inventory program based on mapping and classification is an essential tool to manage and maintain wetland ecological character and protect the critical services that wetlands provide globally (Ling, Hughes, Powell, & Cowood, 2018). The USA has the most advanced and ongoing wetland inventory program (Ling et al., 2018), identifying and mapping wetlands in the National Wetland Inventory (NWI) since 1975. The NWI data enables natural resource managers from many agencies to understand and manage wetland losses, which

²¹ Not all dredge and fill activities require a Section 404 permit and not all methods of altering wetlands are regulated by Section 404.

²² The EPA establishes the substantive environmental criteria for issuing permits and enforces rules on illegally altered wetlands (unpermitted). The Corps issue permits for altering a wetland habitat with the goal of no net loss of wetlands and enforces rules on permit holders.

ultimately supports conservation and rehabilitation efforts in a country with vast ecological diversity. Further research could elaborate on whether or not the NWI has helped manage wetlands and prevent wetland losses.

3.10.2 Management at the State and Tribal Level

Wetland programs are currently found in many states through different agencies “[...] pursuing a range of goals that are unique to the priorities and range of wetland types and functions within their jurisdiction” (Environmental Protection Agency, 2008). While each state and tribe have their own wetland goals, there is a common set of program objectives that comprise a comprehensive wetland program. These are summarized in the Core Elements Framework (CEF) and the Enhancing State and Tribal Programs (ESTP).²³ Unlike Canada, wetland permitting in the USA is mostly run by federal agencies. Although states can and *should* aim to assume authority over the Section 404 permitting program, the assumption of authority from the EPA has been successfully achieved by only two states since the program began in the 1970s. Assuming control from the EPA for wetland permitting has become an increasingly complex task with many barriers to assumption (Carlos, 2014).

²³ The CEF and the ESTP Initiative were designed for state and tribal wetland programs that are in developing stages but can be applied at any stage of a wetland program. The goal of the ESTP is to enhance EPA's delivery of technical and financial support for state and tribal wetlands programs. The overall objective is to accelerate wetland program development on a national scale. CEF is made up of four core wetland program elements: monitoring and assessment, regulatory activities, wetland restoration and protection, and water quality standards for wetlands (See Figure 3.1).

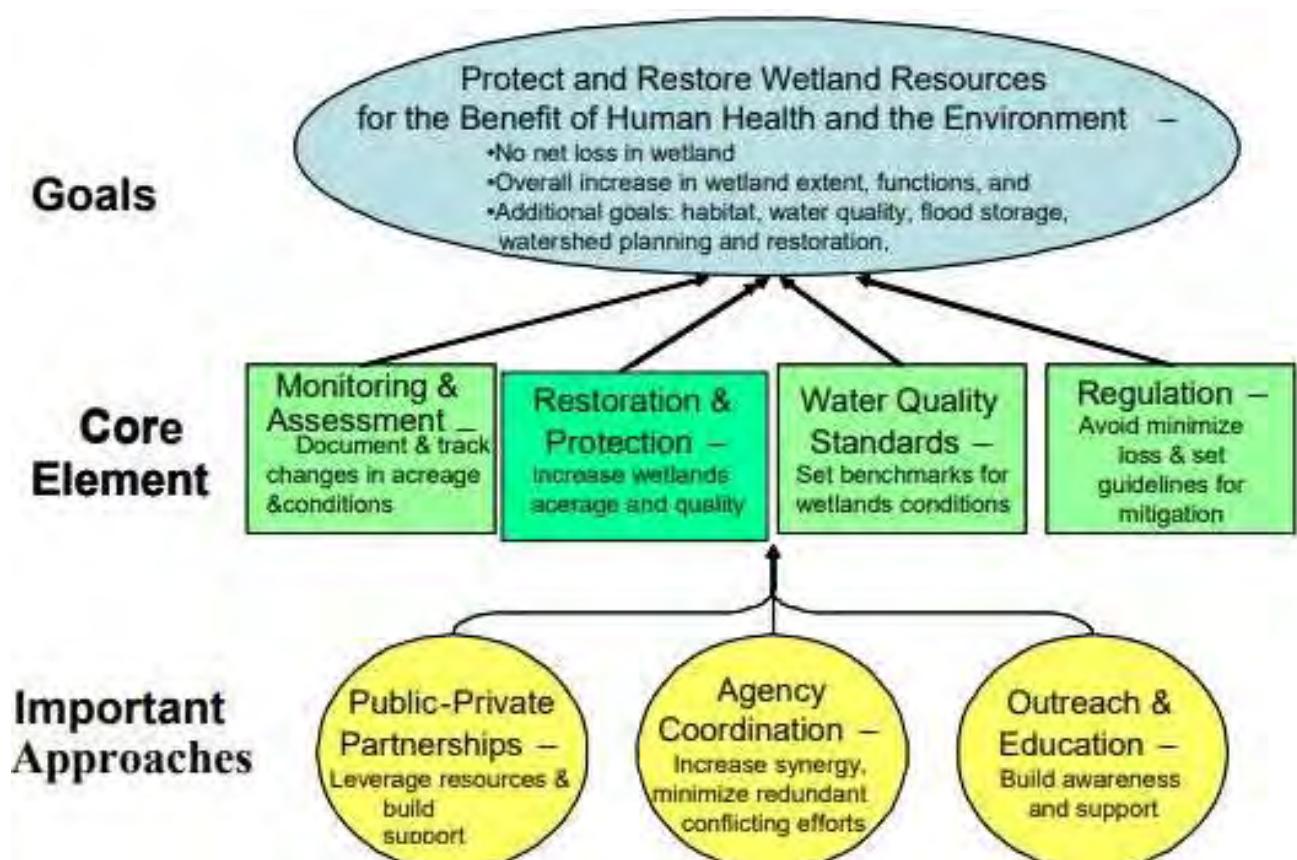


Figure 3.2 Core Elements Framework by the US Environmental Protection Agency (EPA, 2008, pg.4)

3.10.3 No Net Loss of Wetlands

In 1990, the U.S. congress instructed the Army Corps of Engineers to pursue the goal of “no overall net loss,” according to Section 307 in the *Water Resources Development Act*. No net loss aims to support the goal of preservation and mitigation to compensate for lost wetland values and functions (Maureen Ryan & Mark Squillace, 2004). Preserving wetlands or mitigating for their losses involves a three-stage process known as “sequencing.” Most state and federal wetland policies require wetland permit seekers to first avoid wetland impacts if possible, second, minimize unavoidable wetland impacts, or third, mitigate any remaining wetland impacts.

The costs and delays associated with wetland mitigation provide some economic incentives for land developers to avoid and minimize wetland impacts. And, as long as wetland mitigation actually offsets unavoidable wetland losses, the approach results in “no net loss” of wetlands. In theory, mitigation sequencing *should* achieve no net loss of wetland; however, Bendor (2009) writes that repeated delays in attaining successful mitigation can result in a substantial net loss of wetland function at the landscape level and that any systematic cause of wetland function loss has significant implications for modern wetland policy. It requires

acknowledging, accounting for, and protecting against dynamic, temporary wetland loss to maintain the services and values that wetlands provide. He argues that estimating aggregate wetland restoration delays is necessary for evaluating the extent to which regulatory programs support the goals of no net loss.

3.10.4 Habitat Banks

No net loss has stimulated the expansion of restoration practices through wetland mitigation and banking. The concept of habitat banking was first introduced in the US in the mid-1980s to compensate for losses of wetland habitat to new developments. Since the introduction of mitigation banking, the practice has expanded to include compensation for losses of species-at-risk habitat in the US. In recent years, various countries around the world have begun developing similar habitat banking programs, and numerous habitat banks are now operational internationally (Madsen, Carroll, & Brands, 2010).

3.11 National Wetland Policy and Management Program: Canada

Canadian federal lands are considered national territory and are managed separately from provincial lands. The onus to manage provincial natural resources falls on each province, but national policies and strategies can and should lead the way. Streamlining the outcomes of each provincial strategy is possible with a national strategy that oversees the effective, efficient, and transparent management of Canada's wetlands. Currently, the National Wetland Roundtable (NWR) in Canada will play a major role in implementing the national strategy.

3.11.1 The Canadian Wetland Classification System (CWCS)

The CWCS is based on a three-level classification: five wetland classes (bog, fen, swamp, marsh, and shallow waters); wetland forms based on surface morphology, surface pattern, water type, and underlying soil morphology; and an open-ended number of wetland types. The "wetland type" level recognizes that field-level wetland classification and mapping requires practical local experience and input. The currently 49 wetland types used in the CWCS allow regional approaches to site-level wetland classification to be part of the system (Rubec, 2018).

3.11.2 Canadian Federal Policy of Wetland Conservation

In the late 1980s, the Canadian government and other sectors in the country began a concerted effort to develop a national wetland policy. A workshop organized by Environment Canada resulted in recommendations by NGOs describing the need for wetland policy across the country. Along with efforts by Environment Canada, the following events led to the

culmination of the federal wetland policy and subsequently many provincial policies (Rubec, 1994):

- The *North American Waterfowl Management Plan* (1986) is a multilateral agreement between Canada, the United States and Mexico “to reverse or modify activities that destroy or degrade waterfowl habitat, primarily wetlands.”
- A *Framework for Wetland Policy in Canada* (1987) endorsed and encouraged the application of the framework across federal and provincial member jurisdictions.
- A wetland policy statement to supplement the “wise land use” provisions of the *Federal Policy on Land Use* was recommended by the Federal Interdepartmental Committee on Land.
- *The Federal Water Policy* (1987) identified wetland conservation as a significant water resource issue.
- In 1987, the Third Meeting of the Contracting Parties to the Ramsar Convention was held in Regina, Saskatchewan, in which they adopted a definition of *Wise Use*, and the Wise Use Working Group, established at Regina, subsequently produced *Recommendation 4.10: Guidelines for the implementation of the wise use concept*.
- The *Sustaining Wetlands Forum* (1990) produced recommendations calling for all jurisdictions in Canada to adopt mutually supporting wetland conservation and management policies.
- Canada's Green Plan announced the federal government's commitment to adopting a federal wetland policy.

The *Federal Policy on Wetland Conservation* (FPWC) was based on a rationale that defined the importance of wetlands through the ecological, socio-economic, and estimated value of wetland functions in light of the on-going loss and degradation of the wetland resource (Government of Canada, 1991). *Environment and Climate Change Canada* (ECCC) is the federal agency responsible for the implementation of the FPWC. The policy objective with respect to wetland conservation is to “promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future” with seven goals, including no net loss of wetland functions on all federal lands and waters (Austen & Hanson, 2008). Like the USA, the FPWC has a goal of achieving no net loss of wetlands in the country. Unlike the USA, there are no federal agencies that work directly with provinces or aboriginal groups to create wetland management programs. Access to federal funds became available through the National Wetland Conservation Fund (NWCF) beginning in 2014 but ending in 2019.

3.11.3 Canadian Wetland Inventory

A Canadian wetland inventory does exist, but “unlike most developed nations, Canada does not have a comprehensive wetland inventory for the entire country” (Ducks Unlimited Canada [DUC], 2018). In 2002, the Canadian Wetland Inventory (CWI) was established by DUC, Environment Canada, the Canadian Space Agency and the North American Wetlands Conservation Council as a resource to focus on conservation, restoration and wetland

monitoring programs. The standard methodology of the CWI has been tested and finalized on 25 study sites and wetland inventories completed in the Boreal and Prairie ecozones, as well as the Saint Lawrence Lowlands in Quebec (DUC, 2018). It is not clear when the inventory will be completed because access to funding remains an unanswered question, but DUC estimates that the inventory will be complete within five years of securing funding. It is not clear how much money is required to complete the inventory.

The National Wetland Roundtable²⁴ (NWR) research points to the need for a complete national inventory of current wetland resources complemented with an ongoing monitoring program to track the status as well as trends of all classes of wetlands and their ecological goods and services. According to the NWR, the key elements of a national inventory include:

- A framework with standard practices such as delineation and classification.
 - Science-based approaches are supported by the best available technology, such as satellite imagery.
 - Links to inventory and monitoring efforts, including forestry, agriculture, and greenhouse gas emissions.
 - Data sharing.
 - Ongoing collaborations outside government agencies that are funded by partners.
- (Canadian Wetlands Roundtable, 2016)

3.11.4 Wetland Management Initiatives Across the Nation

Many positive initiatives have taken place since Canada's move toward protecting and conserving Canada's remaining wetlands. Habitat banks are one such example. Habitat banking is a variation on habitat offsetting, which can apply to any ecosystem that requires offset,

[...] whereby offset benefits are provided not in response to the negative impacts of a particular development project, but rather proactively in anticipation of future development projects (Poulton, 2018).

The first habitat bank in Canada was constructed in 1993 in the North Fraser Harbour in Vancouver, British Columbia. Several other Canadian provinces have developed wetland habitat banks, including Nova Scotia, Quebec, Manitoba, and Alberta. Nationally, Canada currently lacks a well-defined, formalized process for establishing and operating habitat banks.

Updated policies and legislation continue to guide Canada's wetland conservation (Myers et al., 2013). For example, Ontario's *Wetland Conservation Strategy* (2017) represents a 15-year (2017-2030) blueprint for improving the conservation of wetlands by providing a conceptual framework for conserving Ontario's wetlands in order to achieve by 2030, a net gain in wetland area and function where wetland loss has been the greatest in the province

²⁴ The CWR is an organization created in 2015 that is responsible for developing programs that develop and share trusted information about wetland science, management, and stewardship. The organization is co-chaired by *Ducks Unlimited Canada* and the *Canadian Federation of Agriculture*

(Farquharson et al., 2018). Manitoba's *Peatlands Stewardship Act* (2014), which came into effect in 2015, promotes the protection and conservation of peatlands. Quebec's 2017 legislation respecting the conservation of wetlands and bodies of water "reforms the legal framework in order to modernize the measures that ensure wetland conservation" (Farquharson et al., 2018, pg.3).

3.11.5 Critical Issues with Canadian Wetland Management Approach

Canada has identified major problems in its current approach toward wetland conservation as the country continues to experience wetland loss, declining biodiversity, fragmentation, and degradation despite efforts to curb these negative impacts. Critical issues identified in their COP national report include (1) trust issue between governments, industries, agriculture and conservation; (2) flooding and property damage; (3) heightened divisions between landowners; and (4) a lack of legislative and regulatory clarity or certainty for all parties involved (Farquharson et al., 2018). The most significant difficulties in implementing a national strategy are due to limited data in Northern regions and a lack of ongoing monitoring programs (Farquharson et al., 2018). At the provincial level, there are fundamental wetland policy issues such as:

- The continued exemption of agricultural activities.²⁵
- The limited protection afforded locally.²⁶
- Identify significant wetlands and unevaluated wetlands.
- Comprehensive provincial wetland inventories.
- The lack of a water quality/quantity protection policy or statutes.²⁷
- Limited access to financial resources affects all levels of wetland management.

3.11.6 Priorities for the Future of Canada's Wetland Management

Canada has identified five priorities for the future of a national wetland policy implementation strategy, including:

1. Work toward implementing the key recommendations from the CWR about national and regional inventories, policies and ecological goods and services.
2. Better communication about the importance of wetlands to Canadians.
3. Strengthen Indigenous Peoples' participation in the conservation of wetlands.
4. Increase dialogue and opportunities for sharing information between wetland stakeholders.

²⁵ Prairie pothole wetlands are some of the most threatened ecosystems largely due to uncontrolled drainage from land use and agricultural expansion. Prior to 1990, the Alberta government encouraged landowners and producers to drain wetlands to increase land for agricultural use through various supports such as the *Farm Surface Water Drainage Program* and through the operation of drainage districts (Bruneau, 2017).

²⁶ Quebec has delayed environmental permitting requests in certain municipalities until the municipalities have completed management plans to demonstrate an overall wetland protection strategy. There is a significant amount of pushback from both municipalities and developers who are not onside with this requirement and have posed legal challenges to the province.

²⁷ Ontario reconsidered its provincial policy statement and water management strategies in the wake of the Walkerton Inquiry, leading to recommendations to consider source protection and the role that wetlands play in water quality and quantity (Hostedde & Shrubsole, 2003).

5. National support for documenting and addressing changes to Ramsar Sites.

According to its COP13 national report, Canada has also committed to conserving “at least 17 percent of Canada’s land and freshwater through a network of parks, protected and conserved areas, and other effective area-based conservation measures by 2020” (Farquharson et al., 2018, pg.4); however, it is not clear if this goal has been met in light of the pandemic events of 2020.

3.12 Conclusion

This chapter explored wetland management and conservation at international and national levels. The discussion began by describing the link between water management and wetlands. The goal was to highlight the importance of sustainable water management to the *wise use of wetlands* because it is necessary to ensure that adequate water of the right quality is allocated to wetlands at the right time (Ramsar Convention Secretariat, 2010b). The discussion then moved on to the ways in which wetlands are managed in Australia, the U.S.A, and Canada to present the context for wetland management precedents and applications in the real world. The following section narrows in on water and wetland management in Alberta.

Chapter 4 Wetland Management and Policy in Alberta

Provinces within Canada are responsible for the management of their natural resources. In the past, Alberta's natural resource policy regime could be "characterized by independent, silo decision making" (Budny, 2014). Resource management at the regional level became possible after a series of shifts in the Alberta socio-political landscape regarding natural resources. The most profound influence toward the development of integrated resource planning in Alberta occurred in the 1970s when the government identified the need "[...] for a plan to promote the orderly approach to resource allocation" (Marczyk, 1985) in the Eastern Slopes region of the Rocky Mountains.²⁸ Fast forward to the 21st century, the government's goal to fully realize an *Integrated Resource Management System* (IRMS) remains on the agenda for now. The *Alberta Wetland Policy* (2013) is one of the many shifts toward a more integrated land and resource management system. The following discussion will center on Alberta's wetland management and policy context in terms of regional planning, water management and the regional wetland policy. Furthermore, sections related to wetland policy in Alberta includes Key Informant (KI) input.

4.1 Regional Planning in Alberta

The IRMS is closer to being fully achieved due to the implementation of the Alberta Land Stewardship Act, RSA 2000, c. A-26.8. The Act was proclaimed into law in 2009 to change how Alberta's economy is managed to accommodate population growth, promote sustainable development, and the wise use of land and our natural resource (GoA, 2009). The Act authorizes regional planning under the *Land Use Framework* (LUF). The LUF, released in December 2008, sets out seven strategies to achieve the new approach for managing the province's land and natural resources to achieve Alberta's long-term economic, environmental and social goals. For example, the LUF divides the province into seven planning regions based on watershed boundaries that align within existing municipal limits. The *Regional Plans* (RPs) are based on these boundaries. RPs define expected regional outcomes (economic, environmental and social) and provide a comprehensive plan for land and natural resource use on public and private lands. For each RP, objectives are also established, along with the strategies and actions that will be used to achieve them. Issues surrounding the infringement of property rights among private property owners in rural areas showed a lack of clarity around the

²⁸ At this moment in time, the current United Conservative Party (UCP) has removed this policy in order to enable coal pit-mining in the area, as well as removed the moratorium on water licenses in the area.

purpose of regional planning (Wilson, 2013). Amendments to the Act were made, and the issue was eventually clarified.

4.2 Water Management Background

Water management in Alberta underwent reforms following a conflict in the 1980s regarding the construction of the Oldman Dam; however, other historical events ultimately led to the Oldman River conflict. Legal issues involving the federal and provincial governments, and later First Nations communities and citizen-led coalitions; supply-side water management issues; and irregular regulatory approaches culminated in revising Alberta's water resources management (Schmidt, 2014). Alberta embarked upon water management consultations in the 1990s. Subsequently, and in response to the pressure of coalitions formed during the Oldman Dam controversy (Schmidt, 2014), the government passed the *Water Act* (1996), which came into force in 1999 (Kwasniak, 2016). The *Water Act* (1996) enabled the government to create regional watershed management plans and a provincial water strategy (Heinmiller 2013).

The need for a provincial water strategy was evident as the province faced significant pressures on its water resources due to population growth, droughts, and agricultural and industrial development. The increasing demand and pressure on the province's water supply also increased risks to Albertans' health and well-being, the economy and aquatic ecosystems. In the past, managing water while maintaining a healthy aquatic environment was possible because there had been a relatively abundant and clean supply to meet the needs of communities and the economy. A fluctuating and unpredictable water supply necessitated significant shifts in the province's approach to managing water resources (Saunders & Vlavianos, 2010). Consultations for a provincial water strategy began in 2001 and culminated in 2003 as *Water for Life: Alberta's Strategy for Sustainability*.

4.2.1 Water for Life: A Renewal and Action Plan

Water for Life: Alberta's Strategy for Sustainability (GoA, 2003) initiated Alberta's shift from government to governance through new institutional relationships and shifting rules of conduct for managing water resources in the province (Schmidt, 2014). A review of the strategy five years later by the Alberta Water Council (AWC) found several issues that required attention from the GoA intending to refine the 2003 strategy. The AWC recommendations resulted in the GoA's revision of the 2003 strategy. The GoA subsequently implemented some of the recommendations and renewed its commitment to the strategy in *Water for Life: A Renewal* (GoA, 2008). As a result of the renewed commitment, the document *Water for Life: Action Plan* (GoA, 2009a) was a way to assure Albertans that there was a plan in place to achieve the goals

outlined in the strategy. The renewed strategy and plan delivered a high-level structure outlining goals, outcomes, key directions, and timeframes with which to measure success and be accountable.

The strategy is founded upon three overarching goals: (1) Safe, secure drinking water supply; (2) Healthy aquatic ecosystems; and (3) Reliable, quality water supplies for a sustainable economy. All of these goals impact wetland management somehow, but the most relevant is the goal of achieving healthy aquatic ecosystems. The strategy also identifies three core areas of focus that are also relevant to wetland management in general. These areas are identified as (1) knowledge and research, (2) partnerships, and (3) water conservation. These are important to wetland management in the province and will be discussed throughout the evaluation in Chapter 6, particularly partnerships, in Sections 6.13 and 6.23.

Water for Life identifies three types of partnerships that are integral to the stewardship of water resources in Alberta: (1) Provincial Water Advisory Council (AWC), (2) Watershed Planning and Advisory Councils, and (3) Watershed Stewardship Groups. Although unique in their approach, each group comprises Albertans who are tasked with planning and implementing improved water and watershed management throughout the province. These partnerships are fundamental to the protection and conservation of wetlands in Alberta.

4.2.2 The role of legislation policy and regulation in the conservation and management of wetlands in Alberta

In the context of wise use of wetlands, the design and implementation of wetland policy, and supporting legislation and regulations should promote the conservation of wetlands through management actions, rules, and stewardship. The premise behind conservation is the preservation or efficient use of resources. In the case of wetlands, there is an urgent need to prioritize the restoration and reclamation of degraded wetlands, and conserve remaining wetlands on the landscape. Because this would happen simultaneously with resource and land development, in the context of wise use, it becomes the task of government, non-governmental organizations, citizens, and stakeholders to advocate for and ensure wetland ecosystem needs are accounted for in legislation, regulation, and policy. It is necessary than to clarify the role of each of these management tools in the conservation and management of wetlands in Alberta.

The traditional meaning of legislation “aims to manage or control human activity for particular purposes, requiring compliance with specific regulations, and specifying punishment for contravention” (Rubec and Lynch Stewart, 1998). Specific legislation for wetlands does not exist in Alberta, so wetland legislation in this context refers to statutes or acts passed by legislatures “that have been used to conserve wetlands or have the potential to do so” (Rubec

and Lynch-Stewart, 1998). For example, the *Water Act* is not a wetland statute, but it does offer limited support or at least opportunity to support wetland conservation by, among other things, mandating a strategy for the protection of aquatic ecosystems. Section 36 of the Water Act states that,

Any activity that affects or has the potential to affect water body and/or the aquatic environment requires a Water Act approval. Additionally, before initiating any activity on “public land” [such as a water bed or shore line] an approval under the Public Lands Act is required.^{29,30}

The *Water Act* and *Public Lands Act* are administered by the Government of Alberta mainly through Alberta Environment and Parks, but also through the Alberta Energy Regulator for energy development projects. Although legislative authority is generally administered by the GoA, the *Municipal Government Act, R.S.A. 2000, c. M-26* grants power to municipalities that “Provides for municipal bylaw passing powers (Part 2), municipal “direction, control and management” of natural water bodies (s. 60), and planning and development of all private and municipal lands within municipal boundaries. (Part 17)” (Stewart, 2009). But the authority to act on legislative direction has not resulted in significant wetland conservation in the province through provincial or municipal powers (Stewart, 2009).³¹

Legal statutes are implemented through regulatory action. Regulations are the rules that address the details and practical applications of legal statutes thereby regulations have the full force of the law. The authority to make regulations is assigned within the associated Act. For wetlands in Alberta, Approvals, Authorizations, Licenses, and Dispositions are the regulatory instruments that exist under the legislative authority of the Water Act and Public Lands Act. Furthermore, triggering regulatory mechanisms to disturb wetlands enables a number of directives designed to support the regulatory process within the wetland management framework in the province (See Table 4.1).

Understanding the role of legislation and regulations associated with wetland management in the province provides insight into the GoA’s approach for conserving wetlands in the province. We now know that wetlands are not directly protected by legislation and that regulations exist in order to manage impacts to wetland resources. The role of wetland policy then becomes a very important one,

²⁹ Depending on the activity that will impact a wetland, other provincial Acts may require compliance such as the Fisheries (Alberta) Act, Environmental Protection and Enhancement Act, Wildlife Act or Forests Act. If the impact will occur on federal lands, federal statutes may apply.

³⁰ Stewart (2009) summarizes federal and provincial legislation affecting municipal management of wetlands and riparian lands in Alberta’s White Zone.

³¹ Enacting legislation, regulation, and policy on public lands (Green Zone) compared to private lands (White Zone) has resulted in added complexity to wetland conservation in Alberta (see Section 4.4).

Policies for wetland conservation have emerged as an important tool in Canada's effort to conserve wetlands, focusing primarily on the functions that wetlands provide. The main elements of such policies have been private landowner stewardship of wetland resources; government-industry-landowner cooperation; water quality and flood damage reduction; sustainable use of wetland resources; intergovernmental cooperation; protected areas management; education and public awareness; and research and science (Rubec and Lynch Stewart, 1998)

The development and implementation of a regional wetland policy in Alberta is an important step in recognizing wetland issues and, ideally, targeted actions to deal with wetland loss and degradation. A policy designed specifically for wetlands provides "a clear opportunity to recognize wetlands as ecosystems requiring different approaches to their management and conservation, and not being masked under other sectoral management objectives" (Ramsar Handbook 1pg 17). Wetland policy should identify the key activities and provide a general strategy to decision-makers on how to handle issues as they arise. While wetland policy cannot dictate processes or enforce punishment for contraventions, it can

[...] call into service a range of legal tools to tackle a particular issue. It can guide the development, revision and interpretation of legislation, and in so doing ease duplication and incompatibility among statutes. Policy can establish goals and objectives to work towards and justify the resources that are required to make progress on issues. Policies also promote awareness and understanding of wetland issues by [citizens].

The Alberta Wetland Policy (2013) is discussed in the following section.

4.3 Alberta Wetland Policy (2013)

Prior to the *Alberta Wetland Policy*, Water Act applications to disturb a wetland were made under the guidance of the *Wetland Management in the Settled Areas of Alberta – an Interim Policy* (1993)³² and, where applicable, used the *Provincial Wetland Restoration/Compensation Guide* (2007). KI-7 explains that "[t]he Alberta Water Council that helped shape the policy in a significant way certainly included experts. Its actual development occurred in 'fits and starts' over a 20+ year time period" (Appendix 2, pg.10). Indeed, in 2013 the *Alberta Wetland Policy* replaced the long-standing *Interim Policy* (1993), and even then, it only applied to the White area of the province -- until 2016, when the policy was "fully" implemented to include the Green Area. KI-8 says that:

[T]he process leading to the new policy was long and complex. Experts were consulted, there was a Water Council Wetlands Committee struck to help develop a new policy, but despite their long and hard work, their report was not consensus-based. The GOA then began a new process to develop the policy that was not, in any obvious sense, multi-stakeholder-base (Appendix 2, pg.10).

³² Although the Interim policy goals applied to peatlands in the "unsettled" Green area, a cautious approach to the use and development of peat resources was adopted until a policy for peatlands came to fruition (Alberta Water Resources Commission, 1993)

KI-6 echoes the previous statement and explains:

A lot of resources, expertise, science and research went into the design and implementation of the new policy. However, there are political factors that make implementation an ongoing challenge. For example, the agricultural sector needs to be better engaged to ensure that they are aware of the policy and have the right tools to meet its requirements. (Appendix 2, pg.10)

With implementation well underway, the policy is designed to support wetland management in the province with guidance and tools that were not available before through the interim policy. The *Alberta Wetland Policy* “provides the strategic direction and tools required to make informed management decisions in the long-term interest of Albertans” (Alberta Water Resources Commission, 1993). Furthermore, the 2013 policy design also supports the achievement of all three goals of *Water for Life*, which signals strong support for an integrated water management approach.

The policy goal is to conserve, protect, restore and manage Alberta’s wetlands to sustain the benefits they provide to the environment, society, and economy (White, 2013). Most respondents either agree or strongly agree that the overall policy goal is achievable, but that “to achieve this goal a broader societal change is needed” (KI-6, Appendix, 2014, pg.11). KI-7 says that “it’s a strong policy signal on government priority and direction. Without it, wetlands would be ignored” (Appendix 2, pg.11). And although it is a strong signal from the GoA about its direction, KI-8 is of the opinion that “The goal is achievable if the GoA aggressively seeks to realize it. However, the policy is not no-net loss, and it is not law. If the government does not aggressively seek to realize the goal, the goal will not be achieved” (Appendix, 2014, pg.11). The policy will also “[r]equire monitoring of outcomes to determine if this is being achieved through land-use decisions” (KI-1, Appendix 2, pg.11). Even though the regional policy improves upon the interim policy, it requires monitoring, evaluation and enforcement programs that support wetland resource management.

To apply to alter a wetland, an applicant must demonstrate sufficient consideration of the mitigation hierarchy: avoid, minimize, and in the case of unavoidable impacts, meet the replacement requirements (Kwasniak, 2016). Legislative alignment and regulatory authorizations to disturb wetlands are required if avoiding impacts to wetlands is not possible for the proposed activity. Land ownership enquiries are also a matter to consider when determining the right to conduct activities that will disrupt a wetland ecosystem.³³ In addition to legislation,

³³ This is a result of determining who owns the bed and shore of a wetland which depends on if the wetland is not permanent or naturally occurring (Stewart, 2015)

regulation, and ownership, there are many guides, tools, and directives designed to help achieve the policy goal.

4.3.1 Wetland Management Planning Tools and Assessments

An applicant proposing an activity that will impact a wetland that has determined the impact cannot be avoided must submit a wetland assessment to the appropriate regulatory body, which is then reviewed and signed by an authenticating professional. The following table summarizes the standardized guides and tools for wetland management in Alberta. All of the information is publicly available on the *Alberta Wetland Policy* implementation [webpage](#) or Alberta's open government portal.

Name	Description
Regulatory Requirements Guide	<i>Outlines regulatory instruments and processes applicable to AWC implementation.</i>
Stepping Back from the Water	<i>A beneficial management practices guide for new development near water bodies in Alberta's settled region.</i>
Alberta Merged Wetland Inventory (AMWI)	<i>Digital depiction of wetlands for the 5 major classes in the CWCS: bog, fen, marsh, swamp, and shallow open water.</i>
Merged Wetland Inventory Status Map	<i>PDF map that summarizes the data sources and resolutions for different portions of the province.</i>
Relative Wetland Value Map	<i>Provides a preliminary (non-regulatory) estimate of relative wetland value (ABWRET-E) to assist with high-level planning of wetland activities in the WA of the province, such as a Community Area Structure Plan.</i>
Alberta Wetland Identification and Delineation Directive	<i>This document explains how to identify wetlands and delineate their ecological boundaries. The directive is designed to improve the accuracy and consistency of wetland boundaries, areas, and assessments.</i>
Alberta Wetland Classification System	<i>The AWCS groups wetlands into five major classes based on common physical, chemical, and biological characteristics. The system subdivides each class by its vegetative form and type.</i>
Alberta Wetland Assessment and Impact Report (WAIR)	<i>This is a document that a qualified professional or team prepared in accordance with the Alberta WAIR Directive.</i>
Alberta Wetland Assessment and Impact Form (WAIF)	<i>This document is used to support low-risk activities regulated by Alberta Environment and Parks and the Alberta Energy Regulator.</i>
Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A)	<i>A standardized method for assessing the function of wetlands using onsite observations and offsite spatial data. The relative value determined by ABWRET-A is used to inform decisions to avoid high-value wetlands and to determine the replacement ratios and costs for wetland replacement where avoidance is not possible.</i>
Alberta Wetland Rapid Evaluation Tool – Desktop (ABWRET-D)	<i>Supports wetland evaluation for eligible activities that require a WAIF.</i>

Table 4.1 *Alberta Wetland Policy* Guides, Tools and Directives

Table 4.1 summarizes the regulatory tools available supporting the 2013 policy that were not available for the interim policy. KI-6 writes:

[m]any tools that would help with wetland management are still being developed. For example, the wetland inventory is still incomplete. More capacity is needed at the municipal level to ensure better wetland management" (Appendix 2, pg.8)

Thus, although these tools are technically in place, implementing the policy and its tools is an ongoing process. KI-7 says that the policy implementation process "[...] has made good progress on tools and knowledge [but] the reality is that all the tools and knowledge required to do this well are major undertakings (e.g., wetland inventory), so only so much is possible in the short term" (Appendix 2, pg.8). KI-10 is less convinced that the tools will function to achieve sustainability in wetland management. The respondent notes that

If wetland management needs means allowing people to simply remove and place wetlands as they choose and as it benefits development, then yes, the policy certainly has provided more tools (KI-10, Appendix 2, pg.8)

But what is not clear to the informant is how the policy accounts for the natural environment:

It leaves little wetland management responsibility to the natural environment. Wetlands will be managed for maximum economic benefit rather than for maximum ecological service" (Appendix 2, pg.8).

This section summarized the wetland management planning tools and assessments now available in Alberta. Alongside the summary of wetland planning tools, this section also presented the opinions of the KIs related to the wetland policy tools. In doing so, it is possible to see that even though there is a sense of strong wetland policy action, there lacks a clear vision of how these actions will effectively address continued wetland loss and degradation.

4.3.2 Wetland Mitigation Directive

The *Alberta Wetland Mitigation Directive* is designed to inform planning and decision-making to avoid and minimize negative impacts to wetlands and, where necessary, to replace lost wetland area and value. Mitigation is not new to the 2013 policy; it was the top regulatory tool under the interim policy to determine whether or not a wetland was disturbed. Unfortunately, even though the primary and preferred response has always been to avoid wetland impacts, applications to disturb wetlands are rarely denied. Minimizing and replacement have been the most common outcome of an authorization related to wetland impacts (Clare & Krogman, 2013; Clare et al., 2011). KI's also addressed this issue when asked about the 2013 policy's ability to protect wetlands. One respondent with a regulatory background said that the policy could protect wetlands in Alberta, but that it "is not clear to what extent avoidance through alteration of

site locations will be supported by the regulators" (KI-1, 2014, pg.1). Another respondent, with a background in regional watershed stewardship, partially agreed that the 2013 policy could protect wetlands but that "i[t] really depends on how strongly [AEP] adhere to wetland avoidance as the primary response to applications" (KI-4, 2014, pg.1). Uncertainty around the implementation of the mitigation hierarchy is common among most respondents. Another respondent who represents a local municipality disagrees that the policy is designed to protect wetlands because "The policy does not value the existence of a wetland to its direct surrounding environment, it will allow it to be drained, and the direct value will be lost" (KI-10, 2014, pg.1). The potential for the policy to protect wetlands is nascent, as a representative from Alberta NAWMP stated, the policy will directly protect wetlands by "reduc[ing] but not eliminat[ing] unregulated wetland loss" and that it "provides clear priority and direction on wetlands to all other Government of Alberta Ministries" (KI-6, 2014, pg.1). Fortifying the policy will require input from local communities and stakeholders at all levels and action on behalf of the GoA and water partners to deliver an effective and efficient wetland management program.

4.3.3 Wetland Values and Functions

A new feature of the 2013 policy is the concept of relative wetland value (RWV). Wetland functions and values are designated by using a relative wetland value based on the following functions: (1) biodiversity and ecological health, (2) water quality improvement, (3) hydrologic function, and (4) human uses. Value categories of A to D are based on criteria related to these functions and the relative abundance of wetlands in each region of the province. The value categories determine replacement values in the case that wetland impacts are unavoidable. Valuing wetlands in this way supports a more structured way of managing wetlands on the landscape that may be subject to development. Some stakeholders disagree about the purpose of a more structured approach. KI- 10 writes that "The environmental value of wetlands, and the fate of their existence, will still be subject to economic preference" and that "In my experience when it comes to the profitability of the agricultural sector, the economic incentive is not enough to ensure that societal and environmental values are upheld" (Appendix 2, pg.3). KI-12, a private agricultural landowner, disagreed that relative wetland value is an important aspect of the 2013 policy (Appendix 2, pg.15) but did not offer further clarification on their perspective.

The remaining KIs partially agreed, agreed, or strongly agreed that RWV is an important aspect of the 2013 wetland policy: "It is one of the foundational concepts," says KI-1, whereas KI-2 goes a step further and offers a way to improve RWV: "part of the RWV might be a sliding scale. As wetlands become increasingly scarce their value goes up" (Appendix 2, pg. 15). KI-6 explains that

Unlike the interim policy, which used an ‘acre-based’ approach when trying to mitigate wetland loss, the new policy adopted a ‘value-based’ or a ‘functions-based’ approach. So yes, relative wetland value is an important new development” (Appendix 2, pg.15).

The RWV is in alignment with the policy’s principle to protect wetlands of the highest value, “[t]hen you need a means to assess that” (KI-7, Appendix 2, pg.15). But although RWV offers a way to assess the value of wetlands in Alberta, something that was not an option before the 2013 policy, “the approach can be difficult and expensive for those who wish to preserve wetlands in the public interest to establish RWV” (KI-8, Appendix 2, pg.15). Thus, although RWV is generally a positive step toward improved wetland management in Alberta, more tools are needed to address different land-uses such as wetlands on private agricultural lands and wetland conservation by NGOs or private stakeholders on public lands. The issue of protecting wetlands in the public interest is addressed to some extent by wetland stewardship and the *Water for Life* partnerships.

4.3.4 Wetland Restoration Directive

There has been a significant change to the way wetlands are valued since the interim policy. As a result of the replacement matrix and relative wetland value, the previous *Provincial Wetland Restoration/Compensation Guide* used by DUCs, the only wetland restoration agent at the time, has since been archived (Alberta Environment, 2007). The replacement matrix and relative wetland values are found in the *Alberta Wetland Restoration Directive*, which now guides the process for the replacement of wetlands and wetland values (GoA, 2016). In addition to the *Directive*, a guide for setting a *Practice Standard for Wetland Science, Design, and Engineering* (Kwasniak, 2016) was developed by AEP and ten professional organizations in the province.

Wetland restoration on private land is voluntary. As defined in the *Wetland Restoration Directive*, there are three options for restorative replacement from which proponents can choose:

1. Payment to the in-lieu fee program allocated to restorative replacement with wetland restoration completed by a Wetland Replacement Agent.
2. Purchase of credits from a third-party wetland bank.
3. Permittee-responsible replacement.

KI-7 says that the new policy “[...] does provide balance [because] it discourages wetland loss by a regulated requirement to replace what is impacted” (Appendix 2, pg.3). KI-10 says that in their experience:

[...] WRAs must seek out potential restoration opportunities. In order to perform many restorations, a private landowner must AGREE that restoring a wetland will provide the landscape (and most importantly, the owner) with a benefit. Finding landowners willing to

restore wetlands is the hard part and is restrictive to the ability of the wetland policy to fulfill its purpose. I foresee the loss of many wetlands on the landscape in a rural municipality such as my own, with little possibility for equivalent restoration within its boundaries (Appendix 2, pg.1)

Finding landowners willing to restore wetlands on their lands has proven to be difficult because it would require the landowner to give up land use for wetland restoration when there are other more lucrative options for using their land. In addition, it seems that agricultural owners are less rigorously regulated. KI-10 explains that:

Agricultural producers are consistently awarded additional privileges when it comes to Alberta-wide reduction of environmental impact. Cumulatively, the impact of farms is substantial; certainly, the case when it comes to wetland loss. Developers and other industries will no doubt be forced to comply with the new policy, while agricultural producers seem to experience a much lower risk of enforcement.

They explain that they do not believe

[...] that the Government of Alberta has the ability to enforce the Wetland Policy as it pertains to rural Alberta. Many farms will continue to drain wetlands for agricultural profit, and it will go unnoticed. I feel that the responsibility is left too heavily on the municipality to enforce such legislation, a responsibility that is not valued to the same degree across different municipalities.

This is unfair:

If some stakeholders in wetland loss and protection are asked to comply with the new policy, there must be some mechanism in place to ensure that ALL stakeholders are held to the same standard. (Appendix 2, pg.2)

Government direction on private lands with regard to wetlands has been identified as a major challenge for the implementation of the 2013 policy. KI-4 notes that “Challenges with wetlands on agricultural landscapes was not addressed [during stakeholder consultations], and to my knowledge has not been dealt with” (2014). Since then, there have been more initiatives to work with private landowners through communication, education, participation and awareness activities delivered by organizations such as DUCs, Alberta NAWMP, and ALUS. Solving these issues will require continued cooperation and appropriate compensation. KI- 6 writes that “More capacity is needed at the municipal level to ensure better wetland management. Capacity is also an issue for the agricultural sector” (Appendix 2, pg.8), thus expressing a need for capacity and coordination among landowners and WRAs.

4.3.5 Wetland Stewardship in Alberta

Stewardship is recognized in the wetland policy as an important component of effective wetland management. Stewardship will be advanced through education and awareness, voluntary programs, and/or incentives to encourage wetland conservation, restoration, and

protection. AEP is currently working with stakeholders to explore opportunities for enhanced wetland stewardship, including the creation of a wetland banking program. There are grants and programs available for creating and restoring wetlands. There are also long-standing agencies at the national and international levels that have been involved in wetland conservation for decades. The NAWMP and DUCs are both major agencies whose focus is on wetland conservation for waterfowl management, and they are involved in many aspects of wetland management in Alberta, including restoration, research, policy, stewardship, and education. Wetland stewardship will be discussed in more detail in the following chapters 5, 6, and 7.

4.3.6 Legal and regulatory authority over wetlands in Alberta

The province of Alberta, its municipalities, and the federal government have legal authority over wetlands to different extents. The federal government's authority is primarily under the *Fisheries Act* and the *Migratory Birds Convention Act, 1994*. The GoA "derives its legal authority to regulate wetlands, as well as land-use changes that affect wetlands, under section 3 of both the *Public Lands Act* and the *Water Act*" (Kwasniak, 2016). The bed and shores of all permanent and naturally occurring bodies of water, as well as all water in the province, is owned by the Crown.³⁴ A person who wishes to divert water or carry out land uses that impact water in a natural setting (with exceptions) requires an authorization, whether or not the bed and shores of the wetland are Crown-owned under the Public Lands Act (Kwasniak, 2013). Municipalities have delegated authority from the Province, and derive their authority to regulate impacts on wetlands under the *Municipal Government Act*; however,

The beds and shores of wetlands and their associated riparian lands located within a municipality may be owned by the federal, provincial, or municipal government; by irrigation districts as lands adjacent to or part of their works or distribution systems; by private landowners; or by other organizations such as land trusts or conservation groups. Water contained within wetlands or aquifers underlying riparian lands is always Crown owned (Stewart, 2009, pg. 79).

Ownership of wetland beds and shores have proven to be difficult and confusing to determine on private lands as a result of a multitude of scenarios, agents, and conflicting information (Stewart, 2009). Under the current scenario, municipalities have the choice to implement wetland conservation policies through municipal bylaws and land use bylaw regulations. The City of Calgary is the only example of a municipality that has enacted its own conservation plan: *Calgary Wetland Conservation Plan*; however, the City did not and will not

³⁴ "Ownership of the bed and shore is important because if the bed and shore are private lands, the municipality has to determine the appropriate land use and regulate and control development. If the bed and shore of a wetland is claimed by the Province, then [GoA] authorizes land use, lease of occupation, or disposition" (Stewart, 2009)

meet its goal of no net loss of wetlands because it prioritized land development over wetland retention (Ramirez,2019).

The provincial wetland policy stands alone as a guidance document, but it is supported by regulatory instruments enabled by the *Water Act*. KI-6 points out that the *Water Act* is “[...] not intended to "protect water bodies" - instead, it is a legislation that governs activity in water bodies and therefore does not offer sufficient legislative authority that would enable full wetland protection” (Appendix 2, pg.3). Protection of wetlands may be better enabled through different legislation such as the EPEA. KI-10 suggests that “[in order to decrease wetland loss in the province, protection of wetlands will need to be made into an enforceable law to be effective” (Appendix 2, pg.3). The suggestion to shift wetland policy into wetland legislation is a strong statement, but it is not clear if wetland legislation would be effective without first a review of the wetland policy implementation and its nascent policy tools.

As noted by KI-7, unregulated wetland loss will continue to be a problem even with the new policy in place (Appendix 2, pg.1). In 2016, AEP initiated a pilot project with Strathcona County that aims to bring the government, industry and local communities together to improve understanding of why illegal activities are taking place in water bodies, particularly in wetlands (AB NAWMP, 2016). The County was selected for the pilot project because development pressure from industry and settlement is affecting the region’s important surface and groundwater supplies. Furthermore, damage and loss to wetlands in this area have been greater than in other counties. The purpose of the interviews is to share different perspectives and ideas on the issue and to develop and agree to a set of practical actions that will reduce the number of illegal disturbances to wetlands in Strathcona County. At the time of writing, there were no further public reports available, so the project is likely still underway.

4.3.7 Wetlands Approvals

Disturbing or destroying a wetland in Alberta requires an authorization granted under the *Water Act* or *Public Lands Act* on a case-by-case basis. Government regulators and applicants negotiate the conditions of the permit, and these negotiations are directed by the goal of the wetland policy to sustain the social, economic and environmental benefits of functioning wetlands by applying a mitigation hierarchy of avoidance, minimization, and compensation (Alberta Water Resources Commission 1993). At the same time, regulators are bound by statutory requirements of the *Water Act*, the stated purpose of which is to “support and promote the conservation and management of water,” while also “recognizing the need for Alberta’s economic growth and prosperity” (*Water Act*, RSA 2000, c W-3, 2009). According to Clare & Krogman (2013), in each instance of negotiation, front-line decision-makers must deal with

ambiguous goals within an agency context where the emphasis is placed on the need to “balance” wetland conservation with economic development. Leaving front-line decision-makers with the responsibility to balance wetland conservation with economic development at their discretion without the proper tools to evaluate the impact to the region signals a major problem and perhaps one of the reasons why wetland policy largely fails at preventing wetland loss and degradation. KI-11 notes that the policy is theoretical in nature and does not necessarily impact the approval process: “the policy has nothing to do with the approval process. This process is severely understaffed, and with the new application requirements and flood recovery, the process is worse than ever” (Appendix 2, pg.7). KI-10 echoes Clare and Krogman (2013) and KI-11 because “[...] unless a wetland has been put under protection by a municipal land-use bylaw, there is a very low chance that an application for approval of alteration of the wetland will be denied” and that “[t]he new policy seems to have only made the compensation process for altering a wetland more robust yet complicated” (Appendix 2, pg.7). KI-7 agrees that “[t]he new approval process is more complex and comprehensive, but slower as a result,” and while it is an improvement on the interim policy, the question arises, “Does it honour the core concept that wetlands provide important ecological services and therefore should be protected?” (Appendix 2, pg.7). So, although the new policy offers a more standardized process to move through the approval process, “some of the new policy directives have created some implementation challenges for the industry in terms of increased costs, time requirements and expertise” (KI-6, Appendix 2, pg.7). The issues brought to light in the section repeat the problematic pattern of balancing the environment with the economy, a problem that may not be resolved by the policy or its tools if not carefully considered.

4.4 Private Land Ownership and Wetlands as Common Good

The preservation and conservation of wetlands is a complex issue. Its complexity increases when the wetlands to be preserved or restored are on private lands. Specifically, agricultural landowners who were once encouraged to drain wetlands, but are now encouraged to retain or restore them on their lands. *The Tragedy of the Commons* (Hardin, 1968) is a useful metaphor for analyzing wetlands on private lands. In the metaphor, the *Commons* represent any natural resource shared by multiple parties, and the herdsmen represent the parties that exploit the communal resource for their individual, economic benefit. Wetlands present an excellent opportunity to apply Hardin's metaphor because the key factor is present: acute, internalized benefits (to landowner) with diffuse, externalized costs (to society) (Jaffe, 2001). Almost all of the benefits of developing wetlands go directly to the developing landowner. Hardin (1998)

points out that “a resource available to all, the greediest herdsmen would gain—for a while. But mutual ruin [is] just around the corner” (pg.683). However, the idea of the greedy herdsman is not necessarily the idea that will work to motivate change.

Mutual ruin is what is at stake if we do not learn to work together as herdsmen and herdswomen with responsibilities to each other as human beings, and as stewards of the land that we all occupy—whether we tend to it directly or not. The complexity of wetland conservation on private lands is a result of past worldviews or paradigms, policies and mandates now deeply entrenched in our way of being. A private landowner is generally entitled to private property rights, so long as they do not infringe on the rights of others, yet wetlands are generally common property with common benefits, and they need to be restored onto the landscape. This issue exists all over the world, especially in areas like the Prairie Pothole Region³⁵ (PPR) where intensive agriculture is a way of life with devastating impacts to wetland ecosystems.

The result of past policies is that land-use for purposes other than wetland retention is perceived as more productive and lucrative to humans, particularly landowners. This perception is perpetuated by the fact that the destruction of wetlands has been encouraged in many parts of the world through agricultural policies aimed to stimulate food production (Hansson, Pedersen, & Weisner, 2012). Agricultural policies encouraging food production have been very successful. But “the growth of crops or raising livestock necessitate reclamation measures such as drainage or tillage” (Verhoeven & Setter, 2010, pg. 156). Wetland drainage has led to losses of biodiversity as well as a reduction in the nutrient retention capacity of the natural landscape. These losses mean that the earth’s environmental systems are less resilient in a warming global climate and a global growth economy. Attempts at discouraging wetland drainage have been largely unsuccessful in comparison to the earlier success of encouraging wetland drainage because wetland retention is costly and complicated and yields little apparent benefit to the landowner. Ultimately, wetland conservation on private land is not perceived as a beneficial and productive use of arable land (Hansson et al., 2012). In the current context, government subsidies are required to compensate farmer's financial loss if they choose to participate in wetland conservation practices on their land (Xu et al., 2018).

The intensification of agriculture in the 20th century as a result of fertilizer and pesticide use has seriously diminished the biodiversity of wetland landscapes (cite). Agricultural activities are the primary driver of nitrogen (N) and phosphorus (P) pollution in water systems (Jabłońska et al., 2020). The disruption of the global N and P cycles as a result of agricultural practices is

³⁵ See Chapter 3 in Mitsch & Gosselink (2015) for a discussion on the PPR.

considered “the second most serious global problem after the loss of biosphere integrity due to species extinction”(Jabłońska et al., 2020, pg.2). But reclaiming wetlands on agricultural landscapes can mitigate nutrient loss from nutrient application practices, such as nitrogen fertilizer, that leach into freshwater systems. Wetlands that are intended for the purpose of mitigating nutrient pollution can be successfully managed and monitored to measure how well they keep nutrients from leaching into water systems (Windolf et al., 2016).

Wetland retention, restoration and creation are proven ways with which to address the adverse environmental impacts of human activities on the landscape, but these efforts need to happen at a larger scale now, more than ever before (Hansson et al., 2012). Changing the perception of the value of wetlands compared to the value of arable land has proven to be difficult because it is not lucrative. In addition, it is relatively easy, though generally illegal, to drain a wetland without anyone knowing. Furthermore, wetland creation and wetland restoration are complex and expensive solutions to the problem of wetland loss. But the statement that agricultural land converted into wetland can still be valuable land is not yet an accepted reality in the mainstream. In fact, there are wetland areas in many parts of the world where low-intensity agriculture is combined with ecosystem services other than food, including biodiversity and flood detention (Tamburini et al., 2020).

Over time, the negative impacts of wetland drainage become progressively costlier as the negative ecological consequences increase (Jabłońska et al., 2020). As a result, there is a need to increase the rate of wetland creation and retention all over the world (Hansson et al., 2012). In terms of agricultural practices meant for food production, more wetlands on the landscape will reduce agricultural pollution concentrations in riverine systems because they can act as filters and traps for agricultural run off.

Various studies have shown that the economic factor is one of many motivating influences on landowners in Ireland, Sweden, EU & USA. A such, incentivization has proven to be an effective way to change the perception of wetlands as unproductive lands. Government policies that incentivize farmers with subsidies to retain, restore, or create wetlands on their lands now exist in many countries. For example, payment schemes where farmers receive annual rent for preserving wetlands on their lands exist in the EU through different national programs guided by EU water directives (Dworak et al., 2009) and in the United States of America through the *Conservation Reserve Program* (CRP) and *Wetland Reserve Program* [WRP] (Ferris & Siikamäki, 2009).

Studies from the Prairie Pothole Region in North Dakota, South Dakota and Minnesota show that *Wetlands Reserve Program* projects in these states have the potential to reduce soil

loss by as much as 124,000 tons per year. The amount of soil saved through these projects could prevent over 400 tons of nitrogen and 5.5 tons of phosphorus from washing downstream (USDA & NRCS, 2014). Incentives such as the ones offered through *Wetlands Reserve Program* projects or the *Conservation Reserve Program* would most likely work best for the PPR of Alberta, not only because the impact of agriculture in the White Area represents the worst case for wetland degradation in the province, but also because the greatest potential for wetland restoration exists on private lands in the White Area of Alberta.

The CRP and WRP are the two primary agricultural land retirement programs in the United States. In addition to being central in agricultural conservation, these federal programs are more broadly among the most important national conservation tools. The best example for applicability to a specific region, like Alberta, is the *Farmable Wetlands Program* (FWP). The FWP³⁶ is designed to restore previously farmed wetlands and wetland buffer to improve both vegetation and water flow. It is a voluntary program to restore up to one million acres of farmable wetlands and associated buffers. Participants must agree to restore the wetlands, establish plant cover, and to not use enrolled land for commercial purposes. There are restrictions to which type of land can be used and amount of acreage that can be enrolled. But according to the program website:

Restoring farmable wetlands improves groundwater quality, helps trap and break down pollutants, prevents soil erosion, reduces downstream flood damage, and provides habitat for water birds and other wildlife. Wetlands can also be used to treat sewage and are found to be as effective as high-tech methods (USDA FSA, 2021).

When the FWP pilot program was rolled out in 2001, it provided sign-up provisions and incentives for up to 500,000 acres of small non-floodplain wetlands and adjacent uplands in six states: Nebraska, Iowa, Minnesota, North Dakota, South Dakota, and Montana. Enrollment was limited to 100,000 acres per state. By 2008, 14 states accounted for all of the program acreage in the FWP wherein most contracts are in the PPR. The FWP provides annual rent for terms between 10 to 15 years. Compared to Canada, the USA actually has conservation programs legislated (at the federal level) through its Farm Bill which has resulted in the restoration of >2 million hectares of wetland and grassland habitats in the PPR (Gleason, et al., 2011).

Alberta does have some experience with earlier forms of this approach through heritage conservation of buildings (e.g., tax breaks and density transfers), and the heritage conservation of agricultural land (e.g., unbroken sod, historic ranches) with permanent “purchases” of development “rights” from landowner. Specifically for agricultural lands in Alberta, most of these

³⁶ The Farm Services Agency (FSA) runs the Farmable Wetland Program through the CRP with assistance from other government agencies and local conservation groups.

agreements were generally delivered through the non-profit Nature Conservancy of Canada (NCC) by landowners getting a tax receipt for the market value of their land. The program administered by the NCC is called the Ecological Gifts Program [EGP] (Government of Canada, 2021). The EGP is made possible by the *Income Tax Act* of Canada and the *Quebec Taxation Act*. The EGP is administered by Environment and Climate Change Canada, but there are a multitude of partners at many levels of government, as well as non-government organizations, like the NCC that carry it out. Under the EGP, the NCC is enabled to negotiate conservation easements with private landowners. The conservation easements

[are] registered on title and protect a property's conservation values by permanently placing terms and conditions which are determined and agreed upon by the donor and recipient on its use in perpetuity. Under the terms of the agreement, the donor continues to own the land and may live on it, sell it, or pass it on to heirs (Environment Canada, 2011, pg.9).

The NCC and landowner first agree on a set of land use restrictions for natural habitats present on the property such as intact grasslands, wetlands, and forests. The value of the property is appraised with and without the restrictions. The land use restrictions result in a decline in property value, which becomes the amount of the tax receipt. One of the disadvantages of the EGP is that the deductible often far exceeds five years of the landowner's income tax (especially on farms with large areas of natural habitat) (M. Natvik, personal communication, April 28, 2021). For wetlands, DUC and the Alberta NAWMP work with the NCC to deliver these programs. Optimally, an offer based on assessing an estimate of the ecological service values of a wetland, and a comparison of the value of the relevant wetland in an alternative agricultural land use would be developed. Then an offer to purchase the wetland ecosystem services from the landowner expecting that this amount is greater than the alternative use value, many would accept the amount to commit to wetland conservation, but also that some others would accept, motivated (as citizens) by other factors.

There are many considerations in the development and implementation of an incentivization scheme. First, there is a need to understand how and why agricultural landowners make decisions and what factors influence their decisions with regards to wetland conservation, reclamation, or restoration on their land (Daxini et al., 2018; Hansson et al., 2012). There is also a need to shift policy perspectives about landowners from ordinary citizen, or individual landowner, toward the view of landowner as a professional business manager or entrepreneur (Hansson et al., 2012). Understanding influential and motivating factors, as well as shifting policy perceptions about the role of landowners in environmental management, are necessary in order to improve wetland conservation, reclamation, or restoration on private lands. A better understanding of these important factors will positively inform the design and

implementation of conservation policies, including monetary incentives, aimed at encouraging wetland retention, restoration and creation on private lands.

Studies that have examined these underlying causes have found that most approaches to wetland conservation appeal to landowner as moral citizens concerned with the wellbeing of eco-systems or humanity — but a shift from producer to altruistic land custodian is not a realistic expectation.³⁷ For example, Daxini et al. (2018) found that dairy farmers in Ireland were significantly more likely to voluntarily adopt beneficial nutrient management practices when offered incentives. Naturally, the dairy farmers in Ireland voluntarily chose to invest in soil testing as a beneficial management practice because it ultimately made their business more effective. The challenge to policymakers is not necessarily convincing landowners that wetlands are good for business, but rather designing the policy instruments that will naturally lead landowners to come to that conclusion on their own. Ontario's *A Guide to Stewardship Planning for Natural Areas* (Government of Ontario, 2012) is an example of where a landowner is given an educational tool with which to make stewardship decisions based on their specific context:

This guide provides a framework for creating a stewardship plan on rural properties. It uses a 20-year planning horizon and will help you develop a list of stewardship activities you can work on over the first 10 years of your plan. A plan can be prepared for any size of property. The complexity of the plan will increase with the size and diversity of the property (pg. 2).

In addition to educational tools provided by government, there are a number of computer software tools available to enable a more accurate assessment of the social value of wetland conservation in particular agricultural practices. For example, *Soil and Water Analysis Tool* (SWAT) has been used to model conservation practices and agricultural practices for the purpose of targeted water management objectives (Jabłońska et al., 2020; Kalcic, Frankenberger, & Chaubey, 2015; Windolf et al., 2016). Jabłońska et al. (2000) estimated the efficiency and cost of establishing hypothetical wetland buffer zones (WBZ) along Polish watercourses and found that WBZs are an effective measure to reduce leached N and P pollution in agricultural catchments. (Kalcic et al., 2015) examined water quality pollution hotspots from vulnerable lands and poor farm management in Indiana, U.S.A. through watershed modelling and spatial optimization approaches to make recommendations based on the most cost-effective conservation practices. Windolf et al. (2016) compared two catchments in Denmark with significantly different wetland restoration programs and found that high intensity

³⁷ Particularly in the context of rapidly changing agricultural land ownership patterns (Magnan, 2015). Ownership of Canadian farmlands is rapidly changing from individuals and families to number companies such as hedge funds (Magnan, 2015). Hedge funds are in the business of making money.

wetland restoration is an effective way to reduce excessive nitrogen loads. Another tool called *FyrisSKZ web tool* was used by (Collentine, et al., 2015) to evaluate payment scenarios for landowners to establish riparian buffer zones in an agricultural catchment in Sweden and found that selecting the most cost-efficient scenario depends on the goal set by program administrators. SWAT and other water modelling approaches have been used extensively in Alberta through the *Watershed Science and Modelling Laboratory* at the University of Alberta (WSML, 2021).

Modeling wetland conservation through tools such as *SWAT*, or developing an in-house *FyrisSKZ*, could be practically applied by policy makers, conservation planners, and even landowners. The approach could even be used adaptively through interactions with stakeholders thus creating an environment where the retention, restoration, and/or creation of wetlands or WBZs become a normalized practice, as opposed to their drainage or destruction. Although *SWAT* is an available and accessible water and soil modelling tool, it is limited when it comes to wetland representation. However, there is potential for the tool to be improved.

It is clear that landowners should be compensated for keeping wetlands on their property. Incentivization programs have been established around the world. The potential to create a market in Alberta for the services provided by wetlands can and should be developed. Creating a functional market for the ecosystem services provided by wetlands will shift the perception of wetlands as valueless land compared to arable land. This brings us to another challenge facing policymakers: The design and implementation of conservation policies must reflect the potential of both the environmental benefits and the economic benefits of wetlands.

Producing and marketing wetland ecosystems services, such as the provision of fibers or biofuels, is an exciting, but also contentious and uncertain, development in modern wetland conservation measures (Magnan, 2015; Xu, Wu, & Ha, 2019). In Alberta, the *Bioenergy Producer Program* (BPP) is a \$63-million funding program developed to support liquid biofuel production and stand-alone bio-power production (Government of Alberta, 2021). The program provided grants to dedicated biofuel-producing facilities, including for:

1. Liquid biofuels, such as biodiesel, ethanol and pyrolysis oil;
2. Biogas electricity production from farm-based anaerobic digesters; and
3. Electricity produced from woody biomass.

Research and development funding also became available for biofuels under the \$225 million CAD innovation stream in two program areas: Emissions Reductions Alberta (\$80 million CAD) and Climate Change Innovation and Technology Framework (\$145 million CAD). It is not clear from the GoA website if the BPP funding will continue after March 2021.

4.5 Other Issues Affecting Wetland Management in Alberta

The Alberta Recovery Plan is built around a \$10 billion infrastructure program that includes the agriculture and forestry sectors as key industries for the implementation of the strategy. Under the agriculture section, there are three pillars: (1) Investment attraction, (2) improving market access, and (3) expanding irrigation. The most notable pillar for impacting wetlands in Alberta is the expansion of irrigation districts and the capital spending and government support that will be allotted to fully establishing the “pillar.” Today, the irrigation industry contributes up to \$3.6 billion annually to Alberta’s GDP; but irrigation expansion is a capital-intensive project that producers would not invest in without subsidies from the government (Amsalu, 2016; GoA, 2020). In his study on the economic viability of expanding irrigation districts in Alberta, Amsalu found that “[t]he economic viability analysis revealed that with the existing government subsidy of 75% to the irrigation rehabilitation program, investment for expansion of irrigated cropland would be economically viable for producers” (Amsalu, 2016, ii). The economic viability for producers ultimately depends on the level of subsidy and the opportunity costs of capital (Amsalu 2016). In October of 2020, an announcement was made that Alberta’s government, the Canada Infrastructure Bank (CIB), and a consortium of eight irrigation districts are investing \$815 million to modernize irrigation district infrastructure and increase water storage capacity in southern Alberta. The “historic investment to expand irrigation” will have implications for wetlands in Alberta, particularly in southern Alberta where the irrigation districts are located. The infrastructure investment by the GoA and CIB shows that there is a willingness on the part of governments to invest in the irrigation districts, and to fully support producers in capital-intensive projects that are “expected to create up to 6,800 direct and indirect permanent jobs and up to 1,280 construction jobs” (GoA, 2020, pg.1).

Other initiatives under the *Alberta Recovery Plan* include a program called *Red Tape Reduction* (*Red Tape Reduction Implementation Act*, 2020 (No. 2), SA 2020, c 39). Thirty-six red tape reduction initiatives were completed in 2019-20, ranging from changes to operational policies, reducing administrative burden to stakeholders, enhancing service delivery, and streamlining internal processes (GoA, 2020a). Specifically, for wetlands, there were changes to codes of practice to reduce the number of environmental approval/authorizations. For example, the *Code of Practice for Powerline Works Impacting Wetlands*³⁸ was part of the Government of Alberta’s transformation of environmental approvals. The annual report notes that “Between releasing the new code of practice on December 23, 2019, and February 12, 2020, a total of 41

³⁸ Enabled through the Water Act and the Water (Ministerial) Regulation.

notices were submitted to *Environmental Approval Systems Onestop* system, replacing the same number of approvals which typically took several months to process versus the new 14-day turnaround for a notification" (GoA, 2020a). More research into what has changed would be needed to make an accurate assessment of these changes to the regulations and what their impact on wetlands could be. But, at best, it seems highly unlikely to increase wetland preservation.

Other important issues in the current climate that could impact wetlands include the UCP government's rescission of *A Coal Development Policy* (GoA, 1976)³⁹ and the ever-growing tailings ponds problem in northern Alberta. Rescinding the *Coal Policy* will remove the land use classification system, which consisted of four coal categories that either prohibited or limited the development of coal on public lands. The purpose of rescinding the policy is to open up coal development in "the Eastern Slopes region defined by an arbitrary boundary on the east" (GoA, 1976, pg.A5 and A6). Tailings ponds in northern Alberta are a serious problem that literally continues to grow. The government, industry and other stakeholders are actively pursuing a resolution through innovation and technology, yet there is no viable resolution in sight and development in the area continues.

The province of Alberta has bet heavily on resource development in northern Alberta. The benefits of focusing on resource development are not palpable today, and it seems that the province's focus on the oil sands resource has been short-sighted, leaving the province vulnerable to global events. For example, the province experienced a state of emergency as a result of the unprecedented global pandemic of 2020. The pandemic was preceded by low oil prices, which made Alberta's economy even more vulnerable to the effects of the province-wide shutdowns as a result of the pandemic. Allowing coal development in an area of the province that is water sensitive and the unresolved issue of tailings ponds in northern Alberta will have negative consequences on wetlands in those areas and will not have a positive impact on aquatic ecosystems in the province as a whole.

³⁹ The UCP rescinded the policy in May 2020, but in response to pushback from citizens and other stakeholders, the UCP reinstated the policy February 2021. It is not yet clear if the policy will be fully reinstated.

Chapter 5 Evaluative Criteria

To examine the *Alberta Wetland Policy (2013)*, as well as the province's wetland management program, a set of evaluative criteria was established. The criteria were developed by (1) understanding concepts and principles from sustainable water management, good water governance, integrated water resource management, (2) synthesizing and amalgamating concepts from the wise and sustainable use of wetlands and wetland management in free-market economies. (3) The synthesis also included research in ecological goods and services and community-based natural resource management literature; (4) it also drew from gray literature published by organizations such as the Ramsar Convention on Wetlands, the OECD Water Governance Initiative, the Global Water Partnership, the MEA, various research papers, articles and blog entries from the University of Calgary's Faculty of Law, and water and wetland management articles, research papers, and conference proceedings.

The act of synthesizing in this manner can result in the integration of relevant literature uniquely combined in a new form and the possibility of new connections not previously formulated. Despite the possibility of new knowledge, there also exists the possibility that invalid connections may be made (Hedelin, 2007; Koleyak, 2012). For example, it was easy to spend a lot of time focusing on water governance simply because of the quantity and quality of research in the field. But it was more difficult to spend as much time on wetland policy and management topics because of the diversity of approaches and technical focus. This does not necessarily produce a negative result, particularly if awareness of a potential gap between water and wetland management knowledge is at the forefront of subsequent discussions. This was the case for the author. After some time, it became clearer that the goal of this research was not evaluating water governance, even though it is foundational to the framework for wetland management. To minimize the risk of invalid connections in this research, the author has carried out an extensive literature study and recognized the author's limited technical expertise.

The goal of the evaluative criteria framework is to describe elements that should be included at the most basic level in a regional context for wetland policy and management approaches. The basic elements are housed under the principles of wise use and the protection of the ecological integrity of these ecosystems. The aim is to illustrate a framework for assessing the potential for effective wetland management and policy outcomes under the evaluative criteria.

To understand more fully the context of a wetland policy and management program, it was necessary to review literature from many aspects of the water sector, including governance, policy, and integrated water resources management. It was also necessary to

study disciplines within the larger water sector in an attempt to understand how wetland policy and management can and should be integrated into water management planning. It is important to note that this exercise is based on the currently available information on water and wetland management sectors. The current literature strongly encourages community and stakeholder engagement at every level, and this document aims to support increased participation in wetland management efforts.

The evaluative criteria framework is based on the literature synthesis. It drew on criteria identified by other researchers as being needed to exercise the *wise use of wetlands* in order to protect the ecological integrity of wetland ecosystems. Certain themes kept recurring in the literature review across disciplines of water governance and wetland management subjects. The following four themes form the general categories for the framework: (1) Enabling Environment, (2) Drivers of Wetland Loss and Degradation, (3) *Wise use of wetlands*, (4) Enhancing Implementation. Summary table 5.0 outlines each criterion⁴⁰ and associated indicators.⁴¹ Subsequent sections and tables 5.1 to 5.16 discuss the meaning behind each criterion, indicator, and how the criteria will be analyzed.

Criteria	Indicators
5.1 Enabling Environment	5.11 Good Water Governance 5.12 Laws and Institutions 5.13 Policy Coherence 5.14 Regulatory Frameworks
5.2 Addressing Drivers of Wetland Loss	5.21 Wetland functions and benefits are widely featured. 5.22 Water use respects wetland ecosystem needs. 5.23 Participatory Skills and Partnerships 5.24 Invasive Alien Species
5.3 Wise use of wetlands	5.31 Traditional Knowledge, Innovations, and Practices 5.32 River Basin Management 5.33 Inventory, Assessment and Monitoring 5.34 Restoration
5.4 Enhancing Implementation	5.41 Scientific Guidance 5.42 Communication, Education, Participation and Awareness 5.43 Financial Resources 5.44 Capacity

Table 5.0 Evaluative Criteria Framework Based on *Wise use of wetlands* and Principles of Water Governance

⁴⁰ Evaluative criteria in the context of this research are the normative standard against which the ability of the Alberta wetland policy and management plan will be measured for achieving the *wise use of wetlands* and maintaining their ecological integrity.

⁴¹ For the purposes of this research, an indicator is documentable qualitative information regarding some aspect of the wetland management policy and/or program in Alberta that can provide a meaningful approximation of the status of outcomes related to the achievement of *wise use of wetlands* and the maintenance of their ecological integrity in the province.

5.1 Enabling Environment

For the *wise use of wetlands* to be capable of protecting the ecological integrity of wetland ecosystems, enabling conditions for both the *wise use of wetlands* and the maintenance of ecological integrity must be present. According to the Global Water Partnership (GWP), a proper enabling environment establishes the rights and assets of all stakeholders at the same time considering the desired environmental outcomes set out, in this case, an environmental management framework (GWP, 2018). An enabling environment consists of the rules and strategies that aim to achieve a sustainable balance between the social, economic, and environmental needs for water and the *wise use of wetlands* (GWP, 2018). The enabling environment sets the policies and legislation, taking into account external governance and political imperatives (Rogers & Hall, 2003). The enabling conditions that were considered for this research include (1) innovative water governance, (2) laws and institutions,⁴² (3) policy guidance, and (4) regulatory frameworks. Without these institutional environments and enabling conditions, the *Alberta Wetland Policy* (2013) and the supporting wetland management program will not be effective in achieving wise use.

5.1.1 Good Water Governance

One of the primary concerns with respect to water resource management in general, and one that directly impacts wetlands, is good water governance. Governance is defined as the processes and institutions, formal and informal, through which a society operates. Good governance is one of the uses derived from the concept of governance. Toikka (2011) suggests that many governance schemes do not rely on changes in the policy-making process. Instead, the shift revolves around the inclusion of multiple actors, whether private or public, into the process. Indeed, derived uses of "governance" generally imply that there is an "increased involvement of non-governmental actors in decision-making processes and the extension of the stakeholder range along the institutional and jurisdictional levels (Kruif & Özerol, 2013).

For the purpose of this research, water governance is the set of rules, practices, and processes through which decisions for the management of water resources and services are taken and implemented, and decision-makers are held accountable. The shift from water governance to good water governance implies that there is an evaluative standard with which multiple actors can govern because it aims to define the normative agenda of what proper water

⁴² "An institution is the structured result or outcome of a process by which values are articulated, arranged and communicated, having continuity over time, and influencing or controlling behavior of persons involved with it, who did not necessarily participate in formulating those values (norms)" (Wergert, 1973, pg. 515).

governance should look like (Kruif & Özerol, 2013). The *Water Governance Programme* by the OECD is one among many institutions that have identified an urgent need to (1) take stock of recent experiences, (2) identify good practices, and (3) develop practical tools. The purpose of this call to action is to support different levels of governments and other stakeholders in developing and implementing effective, fair and sustainable water policies. For wetland management and planning, establishing a water management framework based on good water governance principles is the foundation that will support the *wise use of wetlands*. The ‘Good Water Governance’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of statutory, policy and/or regulatory frameworks that foster good water governance in terms of products, institutional design, and/or governance processes.
Planning	The existence and functioning of institutions encouraging good water governance and responding to new needs for water governance practices.
Monitoring	The existence and level of implementation of mechanisms that enable knowledge- and experience-sharing to foster good water governance.

Table 5.1 Good Water Governance Indicators (For document evaluation, see Appendix 8, Tables 6.1.1 a, b, c.)

5.1.2 Laws and Institutions

Other important aspects are the laws and institutions that form the enabling conditions for achieving the *wise use of wetlands* to maintain their ecological integrity. Legal and institutional frameworks specify the allocation of roles and responsibilities across all levels of government and water-related institutions in regard to policymaking, policy implementation, priority setting, strategic planning, operational management, regulation and enforcement (OECD, 2015, pg. 16). Legal and institutional frameworks should also help identify and address gaps, overlaps and conflicts of interest through effective coordination at and across all levels of government (OECD, 2015, pg. 16). Adhering to these frameworks will ultimately achieve the policy goals associated with water and wetland management. The required water laws cover ownership of water, permits to use (or pollute) it, the transferability of those permits, and customary entitlements. They reinforce regulatory norms for conservation, protection, priorities, and conflict management. The ‘Laws and Institutions’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of water law that clearly assigns and distinguishes water-related roles and responsibilities for policymaking in the context of wetlands.
Planning	The existence and functioning of institutions in charge of setting water and/or wetland-related policy goals and strategies and delivering them within the province of Alberta.
Monitoring	The existence and level of implementation of mechanisms that can help identify areas of wetland management where there is a lack of clarity on who does what; areas with incoherent and/or contradictory objectives; areas with deficient implementation and/or limited enforcement; and/or areas with overlaps/ duplication of responsibilities.

Table 5.2 Laws and Institutions Indicators (For document evaluation, see Appendix 8, Tables 6.1.2 a, b, c.)

5.1.3 Policy Coherence

Another aspect of the enabling environment that ties into laws and institutions is that of the level of policy coherence. Policy coherence is defined as “the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives” (OECD, 2001), particularly, in this case, across social, economic and environmental goals. In addition to legislation, water and wetland management requires a guiding policy basis combined with a strong policy or regional guiding body (Koleyak, 2012). In the context of the *wise use of wetlands*, this includes framing water policies explicitly incorporating wetland ecosystem needs and providing for representation of wetlands in policy (Baron et al., 2002). Failure to do so can result in the continued degradation of natural wetland ecosystems. The policy basis in this research is evaluated based on the extent that (1) the *wise use of wetlands* and the maintenance of their ecological integrity is written into, and enabled in, policy; (2) that policy provides guidance for wetland managers; and (3) that there are policy tools available to aid in achieving the protection of wetlands through water and wetland management planning. The ‘Policy Coherence’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and the level of implementation of integrated policies, strategies, fostering coherence across sectors while minimizing contradictory objectives and negative impacts.
Planning	The existence and functioning of bodies of institutions to facilitate coherent policies across ministries, discussing synergies and managing trade-offs across water, environment, health, energy, agriculture, industry, spatial planning and land use, and other relevant areas.
Monitoring	The existence and level of implementation of mechanisms to identify barriers that hinder the coherent management of wetland ecosystems in the province.

Table 5.3 Policy Coherence Indicators (For document evaluation, see Appendix 8, Tables 6.1.3 a, b, c.)

5.1.4 Regulatory Frameworks

Policy responses will only be viable if they are coherent and if they are supported by well-designed regulatory frameworks.⁴³ Regulations are the instruments used to express government policy as a way to rectify market, economic or social imbalances (Parker & Kirkpatrick, 2012). For the purpose of this document, a regulatory framework is defined as the comprehensive steps that a regulator must complete in order to bring forward regulations (Rabeau, 1999). Although there is consensus that regulatory solutions are not necessarily the best or most effective means of environmental protection, regulatory schemes offer a viable alternative to the voluntary uptake of environmental recommendations (Koleyak, 2012). Regulatory decision-makers interpret regulations over time and across multiple layers of implementation. This can result in decisions that deviate from originally stated goals and in ways that favour particular interests over others (Clare & Krogman, 2013). Thus, it is of paramount importance that wetland policy measures are regularly evaluated in the context of innovative water governance and the *wise use of wetlands*. Regulations can enable and empower decision-makers to seriously consider the protection and conservation of wetlands in Alberta.

The ‘Regulatory Frameworks’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of a wetland management regulatory framework to foster enforcement and compliance and to protect the public interest.
Planning	The extent to which key regulatory functions are entrusted to and carried out by responsible authorities.
Monitoring	The existence and level of implementation of regulatory tools to ensure that rules, institutions, and processes are fit-for-purpose, well co-ordinated, cost-effective, transparent, non-discriminatory, participative, easy to understand and to enforce.

Table 5.4 Regulatory Framework Indicators (For document evaluation, see Appendix 8, Tables 6.1.4 a, b, c.)

5.2 Addressing Drivers of Wetland Loss

As we have come to understand, wetlands come in all shapes, sizes, and varieties. Furthermore, wetland ecosystems are an important part of the earth systems that make the earth a habitable planet. The complex nature of these ecosystems is largely a result of their hydrology, which is impacted by daily, seasonal, and annual changes in water levels caused by tides, river flooding, and/or precipitation events (Galatowitsch, 2018); however, human impacts to these already sensitive environments have disrupted the balance of delicate water cycles.

⁴³ Among other factors such as stakeholder engagement, access to adequate information, sufficient capacity, integrity and transparency.

These impacts continue to devastate wetland ecosystems continue at a rate faster than any other ecosystem on earth (Mitsch & Gosselink, 2015; Ramsar Convention Secretariat, 2010f).

The largest contribution to the loss of wetlands continues to be from unsustainable agriculture, forestry and extractive industries, population growth, and land use, but the literature generally divides the primary drivers of wetland loss into six categories: (1) Infrastructure development, (2) land conversion, (3) water withdrawals, (4) eutrophication and pollution, (5) overharvesting and overexploitation, and (6) invasive species. Considering the drivers of wetland loss and implementing changes in planning, land-use and decision-making requires that wetland resources and wetland ecosystem benefits be measured, valued, and understood widely (Ramsar Convention Secretariat, 2015). This section will discuss four strategies for addressing wetland loss that should be included in wetland management planning that aims to achieve the wise and sustainable use of wetlands to maintain their ecological integrity. The following strategies do not name the primary drivers of wetland loss, i.e., unsustainable development and land conversion, but they do aim to address them at the highest level. For example, the more we know about wetlands across all levels of society, the better-educated society will be about why keeping wetlands on the landscape is a priority issue.

5.2.1 Wetland Functions and Benefits Featured in Plans and Strategies

The goal of this indicator is to effectively communicate wetland ecosystem functions and the ecosystem services that wetlands provide to people and to the environment in the plans and strategies that drive the management of wetlands.⁴⁴ The mutual and enhanced understanding that can be gained from effectively communicating wetland functions and benefits can be used to advance the involvement of a multitude of actors and is a means to encourage cooperation of groups in society by listening to them first and then clarifying why and how decisions are made. In an instrumental approach, “communication is used with other instruments to support wetland conservation, to address economic constraints, and to motivate action” (Ramsar Convention Secretariat, 2010e). Integrating wetland values into plans and strategies requires effective communication to decision-makers, landowners, stakeholders and the wider public. Achieving this would contribute to an enhanced understanding of the contribution of wetland values to the health and livelihood of people, economic development and biodiversity, soil, and water. Moreover, it would address one of the main factors that hamper the wise use of wetland

⁴⁴ Communication is a two-way exchange of information leading to mutual and enhanced understanding.

management: information failures⁴⁵. Historically, wetland functions have been insufficiently appreciated and not fully quantified (Ostrovskaya et al., 2013), and our knowledge has improved, effectively communicating wetland functions and benefits is a necessity for the *wise use of wetlands* to succeed. The ‘Wetland Functions and Benefits’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of information that relates to the ecosystem services provided by wetland ecosystems in policies, management plans, strategies and/or other relevant documents that are disseminated to key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture, fisheries at the local level
Planning	The existence and functioning of personnel, groups or institutions responsible for assessing, documenting, and disseminating information that relates to the ecosystem services provided by wetland ecosystems to Alberta’s key sectors.
Monitoring	The existence and level of use of mechanisms that determine and/or are capable of measuring the ecosystem services provided by wetland ecosystems.

Table 5.5 Wetland Functions and Benefits Featured in Plans and Strategies Indicators (For document evaluation, see Appendix 9, Tables 6.2.1 a, b, c.)

5.2.2 Water Allocation for Wetland Ecosystem Needs

Water use must respect the water needs of wetland ecosystems in order to achieve the *wise use of wetlands*. Wetlands are characterized by hydrologic conditions. Consumptive water-use eventually leads to wetland area changes. Changes in water volumes and timing of environmental flows will have an effect on the ecological integrity of a wetland ecosystem (Cui, Tang, Zhao, & Bai, 2009; Verones et al., 2013). As a result, it is essential to any water management program that these volumes are accounted for and inventoried. The amount of surface water and groundwater are required inventories for consumptive water use in general but could be used for addressing the water needs of wetland ecosystem needs. Ecological water requirements for wetland ecosystems refer to the water regime needed to maintain the natural growth of wetland habitats, protect biodiversity, sustain human activities, and improve environmental quality (Cui et al., 2009). The ‘Water Allocation for Wetland Ecosystem Needs’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of water management plans (including groundwater), strategies and/or frameworks that consider the water needs of wetland ecosystems in Alberta

⁴⁵ Turner et al. (2000) explain that information failure is a “lack of understanding of the multitude of values that may be associated with wetlands” by politicians and the general public (10). The information problem results from the insufficient understanding of the role and functions of wetlands as well as the indirect consequences of land use, water management, agricultural pollution, air pollution and infrastructure for the quality and sustainability of wetlands.

Planning	The existence and functioning of planners, stakeholders, and engineers who work to identify, assess, calculate, evaluate, and/or advocate for water needs of wetlands.
Monitoring	The existence and level of implementation of mechanisms to determine ecological water requirements for wetlands in Alberta.

Table 5.6 Water Allocation for Wetland Ecosystem Needs Indicators (For document evaluation, see Appendix 9, Tables 6.2.2 a, b, c.)

5.2.3 Participatory skills and partnerships

Participation refers to the active involvement of stakeholders in the common development, implementation and evaluation of strategies and actions for the *wise use of wetlands* (Ramsar Convention Secretariat, 2010e). Levels and kinds of participation can be vary depending on the specific context and the decisions of the individuals and institutions leading the process (Ramsar Convention Secretariat, 2010e). Participatory skills refer to the engagement and potential involvement of local communities and First Nations in the wise use management of wetlands. Thill (2018) makes an important point about differentiating First Nations as rights holders as opposed to stakeholders in the management of natural resources. Partnerships refer to collaborative interactions to promote the involvement of the private sector in the conservation and *wise use of wetlands*. Partnerships with the business sector can provide material support as well as direct delivery of the *wise use of wetlands* through corporate land and resource management, consumer market behaviours, influence on public policy, and engagement of communities. The ‘Participatory Skills and Partnerships’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of legal frameworks to engage stakeholders in wetland-related decision-making.
Planning	The existence and functioning of dedicated stakeholder engagement institutions or platforms, such as catchment-based authorities, decentralized assemblies, governing boards, national or subnational water councils or committees, as well as more informal forms of community-based engagement.
Monitoring	The existence and level of implementation of mechanisms to diagnose challenges and risks in activities related to decision-making in water and or wetland management.

Table 5.7 Participatory Skills and Partnerships Indicators (For document evaluation, see Appendix 9, Tables 6.2.3 a, b, c.)

5.2.4 Invasive Alien Species

Invasive species are organisms that have been introduced intentionally or accidentally outside of their natural range. In Resolution VIII.18, the Convention acknowledged that “Alien species that become invasive pose a major threat to the ecological character of wetlands

worldwide, and to wetland species, and that such invasions can cause major social and economic damage and loss" (Ramsar Convention Secretariat, 2002b). Invasions from alien plants, animals or microorganisms can cause major social and economic damage and loss. It is predicted that the effects of global climate change will include invasion by alien species into new areas and that species formerly regarded as benign may become invasive. Moreover, global trade, global change and changing land-use patterns are actions that will make the negative impacts created by invasive species become more acute. Wetlands are especially vulnerable to invasive species because of their position as ecotones or interfaces between terrestrial and aquatic environments that make them susceptible to invasion from both spheres. The 'Invasive Alien Species' indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of policy that addresses invasive alien species with respect to wetlands.
Planning	The existence and level of functioning of plans and strategies that aim to identify, address, reduce or eradicate invasive alien species with regards to wetland ecosystems.
Monitoring	The existence and level of implementation of mechanisms for dealing with invasive alien species in Alberta.

Table 5.8 Invasive Alien Species Indicators (For document evaluation, see Appendix 9, Tables 6.2.4 a, b, c.)

5.3 Wise use of wetlands

The Ramsar Convention on Wetlands is the first international multilateral agreement that focuses on the protection and conservation of wetlands using the wise use principle. The *wise use of wetlands* is "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" (Ramsar, 2014, pg.16). Ecological character refers to the combination of the ecosystem components, processes, benefits and/or services that characterize the wetland at a given point in time (Ramsar, 2014, pg.14). Maintaining ecological character in the context of sustainable development (i.e., balancing environmental, economic, and social sustainability) requires extensive planning, communication, integration, and compromise among a variety of decision-makers and stakeholders, as well as individual and collective interests. This section will discuss four strategies of addressing the *wise use of wetlands* that should be included in wetland management planning that aims to achieve the sustainable use of wetlands to maintain their ecological integrity.

5.3.1 Traditional Knowledge, Innovations, and Practices

As the province shifts toward adaptive management of water and wetland resources, it necessitates effective and efficient monitoring systems. These systems will provide information on environmental conditions in order to make science-based decisions on water and wetland resource management. The required monitoring would rely on a network of agencies to collect data to assess the status of air, water, and biodiversity, which would be designed to capture changes in the environment. The data collected will ultimately inform the acceptable limits on changes of this type; however, the lived experience of First Nations has often been excluded from the data. Thus there are often “[...] major gaps in how First Nations experience environmental change compared to the agencies that produce the science” (Thill, 2018). More recently, the data collected and the findings produced by these agencies contribute to the understanding of how industrial development impacts First Nations’ treaty rights and how their environmental concerns are addressed (Thill, 2018). Local communities and First Nations can exert a powerful role in maintaining natural wetland infrastructure because of their connection to the land and the many ways they interact with it for their survival and everyday life. Furthermore, traditional environmental knowledge can inform disaster risk and serve as an early warning system, which is important in areas where flooding and forest fires have and will continue to occur. The local knowledge held by indigenous and local communities, including their lived experience and practices, should be respected and integrated into general and specific wetland site management plans. The ‘Traditional Knowledge, Innovations, and Practices’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of law, policy, or management strategies that facilitate indigenous people’s and local communities’ direct involvement in local decision-making for the sustainable use of wetlands.
Planning	The existence and functioning of indigenous and local community groups that are enabled to contribute traditional knowledge, innovations, and practices.
Monitoring	The existence and level of implementation of mechanisms that bring together indigenous peoples and local communities for the <i>wise use of wetlands</i> and the maintenance of their ecological character.

Table 5.9 Traditional Knowledge, Innovations and Practices Indicators (For document evaluation, see Appendix 10, Tables 6.3.1 a, b, c.)

5.3.2 River Basin Management

To be able to achieve the *wise use of wetlands* and maintain their ecological integrity, it is essential that the foundations of IWRM are built into the water and wetland management system. One of the main features of IWRM is management at the river/catchment basin. The

Convention on Wetlands implies a responsibility to all CPs to make sure that management at the river basin level is achieved in their water management strategy. The 'River Basin Management' indicator aims to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of policy and regulatory incentives that foster river-basin management in terms of products, institutional and contractual design, and governance processes.
Planning	The existence and functioning of institutions encouraging water governance innovation and responding to new needs for water governance practices.
Monitoring	The existence and level of implementation of knowledge- and experience-sharing instruments to foster the science-policy interface in river-basin management.

Table 5.10 River Basin Management Indicators (For document evaluation, see Appendix 10, Tables 6.3.2 a, b, c.)

5.3.3 Inventory, Assessment, and Monitoring

The ability to describe, assess and monitor the extent and condition of all types of wetlands and wetland resources at relevant scales is necessary for an effective wetland conservation and management program and absolutely essential to the wise use of wetlands and the maintenance of their ecological integrity. *Ramsar* recommends an integrated framework, "Whenever possible, an integrated inventory, assessment and monitoring programme should be developed and conducted at a single appropriate scale [...]. However, these components are typically planned or undertaken separately" (*Ramsar*, 2005, pg.6).

Currently, *Ramsar*'s working definitions for each concept is as follows:

Wetland Inventory: the collection and/or collation of core information for wetland management, including the provision of an information base for specific assessment and monitoring activities.

Wetland Assessment: the identification of the status of, and threats to, wetlands as a basis for the collection of more specific information through monitoring activities.

Wetland Monitoring: the collection of specific information for management purposes in response to hypotheses derived from assessment activities and the use of these monitoring results for implementing management. The collection of time-series information that is not hypothesis-driven from wetland assessment is here termed surveillance rather than monitoring. (*Ramsar*, 2005, pg.5)

Wetland inventory is used to collect information to describe the ecological character of wetlands. Wetland assessments vary across a wide range of typologies; for example, they can be interrelated assessments, or they can exist for a unique purpose. A key purpose of monitoring is to enable the detection and response to changes or likely changes in wetland ecological character. The data and information gathered for inventory, assessment, and monitoring are a necessary part of the wetland management planning process at the site,

catchment, regional or national scales (*Ramsar*, 2005). The “Inventory, Assessment and Monitoring” indicator aims to evaluate:

Document	Baseline Indicator
Government	The existence of frameworks that require inventory, assessment, and monitoring of wetlands to effectively guide decision-making.
Planning	The existence of monitoring institutions that can produce evidence-based assessments on the performance of wetland management and support decision making accordingly.
Monitoring	The existence of mechanisms to carry-out inventory, assessment, and monitoring activities.

Table 5.11 Inventory, Assessment and Monitoring Indicators (For document evaluation, see Appendix 10, Tables 6.3.3 a, b, c.)

5.3.4 Restoration

Preservation of wetland ecosystems is not always possible. Despite this, there is an urgent need to reverse wetland degradation caused by human impacts, and restoration at some level is always possible but requires time, energy, and resources. According to Resolution VIII.16 adopted by the COP, wetland restoration in the broadest sense refers to projects that can either “promote a return to original conditions [and/or] improve wetland functions without necessarily promoting a return to pre-disturbance conditions” (*Ramsar*, 2002a). The COP resolution also states that “A clear understanding and statement of goals, objectives, and performance standards for wetland restoration projects is a critical part of restoration success” (*Ramsar Convention Secretariat*, 2002a). The ‘Restoration’ indicator aims to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of wetlands restoration guidelines, including inventory, planning, and strategies aimed at restoring designated sites.
Planning	The existence and level of functioning of wetland restoration specialists.
Monitoring	The existence and level of implementation of wetland restoration programs to achieve the <i>wise use of wetlands</i> and the maintenance of their ecological integrity.

Table 5.12 Restoration Indicators (For document evaluation, see Appendix 10, Tables 6.3.4 a, b, c.)

5.4 Enhancing Implementation

The wise use of wetland management is often hindered by three main factors: internal failures,⁴⁶ external failures,⁴⁷ and information failures (*Ostrovskaya et al.*, 2013). Turner et al. (2000) found that all three causes “[...] can be linked to the complexity and ‘invisibility’ of spatial

⁴⁶ See Financial Resources section for more information.

⁴⁷ As part of the larger basin-wide system, wetland ecosystems are impacted by uses and users within the basin system, but outside of the wetland ecosystem. Considering development in isolation as opposed to the environment as a system impacts wetlands even if development occurs outside of the wetland in question.

relationships among groundwater, surface water and wetland vegetation" (p.10). Ostrovskaya et al. (2013) argue that one of the underlying reasons for these failures seems to be the limited capacity of water agencies and other stakeholders to manage wetlands. Enhancing the implementation of the *wise use of wetlands* and the maintenance of their ecological integrity is an operational goal of Ramsar's 4th Strategic Plan.⁴⁸ The convention asserts that "[i]t will be vital for the survival of wetlands and the success of the Convention" to enhance implementation of the Strategic Plan through scientific and technical advice and guidance, resource mobilization, public awareness, visibility and capacity building.

5.4.1 Scientific Guidance

Administering the *wise use of wetlands* to maintain the ecological integrity of wetland ecosystems in Alberta requires all actors involved in wetland management to have access to the same credible and current information. The nature of wetland ecosystems requires scientific knowledge to understand the complexity of their natural processes and make decisions based on that knowledge. Scientific guidance is thus a necessary component of wetland conservation and management. Scientific guidance evaluation indicators are shown in table 5.13.

Document	Baseline Indicator
Government	The extent to which scientific guidance about wetland ecosystems is integrated into legal, policy or regulatory frameworks.
Planning	The extent to which wetland scientific research and technical guidance is entrusted to and carried out by credible and responsible authorities.
Monitoring	The existence of scientific guidance and technical methodologies about conserving and managing wetlands are developed and are available to policymakers and practitioners in an appropriate format and language.

Table 5.13 Scientific Guidance Indicators (For document evaluation, see Appendix 11, Tables 6.4.1 a, b, c.)

5.4.2 Communication, Education, Participation and Awareness (CEPA)

Wetland CEPA refers to Ramsar's CEPA programme that promotes the conservation and *wise use of wetlands* through communication, education, participation, and awareness. Activities related to communication, education, participation and awareness about the *wise use of wetlands* can be found throughout many of the indicators in this chapter; however, narrowing in on the CEPA activities at the regional level in Alberta will identify areas that need attention in order to align to the activities occurring at the national level. The assumption here is that CEPA

⁴⁸ See section 3.4 for details about the 4th Strategic Plan and its relevance to this indicator.

activities are occurring at the national level and are aligned with the commitments made by Canada as a COP to the Ramsar Convention. The 'CEPA' indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of policy that integrates communication, education, participation and awareness to promote wetland values.
Planning	The existence and functioning of institutions, groups, or other platforms that are actively involved in delivering any CEPA activities.
Monitoring	The existence and level of implementation of mechanisms to engage people at the regional and local levels in CEPA activities.

Table 5.14 Communication, Education, Participation, and Awareness (For document evaluation, see Appendix 11, Tables 6.4.2 a, b, c.)

5.4.3 Financial Resources

Wetlands in the context of Alberta wetland management can be considered a common pool resource. A common-pool resource is a natural or manmade resource where one person's use of the commons subtracts it from the availability of use by others but excluding others can be expensive or not necessarily possible. The characteristics of wetland ecosystem also mean that their benefits are not readily convertible into a monetary form, and even though conservation offset programs and wetland banking create the potential to capitalize on wetland ecosystems, it is well known that wetland protection requires massive investment, and that insufficient funding will greatly restrict wetland protection and conservation programs. The lack of funding for wetland protection results in poor training of wetland administrative personnel, bad management of the wetlands, and ineffective law enforcement (Wang, Yao, & Ju, 2008). The shared responsibility of managing water resources requires the mobilization of financial resources to the multitude of actors involved. Mobilizing resources to agencies, partners, institutions, and citizens involved in wetland conservation, management, planning, and research will enable the *wise use of wetlands*. The efficient, transparent and timely manner in which financial resources are distributed will require planning and accountability in policy and institutional setups. Thus, promoting governance arrangements that help institutions raise, manage, and/or distribute the necessary revenues to meet wetland conservation and management goal is required. As mentioned earlier, insufficient funding will undermine wetland conservation efforts by regional institutions and local groups, and the degradation of wetlands will continue. The 'Financial Resources' indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of governance arrangements or frameworks that help water institutions collect or distribute funds for the purpose of wetland conservation and management.
Planning	This indicator seeks to appraise the extent to which wetland or water management institutions exist and are in charge of collecting financial resources and allocating them in a transparent, efficient and timely manner for wetland conservation, management or planning.
Monitoring	The existence and level of implementation of mechanisms to identify where resources for wetland conservation and management are most needed (e.g., investment needs and funding gaps)

Table 5.15 Financial Resources Indicators (For document evaluation, see Appendix 11, Tables 6.4.3 a, b, c.)

5.4.4 Capacity

Capacity is defined as “[t]he ability of individuals, institutions, and societies to perform functions, solve problems and set and achieve objectives in a sustainable manner” (UNDP, 2009). Ostrovskaya et al.(2013) note that capacity should not be limited to only achieving objectives but that there should be room for the capacity to adapt to changing circumstances, a term they refer to as *adaptive capacity*. Capacity-building is the range of processes by which individuals, organizations and institutions develop abilities for effective implementation of *wise use of wetlands* from including, but not limited to, facilities, funding, resources, infrastructure, and enabling environments. Many of these required ‘abilities’ have been addressed in other parts of this work (e.g., Section 4.1 Enabling Environment), but capacity in this section narrows in on areas of capacity-building that have not been addressed in other sections. Specifically, the empowerment of social actors by institutions to adapt to changes and the ability of institutions themselves to be changed by actors in a manner that leads to enhanced capacity to manage wetlands. The ‘Capacity’ indicator seeks to evaluate:

Document	Baseline Indicator
Government	The existence and level of implementation of framework conditions to assure the presence of competent staff able to deal with technical and non-technical wetland-related issues across agencies, responsible ministries and water or wetland-management bodies.
Planning	The existence and functioning of mechanisms to identify the level of capacity of responsible authorities in carrying out duties related to the wise use of wetland management.
Monitoring	The existence and level of implementation of capacity-related programmes that enable learning from past experience and continual improvements to strengthen the capacity of water institutions and stakeholders in critical areas such as planning, financing and monitoring.

Table 5.16 Capacity Indicators (For document evaluation, see Appendix 11, Tables 6.4.4 a, b, c.)

5.5 Conclusion

The evaluative criteria and indicators were developed by synthesizing and integrating research, knowledge and practical applications of current water and wetland management processes geared toward the wise and sustainable use of these resources. Guidelines from international organizations were applied to fit the regional context in Alberta and thus reflect the researcher's interpretation and application of the international guidance to a regional context. In the following chapter, these evaluative criteria will be tested against the context of wetland policy and management in Alberta.

Chapter 6 Results and Discussion

The evaluative criteria and indicators were developed by synthesizing and integrating research with knowledge and practical applications of water and wetland management in the world today. One-hundred documents and the key informant (KI) survey responses from 10 KIs were analyzed. A table summarizing KI sector composition and a table outlining the list of documents that were analyzed are provided in Appendix 1. Appendices 2 to 6 contain the surveys and survey results. Appendix 7 contains the colour legend also shown in table 6.1. Appendices 8 to 11 contain the evaluation tables for each criterion and corresponding indicators. The evaluation tables provide supplemental information regarding the data analysis process. The interview data was synthesized with the document analysis to develop the overall assessment, the results of which are presented below through figures 6.1 to 6.16. Each indicator is also assessed based on the documentation reviewed. While some documents may have been rated higher than the indicator is rated overall, all evidence obtained during the data collection and analysis was considered when giving the indicator an overall evaluated assessment. There is an overall assessment of each criterion in Chapter 7 based on the total evaluation of each indicator in Chapter 6. The following sections provide an assessment based on the criteria and criteria indicators that resulted in any of the following colours: green, yellow, orange, or red. As mentioned, these assessments were made based on the entirety of the evidence (literature review, KI input, document review) as well as the researcher's own judgment. A final summary evaluation for each criterion and its associated indicators can be found in Chapter 7. Assessments are based on the following legend:

Baseline	<i>Represents an assessment of the wetland management and policy program in Alberta for how it delivers the wise and sustainable use of wetlands according to the criteria and indicators developed in this body of work.</i>
	Indicator is mentioned, defined and a clear implementation plan for the element is included.
	Indicator is mentioned and defined, but no direction or guidance for implementation is given.
	Indicator is mentioned but no definition and/or no further elaboration is given.
	Indicator is not mentioned, not defined, and no further elaboration is given.

Table 6.1 Legend for evaluation of criteria and indicators

6.1 Enabling Environment

6.1.1 Good Water Governance

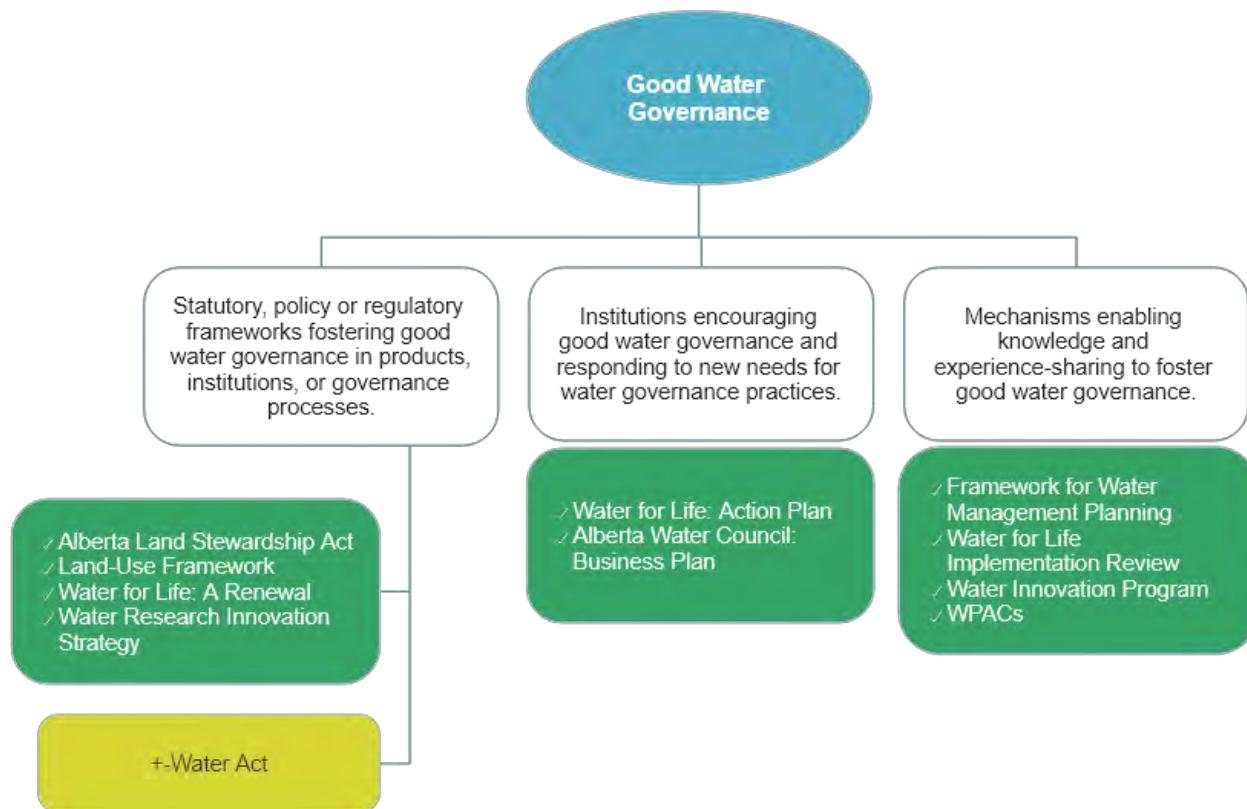


Figure 6.1 Good Water Governance Documents Assessment Based on Appendix 8, Tables 6.1.1a, b, & c.

6.1.1.1 Statutory, Policy, or Regulatory Frameworks Fostering Good Water Governance

Examination of the documents for this indicator shows that Alberta is going in the direction of good water governance. Statutory documents, including the *Water Act*, RSA 2000, cW3, and the Alberta Land Stewardship Act, SA 2009, cA-26.8 (ALSA), support the movement toward an improved way of governing water resources in the province. The *Water Act* clearly states its purpose: “to support and promote the conservation and management of water, including the wise allocation and use of water while attempting to achieve sustainable development” (*Water Act*, RSA 2000, c W-3, 2009, pg.17) and it is followed by six caveats that acknowledge the need for a change in the governance structure including integration, adaptable and flexible administration and management systems, and the shared responsibility of all Albertans to achieve sustainable development goals in Alberta. These caveats suggest that the legislative assembly and provincial leadership have a clear idea of what is required to achieve the wise use of water, and it follows that the Minister and Directors will follow suit. The Minister defined in the *Water Act* is ultimately responsible for administering the *Act*, and both Minister

and Directors hold significant discretionary power to make decisions about the Act. Discretionary power for Ministers and Directors is not uncommon in Alberta. Although it is not uncommon, it is known to be an issue if accountability, trust, and transparency are not at the forefront of decision-making.⁴⁹ In the *Water Act*, the power allotted to the Minister also comes with the responsibility to establish a framework for water management planning and a strategy for protecting the aquatic environment by the end of 2001 (See Section 6.1.1.3).

Wherein the *Water Act* outlines clear roles and responsibilities for the Minister and Director(s), the *ALSA* provides for the “co-ordination of decisions by decision-makers concerning land, species, human settlement, natural resources and the environment” (*ALSA*, SA 2009, c A-26.8, pg.4). This type of coordination among participating actors can and should result in an increase in monitoring and evaluation of the land use program. The feedback loops created by monitoring and evaluation can positively influence management and accountability if, in fact, the feedback loops can be closed, and they allow for new feedback inputs in the next evaluation. An example of this is the preliminary development of the legislation and the LUF. The *ALSA* and the LUF encountered push back from landowners who felt that their private property rights were being threatened:

In order to achieve [*ALSA*] objectives and implement the new philosophy toward meeting the needs of society and regulating economic activities, the Act contains legal features that are unprecedented for a western democracy in terms of usurpation of traditional property rights and the rule of law; both of which are foundational principles to our market-driven economy (Wilson, 2013, pg. 2)

But the perceived threat was based on the misinterpretation of the statute, particularly the idea of “statutory consent” in section 11 of the Act. The misinterpretation resulted in the idea that the Act would remove landowner’s property rights, which was not the case. Statutory consent in the Act actually referred to statutory instruments such as licenses and authorization for the regional plans, not private lands. The Act was under threat of repeal, but eventually, the private lands issue was addressed by amending the Act’s purpose:

In carrying out the purposes of this Act as specified in subsection (2), the Government must respect the property and other rights of individuals and must not infringe on those rights except with due process of law and to the extent necessary for the overall greater public interest (Alberta Land Stewardship Amendment Act, 2011, SA 2011, c9)

With issues addressed in this way, the negative feedback loop of threats to private property was addressed, but other amendments may influence the way in which it is able to

⁴⁹ See (Bankes & Bradley, 2020) discussion on Minister’s broad discretionary power under Section 35 of the *Water Act*

support regional planning since the ALSA is the primary legislation that implements that Land-Use Framework (LUF).

The LUF enables regional plans by establishing land management at the water basin level and identifying multiple actors involved in the planning and management process. For example, the Land-Use Secretariat and Regional Advisory Councils (each one of the seven LUF strategies) are responsible identifying new actors involved in developing regional plans. Prior to the LUF, Alberta did not have formalized regional-level planning. Instead, there were “numerous policies and strategies that affect land-use [...] developed independently from each other and at a different time” (GoA, 2008). Although most policies and legislation were enabled through provincial legislation, the general lack of coordination with the multitude of actors involved, such as the GoA, municipal governments, multi-stakeholder groups, and/or industry, created uncertainty about priorities. The LUF aims to address project-by-project approval and mitigation of their adverse effects with ‘pragmatic’ cumulative effects management at the regional level. Two regional plans for the major basins have been completed, but it is not clear how well the plans have been implemented⁵⁰ or when implementation will be completed in the entire region.

Two other important policies support the direction of the province toward good water governance: *Water for Life: A Renewal* (2008) and the *Water Research and Innovation Strategy* (2014). *Water for Life* is the current strategy for water management in the province that signals the evolution of the government’s move toward good water governance. The strategy empowers Albertans to be part of water-management initiatives and identifies three important partnerships at the community, local, and regional levels: watershed stewardship groups (WSGs), watershed planning and advisory councils (WPACs), and the Alberta Water Council (AWC). The document builds on the work done in the 2003 *Water for Life: a strategy*. The renewed strategy for water sustainability comes as a result of major barriers to implementing the 2003 version, including a lack of legal grounding and mechanisms to ensure implementation, a lack of mandatory compliance obligations, and insufficient financial, administrative, and political support (Alberta Wilderness Association [AWA] et al., 2007). The renewed strategy supports good water governance because there were consultations to address issues in the 2003 strategy with a goal to address the barriers to implementation identified by AWA et al. (2007). Moreover, it reaffirms the province’s water management principles, which are in close alignment with the OECD’s Principles on Water Governance (See Table 6.2).

⁵⁰ Progress reports for SSRP for 2015 and 2016 [available](#); Progress reports for the LARP from 2013-2016 [available](#)

Alberta's Water Management Principles [WMP] (GoA, 2008, pg.7)	Equivalent OECD WMP (OECD, 2011, pg. 4)	OECD Water Governance Category
The Government of Alberta, along with our partners, will manage Alberta's water infrastructure – both provincial and district-owned for long-term sustainability.	Clear roles and responsibilities	EFFECTIVENESS
Alberta will administer and operate the water management system to meet transboundary agreements in cooperation with neighbouring jurisdictions.	Appropriate scales within basin systems	EFFECTIVENESS
Alberta's water resources must be managed within the capacity of individual watersheds.	Appropriate scales within basin systems	EFFECTIVENESS
<i>Water for Life</i> will be integrated into other policies and plans, such as Land-use Framework planning, ensuring better resource management integration.	Innovate water governance practices & Appropriate scales within basin systems	EFFECTIVENESS
Knowledge of Alberta's water supply and quality is the foundation for effective decision-making.	Increase capacity for water management complexity	EFFECTIVENESS
Citizens, communities, industry and government must share responsibility for water management in Alberta and work together to improve conditions within their local watershed.	Coherent cross-sectoral coordination/ stakeholder engagement	EFFECTIVENESS
Alberta will continue to be a leader in drinking water quality and standards to ensure Albertans have safe, secure drinking water.	Proper regulatory frameworks	EFFICIENCY
Best available practices and market-based tools will be used in order to maintain flexible and adaptive water management.	Innovate water governance practices	EFFICIENCY
Alberta currently recognizes "first-in-time, first-in-right" for existing water allocations, which can be transferable to ensure societal demands and needs can be met.	Proper regulatory frameworks	EFFICIENCY
Healthy aquatic ecosystems are vital to a high quality of life for Albertans and must be preserved.	Access to high quality water data information	EFFICIENCY
All Albertans must recognize there are limits to the available water supply.	Access to high quality water data information	EFFICIENCY
Groundwater and surface water quality must be preserved while pursuing economic and community development.	Manage tradeoffs through water governance frameworks	TRUST AND TRANSPARENCY
Albertans must become leaders at using water more effectively and efficiently, and use and reuse water wisely and responsibly.	Mainstream integrity and transparency practices	TRUST AND TRANSPARENCY

ADAPTED FROM ALBERTA'S WATER FOR LIFE PRINCIPLES TO OECD PRINCIPLES ON WATER GOVERNANCE		
EFFECTIVENESS	EFFICIENCY	TRUST AND TRANSPARENCY
Clear roles and responsibilities	Access to high quality water data information	Mainstream integrity and transparency practices
Appropriate scales within basin systems	Responsible and timely mobilization of financial resources	Stakeholder engagement
Coherent cross-sectoral coordination	Proper regulatory frameworks	Manage tradeoffs through water governance frameworks
Increase capacity for water management complexity	Innovate water governance practices	Monitor and evaluate policy and governance

Legend

Included in *Water for Life* principles

Acknowledged in *Water for Life* principles but not adequately

Missing from *Water for Life* principles

Table 6.2 Alberta Water Management Principles Equivalency to OECD Water Management Principles. Alberta principles do not address *Responsible and Timely Mobilization of Financial Resources* or how the GoA will *Monitor and Evaluate Policy and Governance*.

The strategy was supported by the *Water for Life: Action Plan* (2009), which outlines key outcomes and likely dates for implementation for the strategic goals. Specifically, the *Action Plan* outlines key themes, actions required, goals, key actions organized by short-, medium-, long-term dates, and key directions, which is referred to as the strategy's "comprehensive road map" (GoA, 2009).

The *Alberta Water Research and Innovation Strategy (2014)* is the province's framework to guide research and innovation in responding to challenges faced by the water resource system (GoA, 2014). The AWRIS identifies focused actions for government and publicly funded agencies to address gap and priorities in the water management sector in the province, and to date, the systems and multidisciplinary approach have led to good water governance outcomes, including "a partnership between Alberta Innovates (AI) and Sustainable Development Technology Canada (SDTC) led to joint funding for technologies that address water challenges in hydraulic fracturing, enhanced oil recovery, oil sands, and municipal water management" (GoA, 2017b). The strategy produces annual reports to communicate progress toward the outcomes and actions within the strategy, to identify areas for improvement, and to provide clarity on required adjustments.

6.1.1.2 Institutions Encouraging Good Water Governance and Responding to New Needs for Water Governance Practices

Two formal institutions were identified as encouraging good water governance and responding to new needs for water governance practices: The Ministry of Environment and Parks (GoA) and the Alberta Water Council. The Ministry paves the leadership path by setting policy and governance frameworks like the *Water for Life* strategy and action plan. In fact, the ministry is responsible for the implementation of the strategy and for providing leadership and resources to the *Water for Life* partners (GoA, 2008c). Although all of the partners are important to the delivery of the strategy and guiding the province toward good water governance, the Alberta Water Council (AWC) is a unique institution that was designed for these purposes. The AWC is a collaborative partnership set up by ministerial order in 2005. The council provides leadership, expertise, and sector knowledge to help governments, Indigenous Peoples, industry, and non-governmental organizations to advance the outcomes of *Water for Life* (AWC, 2007). Furthermore, the AWC advises the GoA on effective water resources management policies, practices, and tools. The council operates by consensus and is guided by an executive committee. The GoA is ultimately accountable for the implementation of the *Water for Life* strategy and continues to administer water and watershed management activities throughout

the province, but the AWC works diligently to communicate, research, report, and advise on ways in which water management in the province can improve.

6.1.1.3 Mechanisms Enabling Knowledge & Experience-Sharing to Foster Good Water Governance

Returning to the *Water Act*, the GoA's 2001 *Framework for Water Management Planning* (FWMP) remains the guiding document for water management planning in Alberta. At the time it was written, the framework stated its alignment with *Alberta's Commitment to Sustainable Resource and Environmental Management* (CSREM) document and acknowledged that the CSREM and the framework aims would be achieved by Integrated Resources Management (IRM) (GoA, 2001). Although there have been many changes since 2001, the move toward IRM is closer than it was in 2001. In fact, the Framework built the foundation for what is being realized today in the regional plans, specifically “[t]hat water management planning and decision-making be integrated with other planning initiatives and decision-making for other resources such as forests, fish, wildlife, petroleum, minerals and public and private lands” (GoA, 2001, pg.2). Built into the framework are the province's water management principles as well as the role of the government in the approval and adoption of water management plans and decisions under the *Water Act*. It also captures the way integrated land use planning was accomplished back then: “Integrated resource planning is directed through provincial legislation such as the *Water Act*, Environmental Protection and Enhancement Act, Forests Act, and the Municipal Government Act” (GoA, 2001, pg.9). As referenced in the LUF, land-use planning was accomplished through legislation, but there was not a coordinated effort to manage water resource use when demand for water increased, nor were there effective mechanisms in place to manage the pressures of both demand and drought on the system (Schmidt, 2014). At the time it was written, *Alberta Environment and Sustainable Development* was in charge of water-related management, but today *Environment and Parks* is the ministry that “supports environmental conservation and protection, sustainable economic prosperity, quality of life and outdoor recreation opportunities” (AEP). Although roles and responsibilities for water management have become more inclusive of stakeholders, the public, industry, and Indigenous Peoples, there remains uncertainty about how the new governance structure will balance the needs of the economy, environment, and society. This is particularly acute when changing government regimes and major world events impact the already delicate balance that sustainable development requires.

In addition to the FWMP, Watershed Planning and Advisory Committees (WPACs), the *Alberta Innovates* water innovation program, and the *Alberta Water Portal Society* are all

mechanisms for good water governance that enable knowledge and experience sharing to foster said governance. The GoA recognizes that the *Water for Life* strategy is a shift in the management of water resources in the province because it enables shared responsibility and environmental stewardship. WPACs are the main mechanism for fostering collaboration at the watershed level by creating opportunities for stakeholders to come together, share resources, and explore innovative solutions to water management challenges. The water innovation program by *Alberta Innovates* supports water innovations that will:

[H]elp to create a clean tech industry in water treatment; improve water use, conservation, efficiency, and productivity by 30 percent by 2030; and/or provide safe, secure, and reliable water resources while maintaining healthy aquatic ecosystems (Alberta Innovates, 2020b)

The funding program through *Alberta Innovates* is open to researchers, innovators, small and medium-sized enterprises, large companies and consortia who are seeking funding, expertise, and/or sector leadership to advance knowledge and technology for commercialization and industrial use. Recently, the organization hosted the *Digital Innovation Meets Water Management* (Alberta Innovates, 2020a), where private sector companies showcased their water innovation technologies that were supported through the water innovation program. Many speakers highly recommended the program not only because of access to financial resources to support their research and development but also because of the organization's networking opportunities and its technical guidance and support. One of the projects presented by *Roshan Water Solutions* developed a technology to assist municipalities with a rapid water quality test that returned results in-house in a matter of hours compared to the status-quo of 2 to 5 days by sending their samples to a lab for processing.

Alberta Water Portal Society was founded in 2006 "in the spirit of the *Water for Life* strategy" (Alberta Water Portal Society, 2020, webpage). As of 2014, the society is a registered charity that works with private, public, and other non-profit organizations and are supported by industry and water experts. The society has also partnered with all levels of government, academic institutions, environment non-government organizations, corporate partners and advisory councils and irrigation districts. Their projects include *Alberta Water Nexus: Energy, Food, People; My Everyday Water Decisions*; and the *Water Quality* interactive online game. In addition to publications about water and teaching resources, the *Portal* contributes to sharing and collaborating on water information and knowledge.

6.1.2 Laws and Institutions

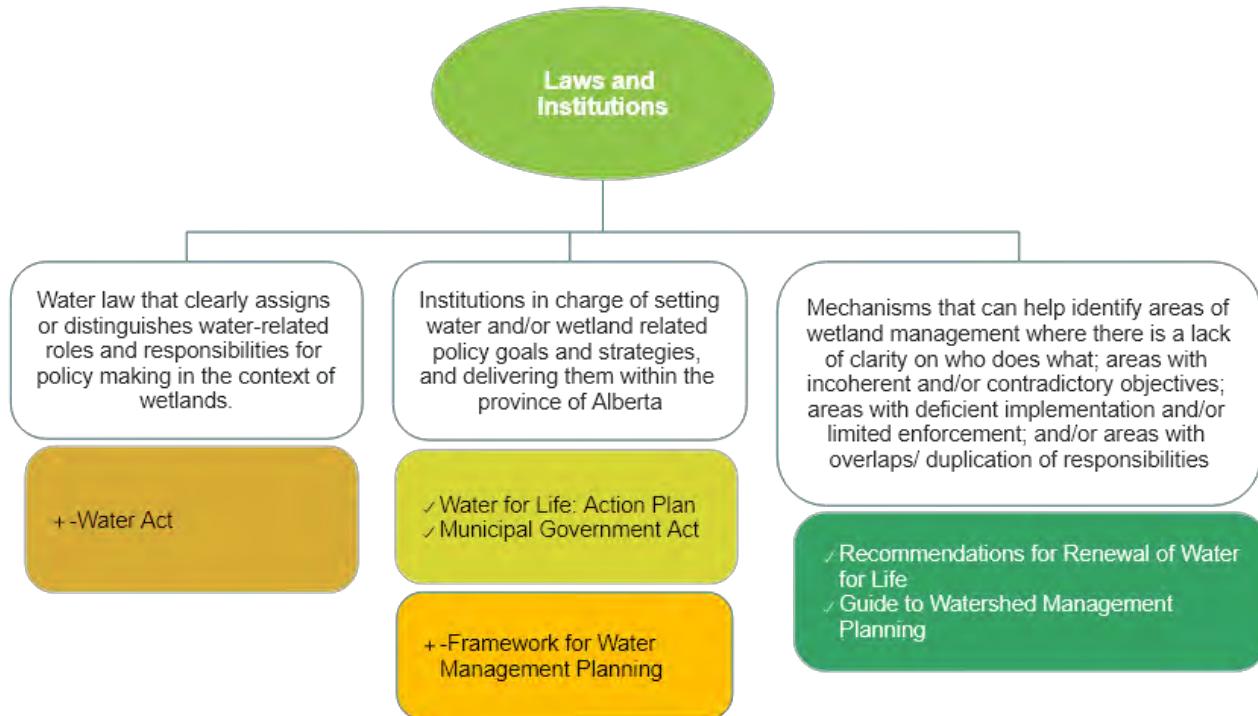


Figure 6.2 Laws and Institutions Documents Assessment Based on Appendix 8, Tables 6.1.2 a, b, c.

6.1.2.1 Water Law that Clearly Assigns or Distinguishes Water-Related Roles and Responsibilities for Policymaking in the Context of Wetlands

The documents for the Laws and Institutions indicator identified areas of concern with regard to defining and elaborating upon roles, responsibilities and implementation within provincial water law and institutions in charge of setting policy goals for the wise use of water and wetlands in Alberta. KI-11 writes that “The laws are in place, but the application isn’t consistent across the province. There was not enough support for training regulators and practitioners, so although the law and framework were well thought out, its implementation was flaccid” (Appendix 6, pg.1). Although it is the only water-law in Alberta, the *Water Act* may be insufficient to enable the *wise use of wetlands*.

The existence and level of implementation of water law that clearly assigns and distinguishes water-related roles and responsibilities for policymaking in the context of wetlands exists, but wetlands are generally grouped under the definition for *water* or implied to be included under the definition for the *aquatic environment* (See section 6.1.2a in Appendix 6.1). The *Water Act* is the main water law whose purpose “[is] to support and promote the conservation and management of water, including the wise allocation and use of water” (*Water Act*, RSA 2000, c W-3, 2009) and is followed by six caveats. The ‘*wise allocation and use*’ is

one of the few examples I came across that acknowledges the concept of wise use.⁵¹ “Water” in the Act is defined as “[all] water on or under the surface of the ground, whether in liquid or solid state” and which differs from *water body* and *aquatic environment*. Included in the *Water Act* are directions for the minister to establish a framework for water management planning as well as develop the aquatic environment protection strategy therein, which includes the protection of biological diversity.

Furthermore, the *Water Act*’s inclusion of statutory tools like *water conservation objectives* could be useful in the context of wetlands if a Director deems it necessary for the protection of a natural water body or its aquatic environment, but it could also work against it as expressed by Bankes & Bradley (2020). There are other statutes that could impact wetland environments, for example, the EPEA, RSA 2000, c E-12, and the Fisheries (Alberta) Act, RSA 2000, c F-16, but only the *Water Act*, RSA 2000, cW-3, 2009 assigns or distinguishes water-related roles in Alberta as per the indicator requirements of this work. However, KI-6 points out that:

“[...] the *Water Act* wasn’t designed or intended to protect wetlands or other water bodies. Other Acts may do a better job at protecting wetlands, such as the ALSA. The MGA recently amended the way it defines water bodies that may actually hinder wetland protection at the local level (Appendix 2, pg.6).

KI-8 offered their input about the AWP and the *Water Act*. They said that at the onset of implementation, the *AWP* “[...] has not been incorporated into law so as to require compliance with it when a proponent seeks a *Water Act* approval or licence that could impact a wetland. However, the policy apparently is being incorporated into those processes - e.g., as a condition of an approval” (Appendix 2, pg.7).

Since impacts to wetlands are governed through *Water Act* applications, *Water Act* Authorizations (i.e., Approval, License, or Notice) are required when an activity will impact a water body or when it will divert and use surface or groundwater, unless the activity is exempt under the *Water (Ministerial) Regulation*. Both Alberta Environment and Parks (AEP) and the Alberta Energy Regulator (AER) grant approvals, licences, and codes of practice through the *Water Act*. AER has authority over energy resource activities, while AEP has authority over all other sectors. In addition to *Water Act* authorizations, two additional provincial authorizations are required when a proposed activity may have impacts on a wetland(s):

- A Public Lands Disposition or Approval/Authorization, where the activity that may impact a wetland is either located on public land or is a permanent and naturally occurring body of water under Section 3 of the Public Lands Act.

⁵¹ Another example is in the EPEA, RSA 2000, c E-12 where the wise use of the environment is stated as a purpose.

- An Authorization under the *Environmental Protection and Enhancement Act*, where the proposed activity that will impact a wetland is regulated by this Act.

In addition to provincial requirements, municipalities manage their lands under the *Municipal Government Act*. The MGA gives municipal governments control and management over watercourses and bodies of water within their municipality. The MGA will be discussed further in the next section.

6.1.2.2 Institutions in Charge of Setting Wetland Related Policy Goals and Strategies and Delivering them within the Province of Alberta.

This indicator identifies the *Framework for Water Management Planning*, *Municipal Government Act RSA 2000, c M-26*, and the *Water for Life*: Action Plan as documents that describe institutions that are in charge of setting wetland-related policy goals and strategies. The documents show that while there are institutions in charge of setting water-related policy goals, the wetland policy goal is currently being implemented. A review of the provincial wetland policy implementation is set to be completed and delivered by the AWC in 2021.

The *Water for Life*: Action Plan (2009) and the *Framework for Water Management Planning* documents show that the GoA, specifically the Ministry of Environment and Parks, oversees the development and delivery of water guidance and decisions. The GoA is also supported by the AWC to advance the outcomes of *Water for Life*, provide advice to the GoA that informs policy or actions, and provide a forum to discuss water perspectives. The GoA commits to reporting annually and encourages all other partners to do the same. The AWC commits to providing advice based on their work with the GoA and other partners, as well as their own work.

In terms of responding to new needs for water governance with respect to wetlands, the goal of assuring that aquatic ecosystems are maintained and protected includes the key action “[to] finalize and implement a new wetland policy for Alberta” (GoA, 2008b, pg.10); and it responds to the call for the protection of the aquatic environment in the 2001 framework. The AWC and GoA are coordinated in setting water and wetland related policies, goals and strategies, and have delivered on some key actions, e.g., The *Alberta Wetland Policy* was completed in 2013 and fully rolled out to both the White and Green Areas by 2016. The AWC recommendations will be reviewed by the GoA, but the GoA will ultimately determine whether the recommendations are implemented or not.

The *Municipal Government Act* (MGA) enables municipalities to conserve wetlands through tools such as land-use bylaws and environmental reserves. While the municipalities own and manage lands containing wetlands, natural wetlands are still crown property. In 2015,

revisions of the MGA gave municipalities more responsibility toward managing environmental impacts during land-use planning. Prior to the 2015 revision of the MGA, the legislation did not provide municipalities with the ability to conserve environmentally significant lands other than lands that met the criteria under Environmental Reserve (ER) (Municipal Government Act, RSA 2000, c M-26). ER lands are those that are undevelopable and may or may not have key environmental features a municipality wishes to preserve (GoA, 2015c, pg.1). The amended MGA now enables municipalities to designate land for a new type of reserve, called Conservation Reserve (CR), in order to protect environmentally significant features such as wildlife corridors, significant tree stands, or other environmentally significant features a municipality chooses to conserve. While there are limitations as to when these sections in the MGA can be enacted and how they can be applied, it does allow municipalities to engage in wetland conservation in the context of their municipal boundaries. The Alberta Urban Municipalities Association (AUMA) and the Alberta Association of Municipal Districts and Counties (AAMDC) have advocated for the opportunity to strengthen provisions for wetland protection under the MGA. Support tools and resources available to municipalities that are publicly available, such as *Your Guide to Making Wetlands Work in Your Municipality* (AB NAWMP, 2016), should be properly distributed.

The question of “regulatory red tape” is an issue that is current today under the UCP government (Associate Minister of Red Tape Reduction, 2015), but it was also supported by KI-12, an agricultural landowner who generally disagreed with the regional wetland policy. KI-12 disagrees with the wetland policy’s ability to balance sustainability goals; support wetland management needs into the future; or apply sound best management practices (Appendix 2, 2014). The issue of burdensome regulatory requirements brings into question the process for permitting activities that may impact wetlands. Particularly in rural areas, there may be a negative effect on compliance because the new requirements may be too onerous. Most respondents disagreed or were unsure about the statement that the approval process was too onerous. At least one respondent recognized the responsibility of the applicant to manage the development application process to allow time for consideration of alternatives for wetland management (KI-1, Appendix 4, pg.1).

Multiple KIs cited the many challenges that some private landowners face in contrast to developers and agricultural operators (Appendix 4, pg.1). Private landowners, for example, particularly those who yield crops on their lands, work in limited time frames (KI-4, Appendix 4, pg.1). Moreover, their capacity to bear operational costs will generally be reduced in comparison to developers and agricultural operators. Oftentimes municipalities “[...] can’t definitively tell

[landowners] if something is a wetland or not, without it costing them a lot for a qualified professional to do a study" (KI-10, Appendix 4, pg.1). It is not clear if these issues are considerations in a future iteration of the wetland management process.

In addition to issues of capacity for private landowners, some municipalities face capacity issues as well. For example, they do not know how to handle wetlands during development permit processes because some municipal policies are not yet aligned to the provincial road map (KI-10, Appendix 4, pg.1). The lack of alignment, as a result of many different factors, creates inconsistent practices during the development permit process at the municipal level. Stewart (2009) writes that under section 60 of the MGA, municipalities could enact water body management bylaws "[to] ensure that impacts on local water bodies and associated riparian lands are minimized" (pg.123); however, a municipality's statutory authority under section 60 of the MGA "needs to be further translated into provincial policy to ensure that municipalities embrace their responsibilities for local "direction, control and management" of wetlands and associated riparian lands and aquifers" (pg.123).

Historically, capacity issues were also found at the provincial level. Clare & Creed (2014) evaluated the government's policy capacity to manage wetlands in Alberta by measuring and evaluating no net change of wetland area; permitted versus unpermitted wetland loss; and an information tracking system. A major finding was that over 80 % of the wetland acreage in the study area was lost without a government permit. The wetland permit data "revealed serious problems with information tracking by both government and non-government agencies responsible for policy and regulatory oversight" (Clare & Creed, 2014, pg. 235). The authors recommended an increase in resources dedicated to acquiring, managing and disseminating information that will ultimately improve regulatory oversight. It is not yet clear if the *Alberta Wetland Policy* has the mechanisms in place to address these issues, but we do know that some municipalities seem to be struggling to implement the policy and could benefit from increased guidance, capacity, funding, and information dissemination.

6.1.3 Policy Coherence

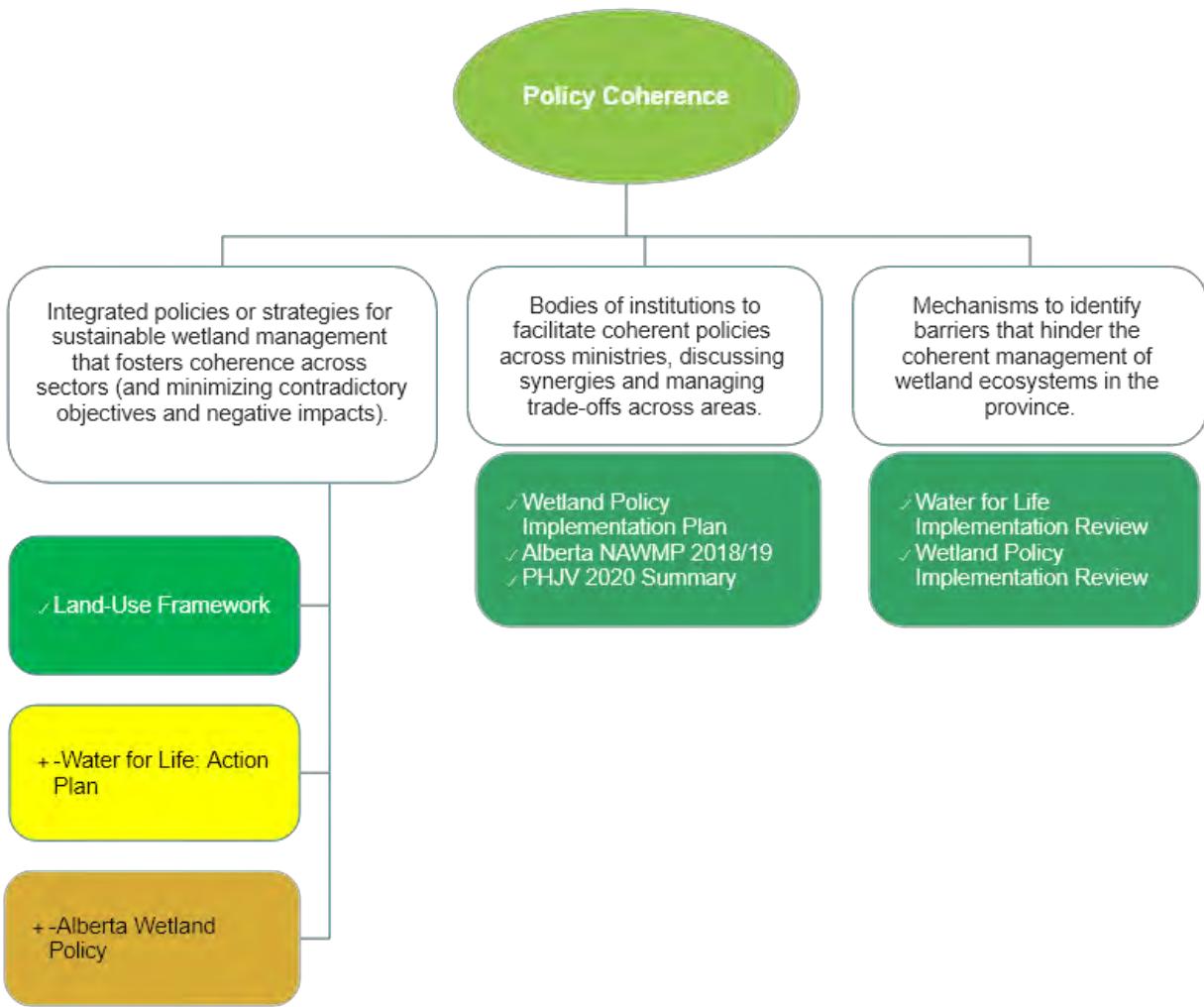


Figure 6.3 Policy Coherence Documents Assessment Based on Appendix 8, Table 6.1.3a, b, c.

6.1.3.1 Integrated Policies and Strategies Fostering Coherence Across Sectors while Minimising Contradictory Objectives and Negative Impacts.

Another aspect of the enabling environment that ties into laws and institutions is that of the level of policy coherence for the *wise use of wetlands* in the province of Alberta. The strongest examples of policy and strategy integration for the *wise use of wetlands* are the LUF (2008), *Water for Life* (2008), the *Alberta Wetland Policy* (2013). The goal of the LUF is to establish a regional system of land use planning to promote mutually reinforcing policy actions related to land-use, managed within basin boundaries, across government departments and agencies, and with participation from stakeholders, the public, and industry. The LUF complements the *Water for Life* strategy as well as the *Clean Air Strategy for Alberta* (1991) and *Climate Change Strategy* (2008). Within the renewed *Water for Life* strategy, an additional

principle was added that had not been included in the 2003 version: “*Water for Life* will be integrated into other policies and plans such as Land-Use Framework planning ensuring better resource management integration” (GoA, 2008b, pg. 7). The key directions and strategies to advance the outcomes of the *Water for Life* strategy are guided by three goals that foster sustainable development in general and could positively impact sustainable wetland management: 1. Safe, secure drinking water; 2. healthy aquatic ecosystems; and 3. reliable, quality water supplies for a sustainable economy. Healthy people, healthy environments, and a healthy economy are essentially the goals of sustainable development. How well these goals are achieved will be determined over time as progress is made to move Alberta into a more balanced approach from supply-side to demand-side water management provisions (Schmidt, 2014). As the work is done toward this aim, the *Water for Life* strategy and action plan are a step toward demand-side water management.

The *Alberta Wetland Policy* (2013) was a key action under the “Healthy Aquatic Ecosystems” goal in *Water for Life* (2008). The policy took over the interim policy that had been in place since the 1990s. The interim policy and the 2013 policy differ in the ways in which the policies enabled wetland conservation and management:

Interim Wetland Policy Goal 1990-2016	2013 Alberta Wetland Policy
<i>The goal of the Government of Alberta is to sustain the social, economic, and environmental benefits that functioning wetlands provide, now and in the future.</i>	<i>The goal of the Alberta Wetland Policy is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy.</i>

Table 6.3 Comparison between interim wetland policy goal and 2013 wetland policy goal

The major difference between the interim policy and the 2013 policy is that the new policy applies to the entire province, both the White and Green Areas, and not just the White Area. In terms of the policy language with regards to power, the interim policy assigned power to the GoA for sustainable wetland management, whereas the new policy is open to interpretation as to who leads the charge. Even though the policy was written by the GoA, there are now other members of society engaged in the delivery and implementation of policy goals and outcomes under the direction and guidance of the *Water for Life* strategy. The responsibility to meet the goals of both the policy and the strategy is distributed among multiple groups of people, including “Ensuring that the responsibilities of managing Alberta’s wetlands are shared amongst all Albertans” (GoA, 2013a, pg.10), rather than just GoA ministries, and thus potentially more achievable. But it is also possible that diffused responsibility could negatively impact accountability in terms of who will be held accountable if the policy goal is not met.

In terms of coordination, the regional wetland policy uses a number of coordinated regulatory tools and delivery mechanisms to ensure the goal of the policy could be achieved. (See section 4.2.1 Wetland Management Planning Tools and Assessments). Coordination of the regional policy also includes fact sheets for major industries like agriculture and forestry. The implementation of the policy for oil and gas is led by the AER but always under the direction of AEP. The tools assume some level of equivalence among proponents, but as KIs have mentioned, private landowners cannot compete with major industry proponents in terms of resources.

Natural resources like wetlands are “public goods,” which means that the cost of “supplying” the ecosystem functions and benefits (to all Albertans) of wetlands on private lands fall on ranchers and farmers (GoA, 2008b). This means that land-use decisions are generally economic decisions. This reality also explains why the loss of wetland habitats is pervasive in southern Alberta, where irrigation districts are highly valued. Irrigation in Alberta is valued as a 3.6-billion-dollar contribution to the province’s GDP (Amsalu, 2016). The LUF, *Water for Life*, and wetland policy are a way of cost-sharing the expense to keep environmentally valuable lands on financially valuable private and public lands. In the LUF, the GoA commits to working with the *Institute of Agriculture, Forestry and the Environment* and other provincially funded applied research institutes to advance a strategy for conservation and stewardship on public and private lands.

6.1.3.2 Institutions to Facilitate Coherent Policies Across Ministries, Discussing Synergies and Managing Trade-Offs Across Water, Environment, Health, Energy, Agriculture, Industry, Spatial Planning and Land Use and Other Relevant Areas.

With respect to institutions that facilitate wetland policy, the North American Waterfowl Management Plan (NAWMP) and Ducks Unlimited Canada (DUC) have been steadily working toward these goals over a number of decades. Locally, the Alberta Water Council (AWC) and the Alberta North American Waterfowl Management Plan Partnership (Alberta NAWMP) are working “on the ground” to facilitate the coherent delivery of wetland management actions.

The Alberta Water Council (AWC) is a collaborative partnership that provides leadership, expertise, and sector knowledge and perspectives to help governments, Indigenous Peoples, industry, and non-governmental organizations to advance the outcomes of *Water for Life*. It advises the GoA on matters pertaining to the successful achievement of the outcomes of the *Water for Life* strategy and on effective water resources management policies, practices, and tools. The approach that the council has taken enables it to anticipate and respond to emerging challenges and opportunities. The AWC has a particular strength in identifying and helping to fill

gaps in policy, knowledge, and information. This valuable role will become even more important to decision-makers as they wrestle with increasingly complex resource issues and potential trade-offs. For example, the AWC created the Water Policy Issues and Gaps Project Team in May 2006 to identify and prioritize water policy issues and gaps relating to Alberta's water management system.

The Alberta NAWMP partnership is one of the regional alliances created through the Prairie Joint Venture Habitat (PHJV) under the NAWMP. The NAWMP is an international plan to conserve waterfowl and migratory birds established in 1986 by Canada and the United States and expanded to include Mexico in 1995. The NAWMP defines and prioritizes geographic regions across the continent based on their biological values for waterfowl and other wetland-associated birds. The PHJV is a voluntary partnership between Alberta, Saskatchewan, and Manitoba brought together for the conservation of wetland and grassland habitat for waterfowl and other wildlife. The PHJV is the parent organization for the Alberta NAWMP. The Alberta NAWMP partnership addresses regional priorities through collaboration, coordinates joint projects, communications, planning and policy support, and facilitates funding options among the partners. Alberta NAWMP partnership is composed of AEP, Alberta Agriculture and Forestry, DUC, Environment and Climate Change Canada, and the Nature Conservancy of Canada. Partner activities are supported through technical and logistical assistance and by advancing innovative ideas through facilitation, funding support and capacity building.

6.1.3.3 Mechanisms to Identify Barriers that Hinder the Coherent Management of Wetland Ecosystems in the Province.

A core task of the Alberta Water Council (AWC) is to review the implementation progress toward achieving the three goals of the *Water for Life* strategy and provide advice accordingly. Five reviews have been completed, with the last review covering 2012 to 2016. The committee in charge of the implementation review found a number of issues that needed to be addressed: reassess the manner in which information is gathered, examine how advice is developed and disseminated, and assess how the advice is incorporated into decision-making. Furthermore, the need to develop and monitor performance metrics for *Water for Life* goals was also a recommendation by the standing committee. The AWC implemented the standing committee's advice into their 2019–2021 *Business Plan* to reflect current needs, including identifying gaps in the implementation of the *Water for Life* strategy. In addition to the *Water for Life* implementation review, the AWC is also tasked with preparing the *Wetland Policy Implementation Review* (2020). The review will fulfil two purposes: (1) identify potential performance measures for the goal, outcomes, and strategic directions of the wetland policy;

and (2) describe the challenges, opportunities, or unintended consequences experienced by sectors in the implementation of the wetland policy. The expected completion date of the report is in the spring of 2021. Both the *Water for Life* and *Wetland Policy* implementation reviews will be able to identify barriers that hinder the coherent management of wetland ecosystems in the province to some degree.

Alberta Wetland Rapid Evaluation Tool – Actual (ABWRET-A) is an instruction manual of standardized methods for assessing the relative value of wetlands developed by AEP and other contributors. This rapid assessment tool allows for the valuation of important wetland functions by assigning them to a category based on functional values. The category assists AEP and the applicant in decisions about wetland avoidance, minimization, replacement, and replacement ratios; however, the guidance materials are very complex and not designed for the layperson to understand (KI-11, Appendix 6, pg.3). The purpose of this standardized approach is to provide consistency, transparency, and comparability for assessing wetland functions and determining wetland value. For the purposes of the AWP, wetland value should be assessed based on relative abundance on the landscape and other key criteria such as biodiversity, water quality improvement, flood reduction, and human values, such as recreation, education, and cultural significance.

The *Alberta Wetland Identification and Delineation Directive* explains how to identify wetlands and delineate their ecological boundaries for the purpose of improving the accuracy and consistency of wetland delineations. The Directive provides standardized identification and delineation methods that could lead to a more precise inventory. Mitsch & Gosselink (2015, pg. 28) write that boundaries, or wetland definitions, should be based on scientific measures, but that what is done with the definition afterward remains a political decision.

6.1.4 Regulatory Frameworks

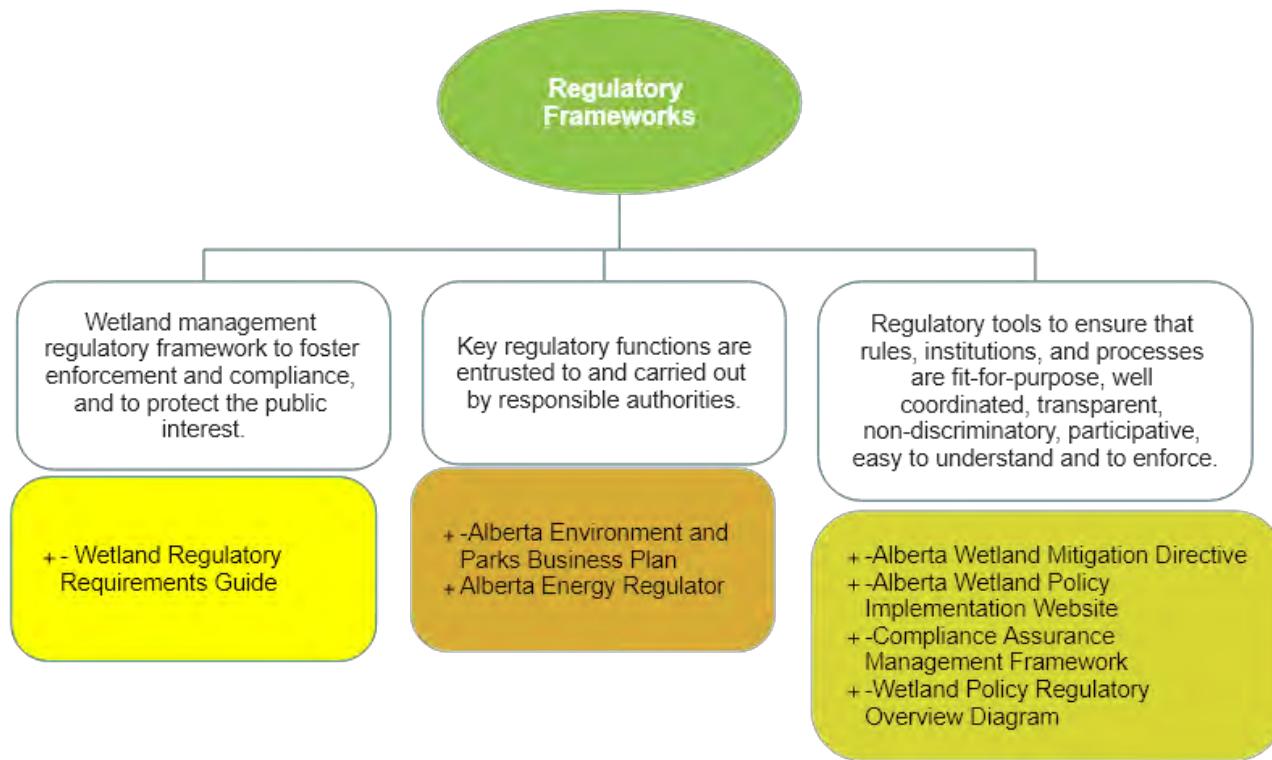


Figure 6.4 Regulatory Frameworks Documents Assessment Based on Appendix 8, Tables 6.1.4 a, b, c.

6.1.4.1 Wetland Management Regulatory Frameworks to Foster Enforcement and Compliance.

This indicator showed that wetland regulatory frameworks that protect the public interest and foster enforcement and compliance are developed or being developed in Alberta. The *Wetland Regulatory Requirements Guide* document is useful for both defining the wetland regulatory framework and as a tool to improve public knowledge of the regulatory instruments and processes applicable to the implementation of the *Alberta Wetland Policy*. The guide identifies, to the public, the primary legislation and requirements applicable to wetland administration. These are the requirements and specific pieces of the legislation that must be complied with to carry out an activity in a wetland. The guide aims to provide clear, consistent, and transparent information about the regulatory requirements for disturbing wetlands. In addition to legislative requirements, the following directives must be abided by when there is a plan to disturb an area in or around a wetland: *Alberta Wetland Identification and Delineation Directive*, the *Alberta Wetland Assessment and Impact Report Directive*, and the *Alberta Wetland Mitigation Directive*.

As stated in the guide, impacts to wetlands in the province are administered under the *Water Act* and *Public Lands Act*, but there are other legislative instruments and their regulatory

counterparts that could impact wetlands as well.⁵² Activities or water diversions that may impact wetlands may require approval, authorization, a licence and/or a disposition under one or both Acts. Compliance with other legislation, both provincial and federal (e.g., *Species at Risk Act*), may be required before proceeding. Furthermore, compliance with *ALSA* and the LUF may also be required before proceeding with an activity that may impact wetlands. Enforcement, compliance, and protection are given statutory power in the *Water Act* under *Part 10 Inquiry and Enforcement Orders and Part 11 Offences, Penalties and Related Matters*. For the *Public Lands Act*, there are caveats for Unauthorized Use of Public Lands as well as Enforcement. Unauthorized drainage of a wetland is technically a punishable offence; however, the offender would have to be caught or reported to the appropriate authority. Enforcement and compliance require evidence to support regulatory enforcement action (See Section 6.1.4.3).

6.1.4.2 Key Regulatory Functions are Entrusted to and Carried Out by Responsible Authorities.

The agencies responsible for carrying out key regulatory wetland management functions are AEP and the AER. AEP “represents the interests of Albertans in delivering a balanced, common-sense and results-based approach to the stewardship of Alberta’s environment while enabling sustainable resource development that supports social and economic well-being” (GoA, 2020b, pg. 69). The department’s budget includes funding for the Land Use Secretariat and the Integrated Resource Management Secretariat. The ministry’s outcomes that can influence wetland management include environment and ecosystem health and integrity, sustainable economic development, public well-being, public health, and safety from environmental conditions and events. The AER’s mandate and role for administering, among other things, Authorizations and Applications under the *Water Act* and *Public Lands Act* has been developed collaboratively among the Minister of Environment and Parks and the Minister of Energy and the AER to reflect a common understanding of their respective roles and responsibilities. Under the *Responsible Energy Development Act* (REDA), the AER is responsible for reviewing *Water Act* applications and submissions related to Alberta’s energy resource industry. If the AER finds that a company is not following regulations under the *Water Act*, they will enforce compliance using various tools.

Enforcement orders can also be implemented through the *EPEA* if the Director has referred the activity to an approval under the *EPEA* and is successful. Enforcement and

⁵² For the purpose of this research, the focus was on the legislation that fit the elements required by the criteria. *Fisheries Act (Alberta)* and *Wildlife Act (Alberta)* are examples of legislation that could also impact wetland management in Alberta but were not considered for this indicator.

compliance tools for AEP include warning letters, tickets, administrative penalties, enforcement, environmental protection, water management orders, and prosecution. The AER uses enforcement decisions, such as warning letters, administrative penalties, prosecution, administrative sanctions, directions of an inspector in relation to section 137(2)(c) of the *EPEA*, orders issued to compel compliance or remediate, any notice of noncompliance that is related to a full or partial suspension of operations, suspension or cancellation of an approval, and cancellation of a reclamation certificate. Both the AEP and the AER encourage companies to proactively identify, report and correct their actions when a rule or requirement is not followed.

Furthermore, both agencies report their summaries of action, investigation and non-compliant orders through quarterly reports as well as orders⁵³ available online. Voluntary compliance is the objective, but effective compliance also depends on providing enforcement when necessary (GoA, 2014c, pg.92). Indeed, KI-8 writes that “The [wetland] policy has not been incorporated into law so as to require compliance with it when a proponent seeks a *Water Act* approval or licence that could impact a wetland. However, the policy apparently is being incorporated into those processes - e.g., as a condition of an approval” (Appendix 2, pg.7). KI-10 writes, “I would hope that the financial burden of correctly following the application process and compensation schedule would be enough to mitigate the loss of wetlands, but I fear it will only result in non-compliance with regulation. In rural Alberta, the risk of enforcement for private landowners is too low” (Appendix 2, pg.11). This brings into question resource allocation for how to properly address issues that will result in a balanced approach to wetland development versus wetland conservation. Working with a precise wetland inventory that is linked to *Water Act* applications for disturbing wetlands and wetland directives could empower agencies to be more effective at regulating wetland loss. While illegal drainage on private lands remains a problem in Alberta, KI-1 recommends “Focus on high-risk areas and start with education and awareness. Prosecution of landowners for an activity that has historically been seen as a natural and necessary part of land management for the purpose of cultivation is unpalatable in Alberta. Sanctions can be in the form of wetland restoration and replacement” (Appendix 4, pg.7), which supports wetland CEPA and acknowledges the status quo approach in Alberta of draining wetlands as a common practice on private lands.

⁵³ Access to enforcement, environmental protection, orders to vacate, and water management orders is [online](#).

6.1.4.3 Regulatory tools to ensure that rules, institutions, and processes are fit-for-purpose, well-coordinated, transparent, non-discriminatory, participative, easy to understand and to enforce.

The *Compliance Assurance Management Framework* (ESRD, 2013) document describes the business of *Compliance Assurance* for the issuing department, setting out goals, core principles and supporting policies. The purpose of the document is to support the consistent, coordinated and effective delivery of the *Compliance Assurance Program* and to provide a guide for all Albertans, including stakeholders and industry, on environmental compliance and performance expectations and how they will be achieved. This framework, or set of rules, sets out environmental, resource management/protection and conservation obligations and requirements for all Albertans. The regulatory framework enables the achievement of compliance by Albertans within the statutory framework and regulatory requirements. The compliance assurance approach is based on education, prevention and enforcement. The framework is assessed by performance measures and performance evaluations; however, wetland regulations or codes of practice are not listed in the document, so it seems that wetland regulation performance is not measured by this framework yet. *Water Act*, *EPEA*, *Forests Act*, *Public Lands Act*, *Alberta Land Stewardship Act*, and *Forest and Prairie Protection Act*, which could impact wetlands, are identified in the framework.⁵⁴

The *Alberta Wetland Mitigation Directive* guides applicants to prioritize “avoid” and “minimize” decisions over “replace” decisions. Where avoidance and minimization efforts are not feasible, wetland replacement is required through permittee-responsible replacement or wetland replacement fees. There are growing concerns that wetland replacement fees are favoured more often than are impacts to wetlands avoided or minimized. When respondents were asked about whether or not this is the case, responses were divided. Respondents who disagreed with the statement indicated that they did not have direct experience with wetland mitigation, and upon further analysis of the comments, all respondents shared common views about the *Mitigation Directive*. The perception that replacement is the preferred course of action in wetland mitigation is a common thread. Whether or not this is the case is a lot less tangible. KI-11 writes that “[...] the perception is that replacement is the primary option, but that is because avoidance and minimization are not measured, whereas replacement is measured” (Appendix 4, pg.2). Measuring avoidance and minimization is possible but requires keeping track of these options as part of the regulatory process; this may be something that is happening, but it is not clear or made public to verify. This action would be a worthwhile measure to verify the strength

⁵⁴ Non-compliance with these acts is a contravention or an offence which can trigger an investigation by AEP/AER.

of the hierarchy in preventing wetland loss. Since proponents must prove that avoidance and minimization were considered, it is a viable action to measure their occurrence compared to replacement.

KI-2 offered some insight into the perception of *why* replacement is chosen more often, “replacement [is] more often employed, perhaps because it is easier and more economical,” thus highlighting a way of thinking about mitigation that is not uncommon (Appendix 4, pg.2). KI-4 shares their former experience of mitigation, in a way qualifying KI-2’s opinion, by acknowledging that “In decades past, fees were definitely the default method” (Appendix 4, pg.2). They also note that there must be sufficient political will and policy direction to bring about the necessary changes to actually prioritize avoidance and that such a shift will take time to integrate into societal values. We are also reminded that “Avoidance can be accomplished by turning down an application to impact a wetland. This fact is not well enough understood or appreciated” (KI- 8, Appendix 4, pg.2). Perhaps it is not a matter of appreciation but rather an indication of the actual policy priority to permit development.

Neither historically nor at this point in time is the priority of wetland retention a priority in Alberta. Moreover, the mitigation hierarchy does not rule out development but rather enables it by offering three choices with which to pursue development. The policy does not advocate for wetland retention, even though it is supposed to provide the strategic direction to conserve and protect wetlands. Instead, the policy seems to focus more on the restoration and management of destroyed wetlands. At this point, the prioritization of wetland retention is a political question, and as many KIs point out, it is a question of political will. KI-1 shared that the unwritten rules that favour economic development over environmental/biodiversity protection are, in his professional opinion, very much a concern in Alberta (Appendix 4, pg. 2). In some cases, trade-off decisions are made considering resource recovery and/or environmental implications, but this is not something that is easily measured without a tool that can properly record and monitor the ratios between a precise wetland inventory that considers wetland functions and values and development of land that may impact a wetland ecosystem. Identifying priority management issues at a provincial scale and using compensation funds accordingly would allow more flexibility in making trade-off decisions between wetland, economic, and social values (Appendix 4, pg.12).

6.2 Addressing Drivers of Wetland Loss

6.2.1 Wetland Functions and Benefits Featured in Plans and Strategies

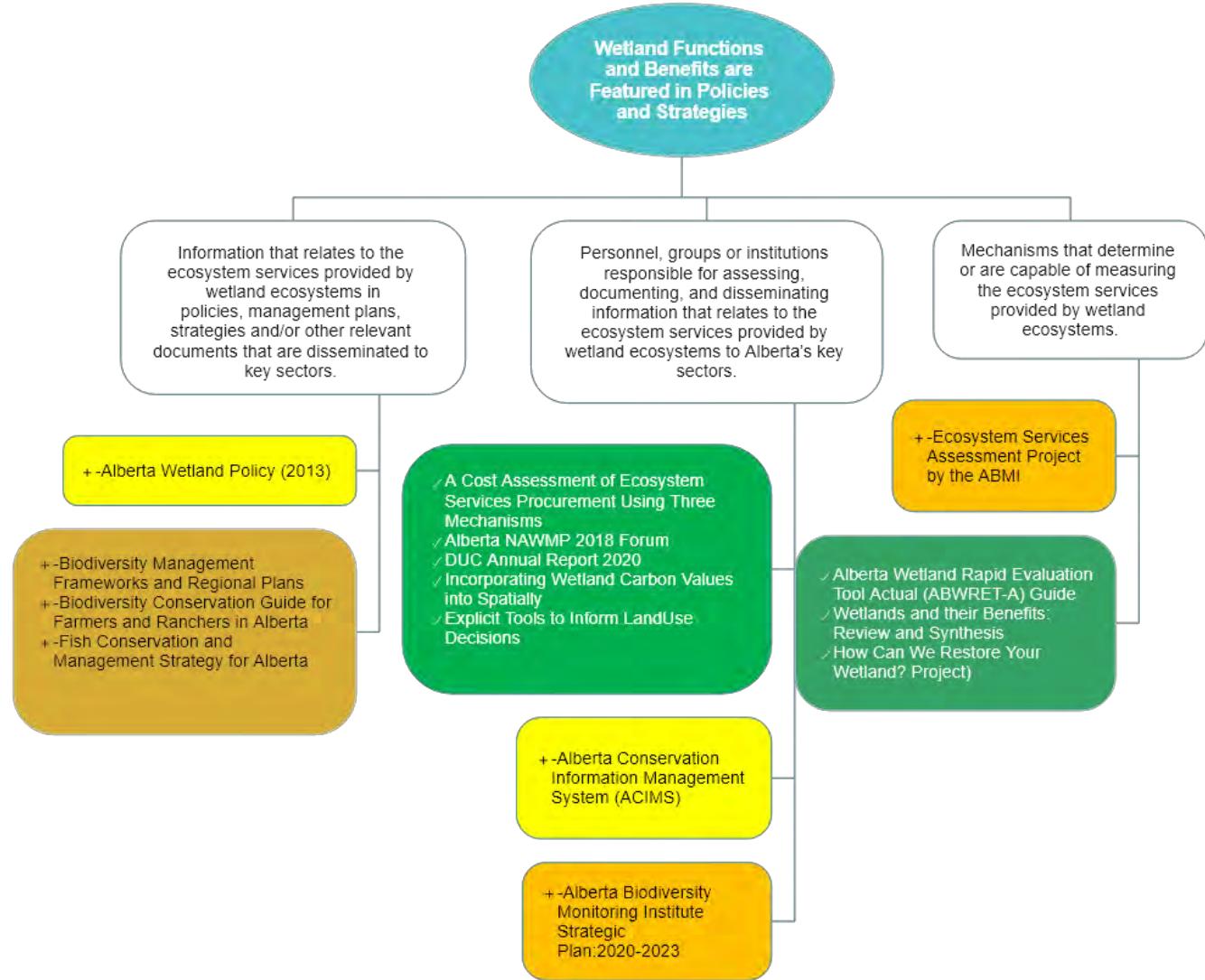


Figure 6.5 Wetland Functions and Benefits Documents Assessment Based on Appendix 9, Tables 6.2.1 a, b, c.

6.2.1.1 Information that relates to the ecosystem services provided by wetland ecosystems in policies, management plans, strategies and/or other relevant documents that are disseminated to key sectors.

The level of information about the ecosystem services provided by wetland ecosystems that are featured in policies and management plans needs to be improved. A key area for improvement could be focused on documents that are disseminated to key sectors. The first indicator looked at the *Alberta Wetland Policy (2013)*, the *Biodiversity Management Frameworks* mentioned in the regional plans, the *Biodiversity Conservation Guide for Farmers and Ranchers in Alberta*, and the *Fish Conservation and Management Strategy for Alberta* documents to

examine if they contained information about the ecosystems provided by wetlands. These documents were found to be publicly available and relevant to the indicator description but may not encompass documents sent directly to key sectors engaged in the regulatory process.

Any person with plans to disturb a wetland must submit an application and adhere to the regulatory framework associated with the *Alberta Wetland Policy* (2013). This policy guides the wetland management program in Alberta. All key sectors that want to disturb a wetland are subject to policy requirements and regulations. The *Policy* overview outlines the policy goal and its outcomes and key terms such as “sustain the benefits they provide,” “wetlands of the highest value are protected,” and “wetlands and their benefits are conserved and restored,” generally point to the ecosystem services provided by wetlands (GoA, 2013, pg. 2). The *Policy* briefly touches on the diversity in wetland form, function, use and distribution, then introduces how wetland value will be assessed using measures associated with ecosystem service functions (i.e., abundance on the landscape, supported biodiversity, ability to improve water quality, flood reduction, and human uses). While the policy includes information about the functions and benefits of wetlands, it does so at a high level and would benefit from graphic illustrations depicting wetland functions and values, rather than relying on text alone.

The section called ‘Wetlands in Alberta’ in the *Policy* defines wetlands, and describes them as “highly diverse, productive ecosystems that provide a host of ecological services and form an integral component on Alberta’s diverse landscapes” and that “they play an important role in sustaining healthy watersheds by protecting water quality, providing water storage and infiltration, providing habitat for wildlife, fish and plants, and sustaining biodiversity” (GoA, 2013, pg. 4). Wetland value and functional groups are addressed (pg.12) and wetland value criteria and categories are discussed on (pg.13). The *Policy* is also “built-in” to the *Water for Life* strategy specifically under the “Healthy aquatic ecosystem” (HAE) goal.

The *Water for Life* strategy could be included as a government document for this indicator,⁵⁵ but it would have received the same baseline colour coding as the *Policy* and so was not included. The completion and implementation of the wetland policy is a key action toward the HAE goal. The policy mentions (pg.2), defines (pg.4), and provides direction and guidance for assessing the ecosystem services provided by wetlands that may be impacted by development. Education and outreach are identified as a policy “system need” so that “Albertans appreciate the value and importance of wetlands to the environment and human

⁵⁵ “*Water for Life* has given us the opportunity to increase other stakeholders’ awareness of the vital benefits that wetlands provide in maintaining healthy watersheds in Alberta. These benefits include improving our water quality, water supplies, and maintaining healthy aquatic ecosystems and the rich biodiversity these areas provide.” AWC 2013

health" thus "[a] comprehensive education and outreach [sic] will help ensure a common understanding of these benefits" (pg.21).

The South Saskatchewan Regional Plan (SSRP) addresses the advancement of watershed management to ensure that land-uses are considerate of the functions and strategically important locations of wetlands, riparian lands, source and recharge areas to ensure ecosystem functions are sustained. Furthermore, wetland benefits are summarized in a short paragraph as well as a summary about the wetland context in Alberta, including wetland loss in the province, wetland policy implementation and the GoA's commitment to increasing knowledge and mapping of wetlands. The Implementation Plan in the SSRP includes "Enhanced Integrated Watershed Management Plan" (GoA, 2014b, pg. 84). Under this heading exists the objective of "regional approaches and tools to support integrated management of water and aquatic ecosystems. One strategy to achieve this objective is to "continue to increase knowledge and improve management of wetland areas within the region" (GoA, 2014b, pg. 84). Establishing regional wetland management objectives as enabled under the AWP and continuing to facilitate the advancement of wetlands knowledge, data systems and science are the implementation methods for which to achieve this particular strategy related to wetlands. The SSRP also highlights the expectation, among other things, that municipalities must "identify and consider, based on available information, the values of significant water resources and other water features such as wetlands [...] within their boundaries" (GoA, 2014b, pg.112). This statement presents the idea that wetlands are not considered a water resource but a feature of a water resource.

The SSRP also includes wetlands in its mapping project of linear footprint management planning. The project aims to map areas of important ecosystem function, including high-value wetlands. Projects like these are part of the biodiversity and aquatic environment goals in the SSRP planning objectives and strategies, and these will ultimately have an impact on the way wetlands are managed in the region. The Lower Athabasca Regional Plan (LARP), on the other hand, does not relay as much information about wetlands into its plan compared to the SSRP. This could be a result of timing because the LARP was released in 2012, whereas the Policy was not released until 2013 and was not fully implemented in the Green Area until 2016. The LARP boundaries are within the green area boundaries. The extent to which the LARP touches on wetlands is within a sidebar note that explains:

Wetland management in Alberta is currently governed by Wetland Management in the Settled Areas of Alberta: An Interim Policy (1993). The interim policy applies to the White Area of the province. The Government of Alberta is currently developing a new wetland policy to provide clear, consistent guidance for the management of wetlands throughout Alberta. The policy will aim to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they

provide to the environment, society and the economy. In support of wetland management, a variety of tools will be explored. One such tool is an off-set program delivered through wetland mitigation banking, which seeks to counterbalance the loss of wetlands where negative impacts are not avoidable. (GoA, 2012, pg. 28)

The difference between the inclusion of wetlands in the SSRP objectives and strategies compared to the LARP is a signal toward the impact that having the wetland policy and its mechanisms in place can have on regional planning. The LARP was completed before any of the other regions because of the intensity of oilsands development in the area at the time and the need for a regional framework to guide the rapid growth in population and economic activity that resulted in “unprecedented pressure on Alberta’s landscapes” (GoA, 2008a, pg. 6).

Both the LARP and the SSRP are committed to completing Biodiversity Management Frameworks (BMFs) for air, land, and water for each region, which to date remain incomplete. BMFs are a cumulative effects management approach designed to address the need for biodiversity monitoring and management. Although the management frameworks will support the conservation and management of biodiversity affected by land-use activity in a region, they are not intended to address all aspects of biodiversity and will be developed to complement existing policies, legislation, regulations and management tools (GoA, 2014b). The primary features of the BMFs are regional objectives, key indicators, a monitoring approach, and identification of management actions to support meeting those objectives. By identifying key indicators of biodiversity, the BMFs will represent the broad range of biodiversity in the region, including key species, important habitats, and landscapes important to sustaining long-term ecosystem health. Indicators will be closely linked to the biodiversity outcomes and objectives identified in the regional plans. The indicators are organized into four-level pyramid, representing the health of terrestrial and aquatic species populations and terrestrial and aquatic habitat health. Target dates for engagement on the frameworks began in 2014 for both the SSRP and LARP. A preliminary *Draft Biodiversity Management Framework* exists for the LARP but remains incomplete and not ready for release as a result of various limitations (see the link to document in Appendix 6.2.1a)

Other relevant documents that contain information that relates to the ecosystem services provided by wetland ecosystems disseminated to key sectors in Alberta such as agriculture, energy and tourism are the *Biodiversity Conservation Guide for Farmers and Ranchers in Alberta* and the *Fish Conservation and Management Strategy for Alberta*. The first document was developed by a collaborative effort between Agriculture and Agri-Food Canada, Alberta Agriculture and Food, Alberta NAWMP partnership, DUC, as well as other government and non-government conservation agencies and individual farmers and ranchers. It begins by defining

biodiversity and explaining its importance to agricultural producers and to the world. Biodiversity is mentioned and defined in the context of an essential benefit to farms and ranches, “Biodiversity is like money in the bank for your farm or ranch” (pg. 6). The document also discusses how farmers and ranchers across Canada are taking action to conserve biodiversity and recommends readers to maintain and restore wetlands on their lands. The document presents six basic principles of biodiversity conservation and, for each principle, lists supporting actions. These general principles and actions can be adapted to suit the specific situation of the landowner. The guide concludes with information to help farmers and ranchers take action to conserve biodiversity. It outlines the steps in developing and implementing a biodiversity conservation plan. And it lists agencies that provide financial/technical assistance to Alberta farmers and ranchers for biodiversity conservation. In terms of the specific ecosystem services that wetlands provide, the document does not present them in a structured way, but rather the importance of wetland ecosystems is peppered throughout the principles discussed and generalized into the concept of biodiversity conservation. A landowner’s particular land context may or may not include a wetland on their land.

The second document is the province’s fish conservation strategy. The strategy is designed to reflect and utilize the scientific understanding of the health of fish populations and fish habitat across all provincial watersheds and the conservation and protection measures needed to sustain them. Fisheries management objectives, species management plans, waterbody management plans will help to manage fish populations and habitats and will likely inform aspects of other mandates. Although the strategy does not delve into details about wetland ecosystem functions and benefits, tools like the *Fish Sustainability Index* (FSI) and the *Index of Native Fish Integrity* (INFI) are likely to include aspects of wetland functions and services (GoA, 2018). Since wetlands ecosystems can also be fish habitats, this strategy will be useful for achieving the goals of the wetland policy and the *Water for Life* strategy.

6.2.1.2 Personnel, groups or institutions responsible for assessing, documenting, and disseminating information that relates to the ecosystem services provided by wetland ecosystems to Alberta’s key sectors.

Alberta Biodiversity Monitoring Institute Strategic Plan: 2020-2023 exemplifies the existence and functioning of an institution that is responsible for assessing, documenting, and disseminating information that relates to the ecosystem services provision (ABMI, 2020). Although the institution’s focus is not on wetlands, it focuses on biodiversity, which is a field of environmental management that looks at wetlands as unique sources of biodiversity. The ABMI is a not-for-profit, non-regulatory, arm’s-length institute that is delivered jointly by the University

of Alberta, the Royal Alberta Museum, and InnoTech Alberta. The institute has been implementing and managing science-based programs to monitor and report on the changing state of biodiversity throughout the province of Alberta. There are a number of wetland-related resources on the website, including field guides, reports, other publications, spatial data and blogposts, as well as a number of current projects that include wetland ecosystems in some way, e.g., Ecological Recovery Monitoring Program; Rare Plants Project; and Rare Animals Project. Although wetland ecosystems are not directly addressed in this document, it does present a number of outcomes that could include wetlands under the strategy's first priority of "Monitoring Alberta's Landscapes and Biodiversity" (pg.10). Under the first priority, the following indicators could contribute to the collection of valuable wetland data: "Collection of specimens and data, and release of resulting provincewide upland and wetland data layers, human footprint, field-based species data," "One new monitoring standard (protocol) developed that can be used across organizations," and "Ecosystem Health program design complete and updated" (ABMI, 2020, pg.11).

6.1.2.3 Mechanisms that determine or are capable of measuring the ecosystem services provided by wetland ecosystems.

Alberta Wetland Rapid Evaluation Tool (AB-WRET) is a regulatory tool that was developed to support the *Alberta Wetland Policy* goal, outcomes and implementation. AB-WRET is a desktop tool to determine the relative value of a wetland. The purpose of the tool is "[t]o provide a manual with instructions and references for assessing the relative value of wetlands" (GoA, 2015a, pg. i). KI-11 noted that wetland ecosystems "[...] are included conceptually in the [wetland] policy but are only really described in the ABWRET-A manuals/workbooks. These ABWRET-A materials are very complex and not designed for the layperson to understand" (Appendix 6, pg.3). Relative wetland value is determined by examining five characteristics: the relative abundance of a wetland on a landscape, human uses of the landscape, the ability of the wetland to improve water quality, the hydrologic function of the wetland, and the ability of the wetland to support biodiversity. Once these values have been assessed, the wetland is assigned a value category from A (highest value) to D (lowest value). Determining the relative value of a wetland will allow land-use planners, developers, and decision-makers to consider the wetland in the context of the landscape and adapt strategic and informed wetland management decisions. This document includes a table of wetland functions and human uses scored by the tool (GoA, 2015a) and assists users in determining the value of wetlands that may be impacted by land-use decisions. KI-10 writes that "The value class that comes out of that assessment is used to set the price of compensation and number of required

replacement wetland hectares based on the number of hectares of wetland that are impacted. For now, replaced wetlands are automatically considered to be low value from an ecological standpoint" (Appendix 6, pg.3). It is not clear if the *AB-WRET* tool measures ecological values to enable development or to enhance protection, nor is it clear how the tool balances development versus conservation.

The ABMI, in partnership with Alberta NAWMP, commissioned *Native Plant Solutions* and *Ducks Unlimited Canada* to conduct a review of tools and models to assess wetland function and ecosystem services. As part of an Alberta initiative to explore an ecosystem service approach to land management, the *Wetlands and their Benefits: Review and Synthesis of Tools and Models Assessing Wetland Function and Ecosystem Services* report outlines a literature review conducted to synthesize tools and models available to evaluate wetland ecosystem functions and/or wetland ecosystem services. The GoA has also conducted pilot projects that aimed to measure ecosystem services of wetlands, and this project will further assist the provincial government in considering an ecosystem service approach to support wetland management. According to the document, eight ecosystem services were identified as a priority for wetland management in Alberta based on the GoA's previous work as well as aspects from the MEA's '*Wetlands and Water*' focus (Native Plant Solutions & DUC, 2017).

Ecosystem Services Assessment Project by the AMBI aims to enhance and create knowledge that will support better environmental management through regional planning, market-based approaches, and sustainability reporting. Its two main goals are to develop a system to assess and map ecosystem services across Alberta; and to better understand how planning and management decisions affect the provision of ecosystem services (ABMI, 2014). The project began in 2014, and the website has posted that the Ecosystem Services Inventory is "coming soon" and will allow users to investigate the provision or supply of ecosystem services by selecting an area of Alberta and an ecosystem service of interest (see Appendix 6.2.1c). Although not specific to wetlands, like the biodiversity guide for farmers and ranchers, this tool takes the biodiversity approach to assessing ecosystem functions and making them available to the public in a way that can be easily understood.

6.2.2 Water Allocation for Wetland Ecosystem Needs

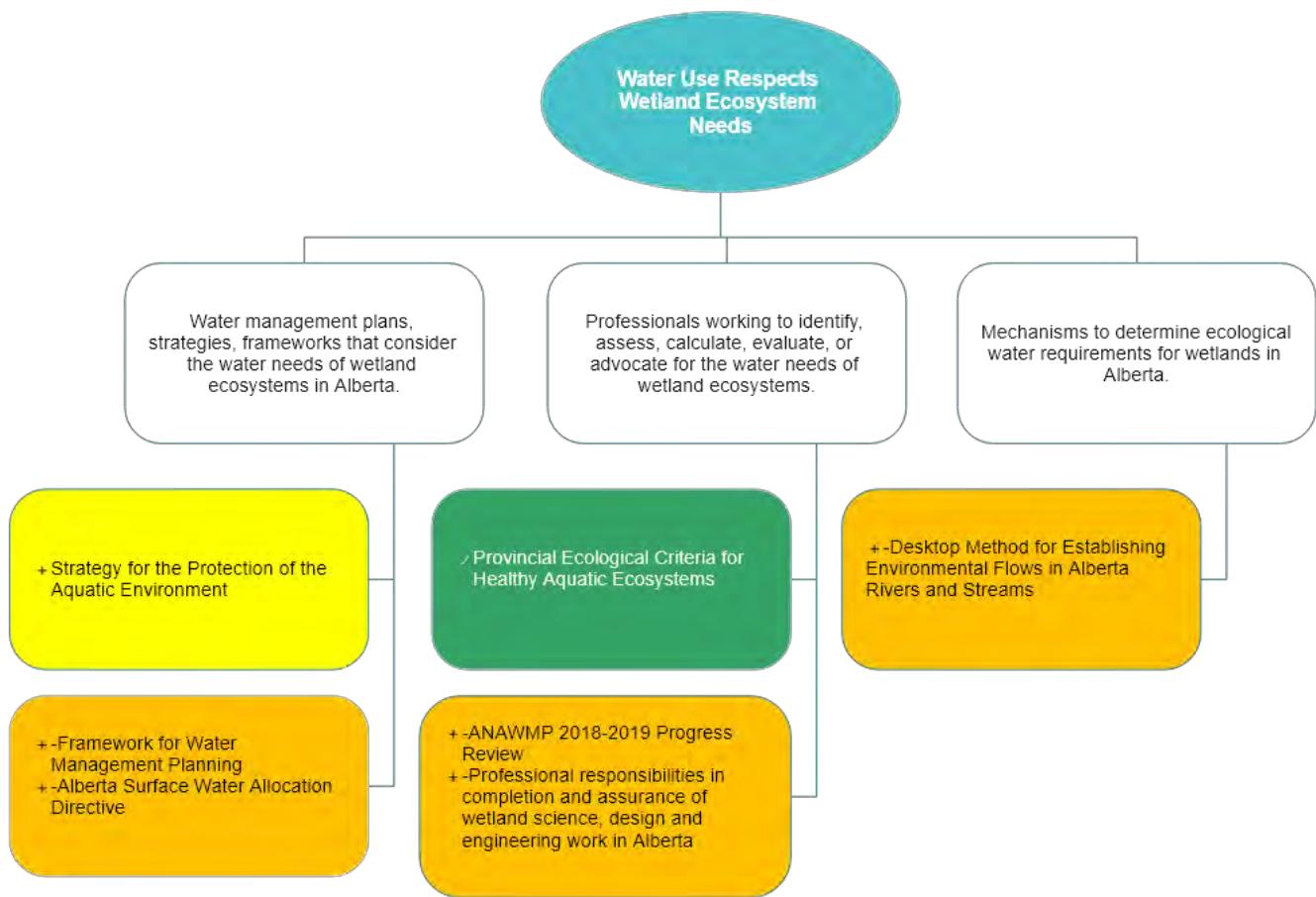


Figure 6.6 Water Allocation for Wetland Ecosystem Needs Documents Assessment Based on Appendix 9, Tables 6.2.2 a, b, c.

6.2.2.1 Water management plans, strategies, frameworks that consider the water needs of wetland ecosystems in Alberta.

This indicator shows that water use in Alberta does not respect wetland ecosystem needs. The *Framework for Water Management Planning* is the major document that guides water management in Alberta. It coordinates with statutory requirements laid out in the *Water Act* and provides further information about the ways in which water is and can be managed in Alberta. Tools such as water conservation objectives, approved water management plans, and regional plans are addressed. Most important for wetlands is the inclusion of the *Strategy for the Protection of the Aquatic Environment* within the framework, which identified “[o]bjectives for the protection of the aquatic environment must be understood and considered in the development of any water management plans or other resource planning activities” (GoA, 2001, pg. 4). Since then, *Water for Life* has been able to address this directly through one of the three goals, which embodies protection of the aquatic environment and water allocation for wetland ecosystem

needs. But *Water for Life* does not yet outline any specific measures for assessing, measuring, or evaluating wetland ecosystem needs (See table 6.4).

Water for Life: Healthy aquatic ecosystems [HAE]	
<i>Goal: Albertans are assured that Alberta's aquatic ecosystems are maintained and protected.</i>	
Outcomes	Key Action
Protection of aquatic ecosystems in critical areas	Develop provincial action plan to improve the health of significantly impacted aquatic ecosystems;
Establishment of priorities for sustaining aquatic ecosystems to be implemented through watershed plans	Set water conservation objectives on all major basins
Management and allocation of water to sustain aquatic ecosystems and ensure their contribution to Alberta's natural capital and quality of life is maintained.	Finalize and implement a new wetland policy for Alberta.

Table 6.4 Adapted from *Water for Life: A Renewal*

Although the “[t]he completion and implementation of the *Alberta Wetland Policy* is a substantial accomplishment in advancing the goal of HAE,” the AWC identified a perception that “Alberta’s growth and development may outpace the benefits” of *Water for Life* actions, thereby continuing the degradation of aquatic ecosystems (AWC, 2017, pg. 27). Moreover, the council identified that the use of tools to sustain healthy ecosystems, restore degraded ones and mitigate impacts has been limited or behind schedule. KI-8, a legal professional, has written extensively about the topic of water allocation for ecosystem needs and says that “the government has some tools to protect water in situ but has done poorly at implementing them” (Appendix 6, pg.2). For example, the GoA “[...] rejected our water trust’s proposal for private instream licenses, which could apply to wetlands to put a priority on wetland water over subsequent licensed allocations. The matter ended in court, [but] notwithstanding the decision against the Trust, privately held instream licenses are possible under the *Water Act*, and a Director could grant one” (Appendix 6, pg.2). KI-8 also points out that the wetland policy’s goal is not a required consideration of allocation applications under the *Water Act*.

Surface Water Allocation Directive supports water allocation management decisions for watersheds without specific objectives or requirements under plans, frameworks or other prescriptive guidance. Its purpose “[i]s to provide a balance between minimizing impacts to the aquatic environment while providing consistent, predictable provincial water allocation guidance where specific advice or objectives have not been developed or approved” (GoA, 2019, pg. 4). The *Directive* provides a desktop evaluation approach for consistent water allocation decision guidance to balance both ecological needs and economic considerations where planning

processes have not established water management objectives. The directive provides guidance to water allocations from rivers, lakes and wetlands using a sustainable watershed approach. The directive applies to new water licence applications and temporary diversion licences and does not impact existing licences but may be applicable to term licences at the time of renewal. The report entitled *Recommendations for Improving Alberta's Water Allocation Transfer System* states the need to identify “protected water” in 2009 and that Water Conservation Objectives have not been set for all basins (Minister’s Advisory Group on Water Management and Allocation, 2009). Both of these actions, if implemented, would help achieve the goal of healthy aquatic ecosystems and benefit wetland water needs.

The *Alberta NAWMP’s 2018-2019 Progress Review* is an important document that identifies professional personnel who may work to identify, assess, calculate, evaluate and/or advocate for the water needs of wetland ecosystems in the province. The document identifies AEP as the lead provincial agency responsible for the stewardship of Alberta’s air, land, water and biodiversity, administers the *Alberta Wetland Policy*, and is involved in the Alberta NAWMP partnership. The document claims the partnership is “dedicated and passionate about advancing wetland and waterfowl conservation” by designing, implementing, and funding projects that ultimately inform wetland and waterfowl conservation in the province. The NAWMP joint ventures in Alberta have developed a series of science-based habitat implementation guides. The standard at the NAWMP is to define and prioritize geographic regions based on their biological values for waterfowl and other wetland-associated birds. Although it is not stated in the document, it is entirely possible that these biological values could involve evaluating, assessing and calculating wetland ecosystem needs.

6.2.2.2 Professionals working to identify, assess, calculate, evaluate, or advocate for the water needs of wetland ecosystems.

Provincial Ecological Criteria for Healthy Aquatic Ecosystems (2008) is the AWC’s development of ecological criteria to identify areas significant to maintaining aquatic ecosystem health. The report describes seven criteria as well as a number of potential indicators, data sources and other guidance provided for each criterion. The development of these criteria is a useful first step if the recommendations are applied in the real world. This document was provided to the Government of Alberta, who may or may not use it to inform the development of mapping and other tools for land use and watershed planners and decision-makers. Other governments, industry, conservation organizations and collaborative partnerships like Watershed Planning and Advisory Councils may also find this advice useful.

The document entitled *Professional Responsibilities in Completion and Assurance of Wetland Science, Design and Engineering Work* in Alberta requires an authenticating professional's signature on regulatory documents submitted under the *Alberta Wetland Policy*. These same individuals will provide professional oversight on wetland replacement projects. The document notes that mobilizing a "highly qualified workforce will help provide assurance to Albertans that wetlands in the province are being managed to a high standard of professional excellence" (Competency Advisory Group [CAG], 2017, webpage). The report is a collaboration between AEP and the CAG to develop and agree upon a common set of standards that define the responsibilities and requirements for authenticating professionals in the province. Depending on their backgrounds, the professionals could be well suited to advocate for respecting wetland water ecosystem needs.

6.2.2.3 Mechanisms to determine ecological water requirements for wetlands in Alberta.

River flow is "[the] fundamental process determining the size, shape, structure, and dynamics of riverine ecosystems" (Zeiringer, Seliger, Greimel, & Schmutz, 2018, 68), wherein establishing environmental flows means assessing the flow that is needed to maintain the ecological integrity of the system. The report *Desktop Method for Establishing Environmental Flows in Alberta Rivers and Streams* is a technical report that "identifies a method to estimate an ecologically-based flow regime on the basis of reductions from natural flow or the percent exceedance from natural flow" in Alberta (GoA 2009a, pg. iv). The report was prepared jointly by Alberta Environment and Alberta Sustainable Resource Development in support of the outcomes and goals identified in the provincial *Water for Life* strategy and action plan. The method "provides a technique to estimate flows to meet the objective of full protection of the riverine environment, in the absence of site-specific studies, which are time-consuming and costly to undertake" (GoA 2009a, pg. iv). The method was developed primarily for rivers that have natural flows, but it can also be used to assess the degree of impact on flows in regulated systems or in those situations where a high degree of allocation currently exists. While not directly linked to water management acts or legislation, the instream flow needs desk-top method can provide valuable information when considering environmental aspects in balancing natural river flows and water demand. The document defines the scope of aquatic ecosystems to include the full diversity of rivers, streams, lakes and wetlands, as well as the groundwater systems linked to them. Properly managing growing demands for water will prevent harm to Alberta's aquatic ecosystems, but it is not clear that proper management of water resources is occurring. For example, in 2020, the GoA rescinded *A Coal Development Policy for Alberta* (GoA, 1976) in order to enable the development of new coal mines in the South Saskatchewan

River Basin (SSRB), but the SSRB “has long been considered to be over-allocated in terms of licensed appropriations and accordingly it [...] has been closed to new licence applications since 2007” (Bradley & Banks 2020). If the current GoA is willing to push through development on an already over-allocated water resource, water needs for wetland ecosystems will likely not be a priority issue.

6.2.3 Participatory Skills and Partnerships

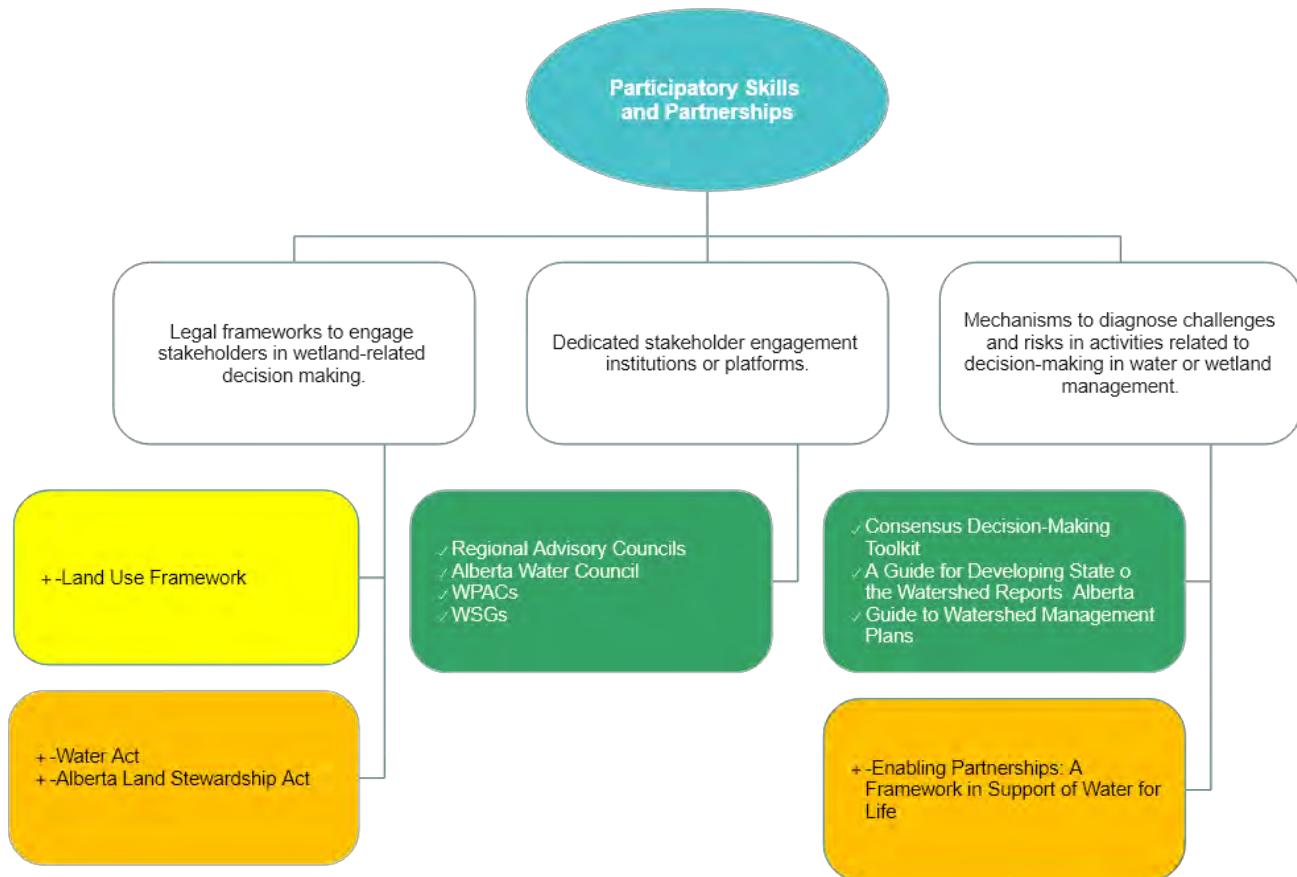


Figure 6.7 Participatory Skills and Partnerships Documents Assessment Based on Appendix 9, Tables 6.2.3a, b, c.

6.2.3.1 Legal frameworks to engage stakeholders in wetland-related decision-making.

This indicator is somewhat supported in Alberta. Support for participatory skills and partnerships has been improved with the development of the *ALSA* and *LUF*. In this section, we will look at the *Water Act* and *ALSA* as statutory mechanisms that require stakeholder engagement. For example, the *Water Act* requires that the Minister consult with the public during the development of the framework for water management planning and the development of the aquatic environment protection strategy. The 1999 document, which includes both the

framework and the strategy, remains the relevant framework for water management planning in the province. Using the framework to develop a plan requires the “Director or other person developing a water management plan” to engage in public consultation during the development of the plan. The Director must also engage in public consultations during the establishment of a water conservation objective. While consultation does occur, the Minister and Director(s) ultimately hold discretionary power to make decisions and act on the frameworks developed through the consultation process.

In contrast, the ALSA requires that the Stewardship Minister ensure appropriate public consultation is carried out and present a report of the consultation process findings to the Executive Council before a regional plan is made or amended. The Minister must also present the proposed regional plan or amendment to the Legislative Council. In terms of the regional planning process, the Lieutenant Governor in Council may describe the public and stakeholder communication required. A number of other actors are involved in the regional planning process, including the Cabinet, Land Use Secretariat, Regional Advisory Council (RAC), and Stewardship Commissioner.

The ALSA enables the LUF, which guides the regional planning process on the ground. Stakeholder engagement was part of the process in developing the LUF. From 2006 to 2008, there were several versions and iterations of engagement, including gathering input and advice from a broad range of stakeholders, public consultations, questionnaires, working groups, and Indigenous People’s consultations. It also outlines the RAC’s responsibility to advise and participate in public and stakeholder consultation for the planning process. The LUF formalizes regional planning, whereas before, land-use planning policies and strategies were uncoordinated and developed independently from each other and at different times.

6.2.3.2 Dedicated stakeholder engagement institutions or platforms.

The AWC’s primary role is to monitor and steward the implementation of the *Water for Life* strategy rather than become immersed in the actual implementation, which is the role of others, particularly the Government of Alberta, but also partnerships on the ground. During consultations for the development of the *Water for Life* strategy, it was recognized that Albertans both wanted and needed to be engaged in water and watershed management decisions. The GoA agreed with the AWC’s recommendation and provided direction in the strategy that water and watershed management is a shared responsibility to be carried out through partnerships with Albertans. To enable Albertans to be involved at the provincial, regional and local levels, three types of partnerships were recognized: the Alberta Water Council, Watershed Planning and Advisory Councils, and Watershed Stewardship

Groups. Each of these partnerships involves a cross-section of stakeholders working towards shared outcomes and goals. As a result of the AWC's mandate to oversee the implementation of *Water for Life*, the documents *Water for Life: A Renewal* and *Water for Life: Action Plan* can be considered guiding mechanisms with which the AWC carries out its functions. Both documents reinforce the importance of partnerships as a way of building a strong foundation for “[...] local commitment to protecting watersheds and ensuring local sustainability” (GoA, 2008b, pg, 5). *Water for Life* goals and key directions are guided to action through the *Water for Life: Action Plan*, which is designed to demonstrate achievable and timely outcomes that reflect and prioritize the growing pressures on the province’s water supplies. The GoA commits “to develop well-informed and empowered partnerships to advance our collective efforts towards improved water conservation, efficiency, and productivity” (GoA, 2008b, pg, 9) by supporting partnerships such as the AWC.

6.2.3.3 Mechanisms to diagnose challenges and risks in activities related to decision-making in water or wetland management.

Enabling Partnerships: A Framework in Support of Water for Life describes how landowners, communities, organizations, industry, and governments can get involved in the sustainable management of Alberta’s watersheds. As a result of their mandate and access to resources, WPACs are identified as a mechanism to find solutions to challenges faced by a particular watershed. Although not specific to wetlands, the document presents a way of decision-making related to water-management in general, which may include wetlands, depending on the specific scenario. The document also describes in detail the mandates of all *Water for Life* partnerships identified in the strategy: AWC, WPACs, and WSGs. This guide could assist someone in determining who to go to for help in diagnosing or addressing challenges and risks related to decision-making related to water or wetlands and supports an adaptive management approach to watershed management.

Consensus Decision-Making Toolkit (CDM Toolkit) is an outcome of a made-in-Alberta collaboration of consensus decision-making practitioners. The document is a functional reference guide for professional practitioners but is also designed to assist those new to the consensus decision-making process. The toolkit is a combination of checklists and templates to help determine whether or not the consensus decision-making process is the appropriate decision-making model for a particular problem. The same checklists and templates will also guide those already participating in a consensus decision-making process.

The *Handbook for State of the Watershed Reporting: A Guide for Developing State of the Watershed Reports in Alberta* acknowledges a gap in the information dissemination process

for watershed management (GoA, 2008a). The data collection process for important information about watershed management by governments and other agencies has been challenged by a lack of an effective method to share, report, and use the valuable data collected to improve decision-making on watershed management (GoA, 2015b). Characterizing the current state of a particular watershed can provide the basis for developing effective management strategies to meet watershed goals. The motivation to develop the handbook was also driven by the outcome in the original *Water for Life* that “Albertans have the knowledge, tools, and motivation to implement actions that will maintain or improve the province’s water resources” (GoA, 2003, pg.7). The *Handbook* introduces users to the concept of watershed-scale assessments and includes an extensive listing of data and information sources from across the province. It serves as an informative reference guide to “non-technical audiences” interested in assessing and reporting on the state of their local watershed. Although this level of reporting is expected of the province’s Watershed Planning and Advisory Councils, it is also recognized that a number of local community-based watershed stewardship groups are also pursuing development of state of the watershed reports to assist them in better directing their stewardship activities.

The *Guide to Watershed Management Planning in Alberta* provides advice on the steps to develop and implement a watershed management plan. The guide is based on the iterative process of adaptive management, from planning through to implementation and evaluation, and back to planning (GoA, 2015b). The guide offers WPACs and WSGs a useful reference for their planning activities. It also informs other collaborative community-led watershed management planning projects and programs about appropriate planning processes. The document also provides information about Integrated Watershed Management Plans (IWMPs). IWMPs are the second key deliverable to be produced by WPACs. IWMPs provide advice to governments and agencies for water management at the watershed level as they have the power to enable their policy and regulatory decision-making authority. Collaboration is central to the development of IWMPs because they are based on a consensus agreement process and inclusive participation of stakeholders and community representatives from within the watershed.

6.2.4 Invasive Alien Species

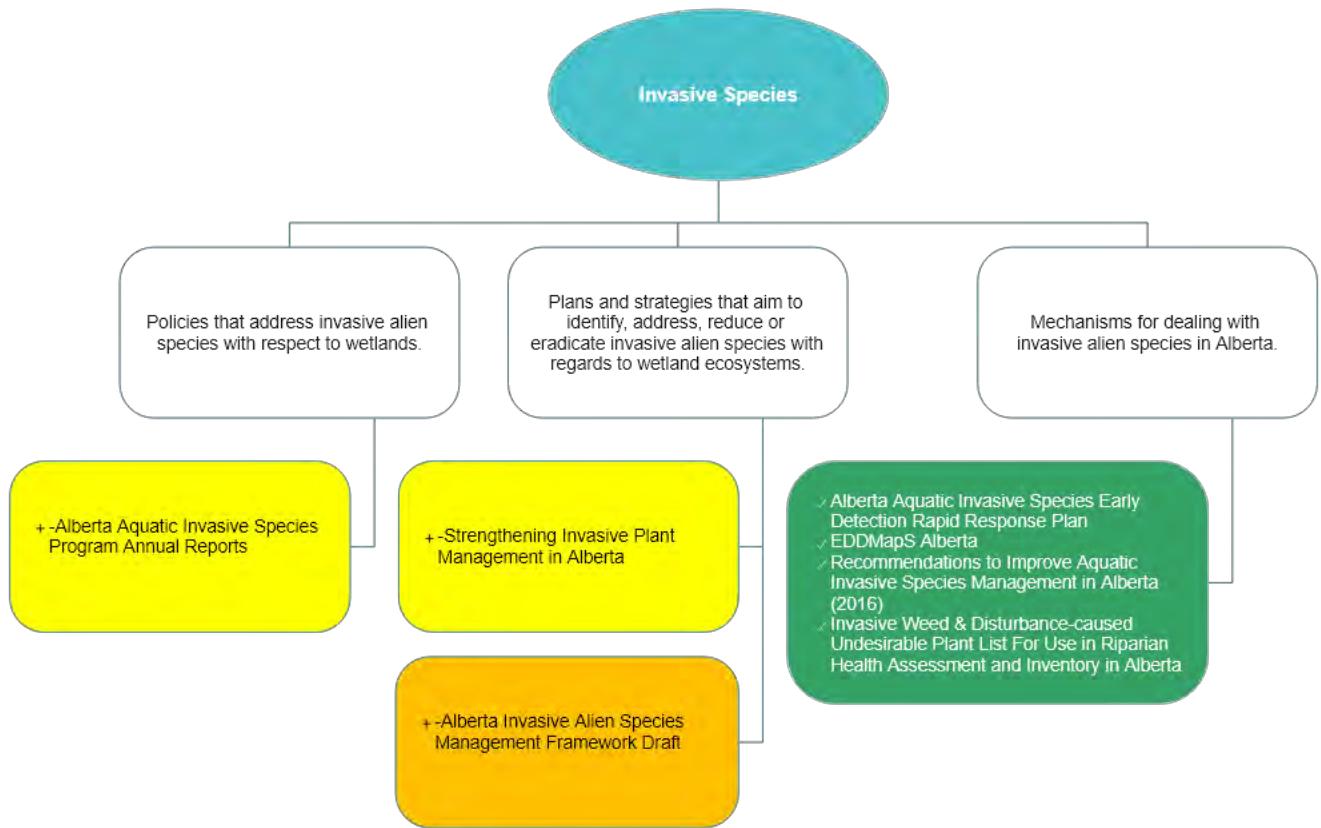


Figure 6.8 Invasive Alien Species Documents Analysis Based on Appendix 9, Tables 6.2.4 a, b, c.

6.2.4.1 Policies that address invasive alien species with respect to wetlands.

The result of the evaluation for this indicator shows that Alberta does have a method and strategy for dealing with Invasive Alien Species (IAS); however, it was not clear from the documents to what extent wetlands were identified as an ecosystem prone to invasive species. That is not to say wetlands are not accounted for in the IAS program; their inclusion is simply assumed due to the nature of wetland ecosystems and invasive plants and animals. Regardless, the invasive program seems well-defined, although changes in government have impacted the way the program is run.⁵⁶ Ultimately, Alberta shows that aquatic invasive species (AIS) are recognized as a threat to freshwater resources in Alberta, and there has been action taken to address AIS through legislation, policy and management. There are three annual reports entitled *Alberta Aquatic Invasive Species Program* between 2015 to 2017 that document the AIS program in Alberta. The AIS program is led by the Fish and Wildlife Policy Division within the Ministry of Environment and Parks, with a number of partners within other divisions of

⁵⁶ For example, annual reporting occurred from 2014-2017, but this has since changed.

government and cross-Ministry partners. The program consists of five elements: Policy and legislation; Watercraft inspections; Education and Outreach; Monitoring; Response. From the onset of the program, changes at the regional and national legislative levels were made to the *Fisheries (Alberta) Act* and to the *Fisheries (Federal) Act*. The AIS program in Alberta was the catalyst for substantial changes to provincial legislation, and as a result of the changes, it has enabled the development of a more robust program (GoA, 2017). A recent update of the program will see the release of the *Aquatic Invasive Species Pocket Guide* to help the public identify 52 prohibited species (fish, plants and invertebrates) and fish diseases of concern.

6.2.4.2 Plans and strategies that aim to identify, address, reduce or eradicate invasive alien species with regards to wetland ecosystems.

The following documents are important to invasive species, but it is not clear if they have been integrated into the AIS program or not. The *Invasive Alien Species Risk Management Framework*⁵⁷ is a draft document intended to provide the structure of a systematic process intended for use by governments, private companies and individuals to manage invasive species in Alberta (GoA, 2010). The *Framework* is a risk-based approach to identifying existing and potentially invasive species, assigning a management authority, assessing the potential environmental, economic, and social effects, and outlining management options. The *Strengthening Invasive Plant Management in Alberta* (Chai & Staley, 2018) document focused on invasive plant management and was prepared by *Innotech Alberta Inc.* It reports on the threat of invasive plant species in Alberta, where about one-half the total number of invasive plant species present in Canada live. It recommends that preventive strategies be devised and implemented. For example, the researchers recommend the use of risk assessments, economic analyses, species distribution models, field studies to quantify invasive species impacts and control efficacy in local ecosystems. This report also identifies a lack of science and applied research in invasive plant programs in Alberta and recommends that scientists and practitioners should begin to work together on areas of mutual interest.

6.2.4.3 Mechanisms for dealing with invasive alien species in Alberta.

Alberta Aquatic Invasive Species Early Detection Rapid Response Plan (2019a) is a key mechanism in Alberta for dealing with invasive alien species. The AIS Rapid Response Task Team Regular Members are made up of representatives from ministries, companies and organizations that regularly participate in the ongoing business of the team, including AEP – Fish and Wildlife Policy Branch; Alberta Support and Emergency Response Team, Operations,

⁵⁷ This document was found on an old link from the Ministry of Agriculture and Forestry, but without more research it is not clear if the document is being used today.

Infrastructure and Parks Division; Ministry of Agriculture and Forestry • Science and Monitoring • Eastern Irrigation District (EID); TransAlta; Alberta Irrigation Projects Association (AIPA); and the Ministry of Justice and Solicitor General. The rapid response plan is essentially a list of contacts available to assist callers that may have encountered invasive species. It includes contact information for the AIS 24-hour line (reporting and inquiries); 24 Hour Environmental Emergency/Complaint (ASERT); Alberta Support & Emergency Response Team Office, Aquatic Invasive Species Program; AEMERA (which no longer exists today); AEP, Alberta Irrigation Projects Association, Alberta Irrigation and Agriculture, Emergency Management Services, Agriculture and Forestry. A tool to support the plan is *EDDMaps*, which stands for Early Detection and Distribution Mapping System. It is a system used in Alberta that offers real-time tracking of invasive species occurrences through local and national distribution maps, electronic early detection reporting tools, and a library of identification and management information. The system is a state-of-the-art invasive species tracking and reporting program, currently tracking 62 aquatic and terrestrial species.

The AWC's Recommendations to Improve *Aquatic Invasive Species Management in Alberta* (2016) report documents the history of AIS management and analyses the current situation of the AIS program in Alberta. The report concluded that AIS pose significant threats that could adversely affect aquatic ecosystems, the economy, recreational opportunities and human health (AWC, 2016). The recommendations addressed in the report identify opportunities to improve general awareness of the issue, communication among stakeholders and coordination of activities in support of preventing AIS from becoming established in Alberta and effectively managing those that are already present.

6.3 Wise Use of Wetlands

6.3.1 Traditional Knowledge, Innovations, and Practices

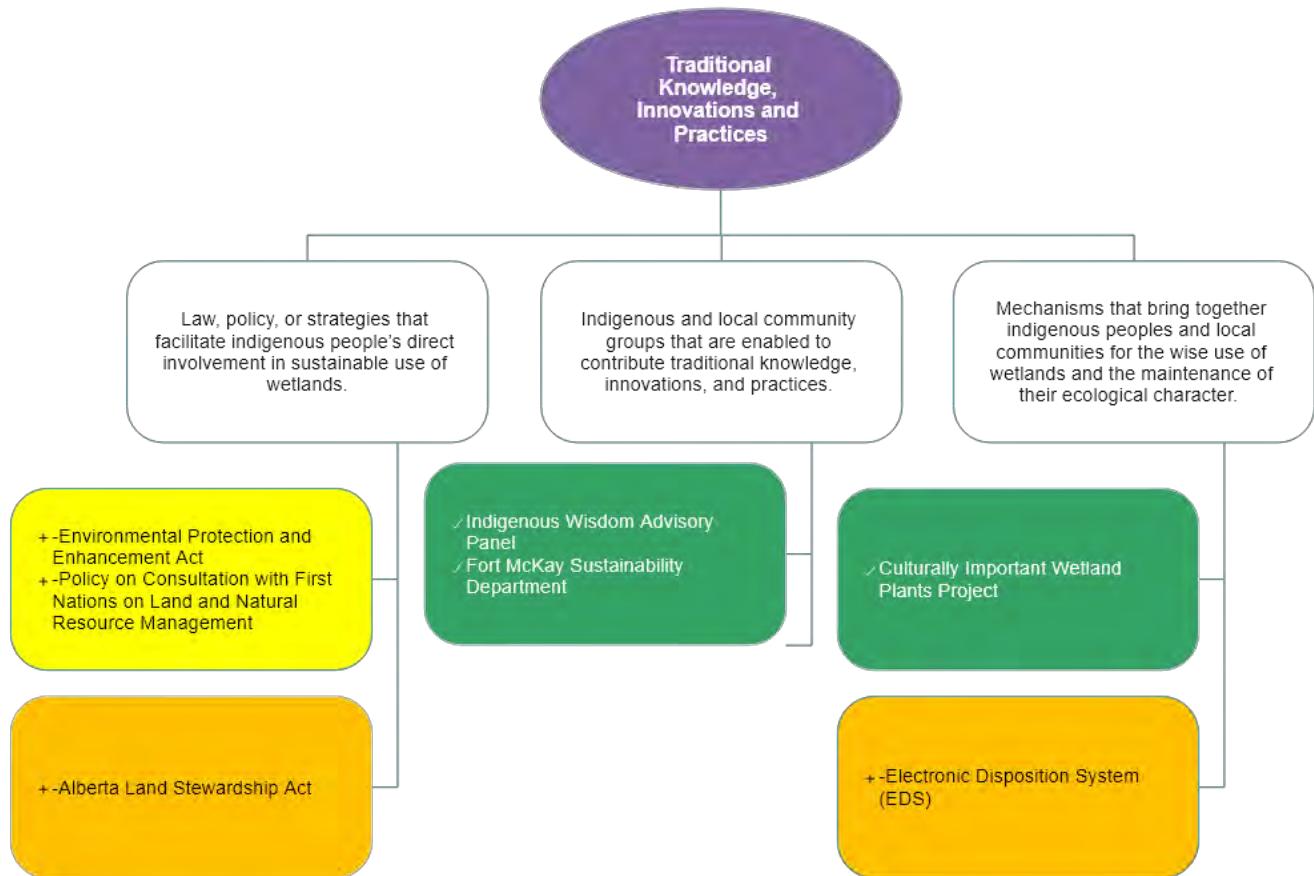


Figure 6.9 Traditional Knowledge, Innovations, and Practices Documents Assessment Based on Appendix 10, Tables 6.3.1 a, b, c.

6.3.1.1 Law, policy, or strategies that facilitate indigenous people's direct involvement in the sustainable use of wetlands.

Based on the evaluation of this indicator, there is a need for improved transparency with regards to the integration of traditional knowledge, innovations, and practices of First Nations for the *wise use of wetlands* in Alberta. In this section, I will discuss statutes, policies, institutions, and mechanisms that could facilitate the integration of traditional knowledge innovations and practices into Alberta's wetland management program. The ALSA and EPEA are statutes that directly address the indicator and, as a result, were included in this discussion. The ALSA is to provide a means to plan for the future, recognizing the need to manage activity to meet the reasonably foreseeable needs of current and future generations, including aboriginal peoples. Section 52 of the Act enables the Lieutenant Governor in Council to establish a Regional

Advisory Council (RAC) for a planning region as well as the ability to appoint members of a regional advisory council, including individuals who are members of aboriginal peoples.

RACs are made up of people who can strategically consider what is best for the entire region at a holistic level. RAC members are appointed by Cabinet through a nomination process. A RAC's mandate is to provide advice to the GoA based on a term of reference for developing each regional plan. Members are expected to provide their expertise and perspectives of the region, but they should not represent their respective company or organization's position. Council members are also expected to prepare for and attend all council meetings. The position is paid by an honorarium per meeting, and as such, alternates are not allowed. RACs are asked to submit their advice in the form of a *Recommendation to Government* report. The council disbands once the RAC delivers on its mandate. The SSRP RAC was made up of 19 members, one of which represented the Consultation Coordinator for the Tsuu T'ina First Nation (Treaty 7). The LARP RAC was made up of 15 members; one member represented the Elizabeth Métis Settlement; another member represented the Athabasca Tribal Council. Both documents highlight the ways in which the regional plans should consider and include First Nations in regional planning and that Aboriginal People's rights, traditional uses and values are respected and reflected in planning. The primary issues of First Nations in both regions are similar, but the SSRP RAC recommendations advocate for planning that considers "opportunities for increased aboriginal participation in the regional economy" (South Saskatchewan Regional Advisory Council, 2010, pg. 42), whereas the LARP RAC recommendations asked for guidance, support, tools, and skills to engage in land-use planning and advocacy for First Nations in the region (Lower Athabasca Regional Advisory Council, 2010).

Other provincial laws that facilitate Indigenous peoples' and local communities' direct involvement in local decision-making are the EPEA and *Protecting Alberta's Environment Act, SA 2013 cP-26.8* (PAEA, 2013). The Indigenous Wisdom Advisory Panel (IWAP) was originally appointed under the PAEA. It is not clear what effect the PAEA still has on its own today. The investigation revealed that the PAEA was an irregular piece of environmental legislative protection because it created confusion, and its process was not as refined as other legislative statutes. Some criticisms of the PAEA were that it seemed rushed (visible editing errors on the final statute), not held to account (its purpose for establishing a monitoring agency was dismantled shortly after being created) and did not hold much power (even though it exists today there is no reference to it). According to CanLII, the PAEA "is repealed or spent since 2016-06-30. The PAEA's purpose of establishing a regional monitoring authority ceases to exist.

Despite this, the IWAP is continued and is deemed an advisory panel established by the Minister under the EPEA.

6.3.1.2 Indigenous and local community groups that are enabled to contribute traditional knowledge, innovations, and practices.

According to the document entitled *Indigenous Wisdom Advisory Panel Mandate and Roles Document* (2017), the IWAP is “dedicated to ensuring that Indigenous science knowledge systems, languages, oral traditions, understandings, natural laws and cultures are represented and respected equitably with the Alberta environmental science program under the EPEA” (IWAP et al., 2017, pg.1). Furthermore, the IWAP is to provide advice to the Chief Scientist and the Minister about how to incorporate traditional ecological knowledge into the environmental science program. The *Mandate and Roles Document* is a collaboratively written agreement envisioning a relationship between the Indigenous Wisdom Advisory Panel, APE’s Chief Scientist and the Minister of Environment and Parks. The panel was originally named the *Traditional Ecological Knowledge Advisory Panel*, but members, who are knowledge keepers and Elders, renamed the panel to focus on Indigenous wisdom as it reflects an accurate and culturally appropriate recognition of the scope of Indigenous knowledge and worldview.

The Fort McKay Sustainability Department (FMSD) oversees Fort McKay’s interaction with the oil sands industry as well as government relations associated with resource development and Crown land management. The department engages in negotiations of impact benefit agreements, supervises community engagement and public consultation about natural resource development and Crown land decisions, monitors environmental impacts within the traditional territory, and oversees several regulatory activities. Specifics include water quality and air quality monitoring, monitoring other industrial impacts on the environment, cumulative effects, and environmental research. Fort McKay First Nations (FMFN) has a “longstanding tradition of relationship building with the oil sands industry for the betterment of the entire community” (FMFN, 2021). Within the FMSD’s ‘Knowledge keepers’ website exists the *Draft Biodiversity Management Framework (BMF)*. The document offers the direct perspective of First Nations, particularly FMFN, addressing land use planning in the LARP. The document states that the FMSD supports the *BMF* but also notes that deficiencies in the development and planning of individual BMFs must be addressed. A major criticism of the BMF project for the LARP emphasizes that:

Until Aboriginal goals and their relationship with the land are recognized, Aboriginal values will never truly be included in criteria and indicator frameworks. By assuming that Constitutional rights will be protected as a natural extension of protecting the environment, Alberta continues to misunderstand

the nature of Constitutional rights and marginalize the needs of Aboriginal people in land use planning (FMFN, 2015, pg.31)

A 2012 AWC report found that there remains a gap in the participation of Indigenous peoples and incorporation of traditional knowledge and practices in water management planning activities (AWC, 2017). Since then, there has been work done on policy and projects related to First Nations and resource management in Alberta. The first example is the *Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management*, which states that the provinces “management and development of provincial Crown lands and natural resources is subject to its legal and constitutional duty to consult First Nations” and, where appropriate, accommodate their interests when Crown decisions may adversely impact their continued exercise of constitutionally protected Treaty rights” (GoA, 2013, pg.1). The policy recognizes that First Nations’ Treaty rights are protected by section 35 of the federal *Constitution Act, 1982* and acknowledges the importance of these rights in maintaining First Nations’ cultures and traditions. Provincial Crown decisions that directly involve the management of land, water, air, forestry, or fish and wildlife on crown land will first seek to “reconcile First Nations’ constitutionally protected rights with other societal interests with a view to substantially address adverse impacts on Treaty rights and traditional uses through a meaningful consultation process” (GoA, 2013, pg.1). In addition to balancing inclusive societal needs, the provincial government notes that it will “[strive] to ensure First Nations have the chance to benefit from economic development opportunities and to enjoy Alberta’s prosperity” (GoA, 2013b, pg.1). How these commitments will be achieved is not described in the document. For proponents, the policy requires them to act within applicable statutory timelines and in accordance with *The Government of Alberta's Corporate Guidelines for First Nations Consultation Activities* policy. The policy also requires the establishment of a consultation office that reports to the Minister of Aboriginal Relations to manage all aspects of consultation, carry out activities according to the policy, and draft corporate guidelines.

6.3.1.3 Mechanisms that bring together Indigenous peoples and local communities for the wise use of wetlands and the maintenance of their ecological character.

The Culturally Important Wetland Plants Project is a program funded under the Oil Sands Monitoring Program [OSMP] (Alberta Environment and Parks and Environment and Climate Change Canada, 2018). The goal of the project is to co-produce knowledge about culturally important wetland plants through community-led, traditional environmental knowledge-based monitoring in the Athabasca and Peace oil sands regions. Rooted in a collaborative approach to environmental monitoring, the program supports Indigenous community

involvement in wetland plant monitoring program design, implementation, evaluation, reporting, and communication to ensure the project is based on community-specific priorities. Contact information for this project is directed to the *Indigenous Knowledge, Community Monitoring, & Citizen Science Branch*, which is a department within AEP. There is not much information about this branch on the public forum other than the contact information on the info sheets for the OSMP community-based project sheets. Other projects within provincial programming included the ongoing Indigenous Provincial Lake Monitoring Program and the Indigenous Climate Change Observation Network (GoA, 2020).

Electronic Disposition System (EDS) is a web-based tool managed by AEP. Through EDS, proponents can create and submit a Pre-consultation Assessment Request; Amend a Pre-consultation Assessment Request; Respond to a Request for More Information; View a submission status; Submit a request for an Adequacy Assessment and Cancel a File Number for Consultation. Proponents use EDS to electronically apply to the ACO for consultation direction on activities regulated by the AER under the Public Lands Act; *Water Act*; and Environmental Protection and Enhancement Act—all of these Acts can influence development on wetlands. The ACO provides consultation advice and recommendation to these ministries upon their request. Proponents can refer to the *EDS First Nation Consultation User Guide* for detailed instructions and information on EDS. As of August 20, 2019, the AER is moved from EDS to *OneStop*, which will impact the way that proponents engage. AER's *Bulletin 2019-11* and the GoA's *Enhanced Approval Process Manual* offers some insight but do not offer details about changes or guidance about implementation are provided. An inquiry to the AER revealed that the pre-consultation and consultation process and requirements have not changed due to the system change.

6.3.2 River Basin Management

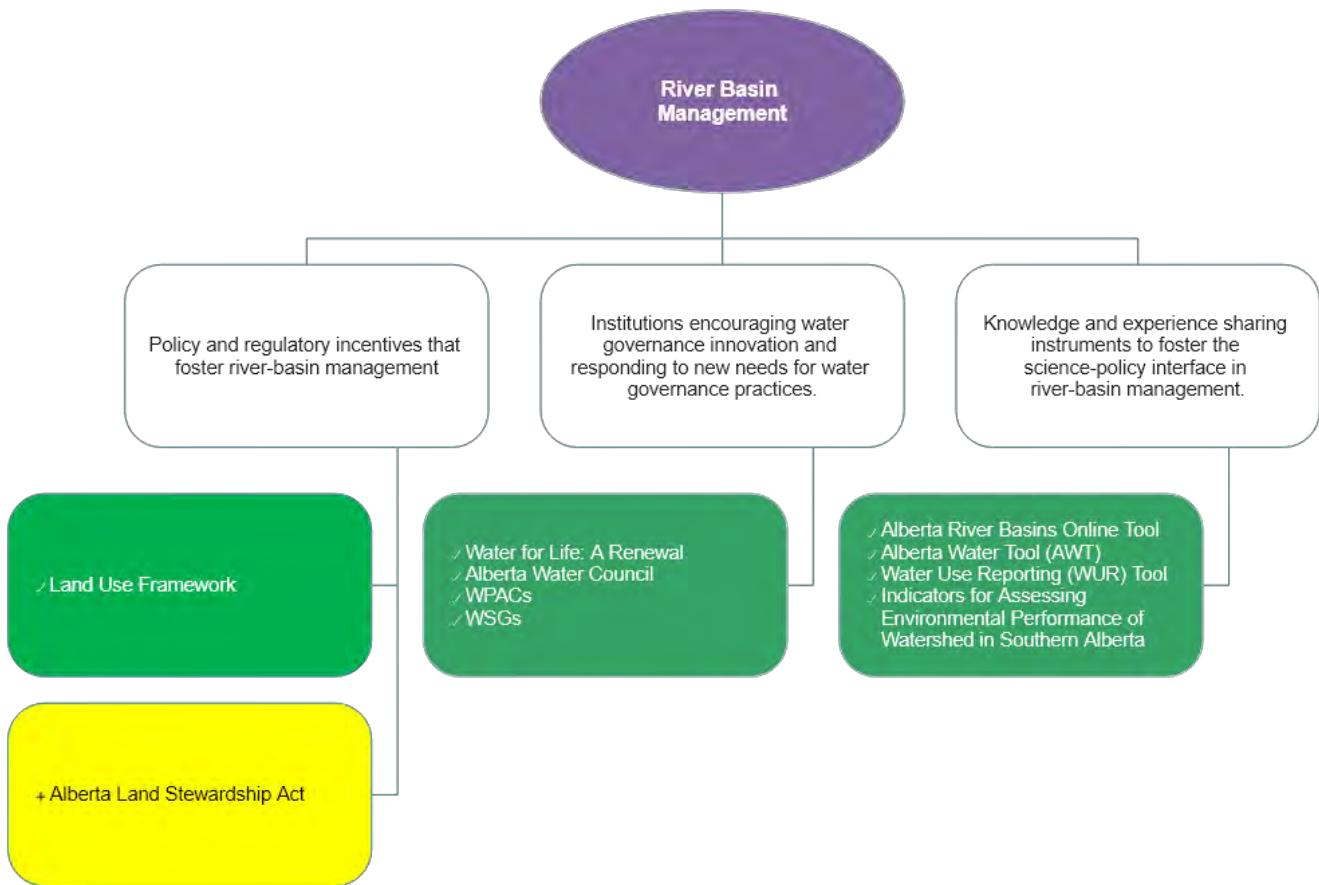


Figure 6.10 River Basin Management Documents Assessment Based on Appendix 10, Tables 6.3.2 a, b, c.

6.3.2.1 Law, policy, or strategies that facilitate indigenous people's direct involvement in the sustainable use of wetlands.

This indicator shows that Alberta has the governance structure, institutions, and mechanisms in place to support river basin management in the province. River basin or watershed management is a practice that involves the management of land, water, biota, and other resources in an area generally defined by a major river basin for ecological, social and economic purposes. In Alberta, the ALSA is the primary legislation that fosters river-basin management through the LUF and the regional plans. Although watershed management is not necessarily a new concept in the province, its coordination at the regional level is. The first strategy of the LUF was to “[d]evelop seven regional plans based on seven new land-use regions” (GoA, 2008, pg.3). These land-use regions are corresponding with the province's major watersheds and are aligned within municipal boundaries. Regional plans are legislative instruments embodied within the ALSA and are essentially regulations. Despite this, portions of

the regional plans are not intended to have a binding legal effect, but rather serve as “statements of policy to inform the Crown, decision-makers, local government bodies and all other persons [...]” dealing with the regional plan and the planning region (GoA, 2014, pg.8). Regional plans have four key components: introduction, strategic plan, implementation plan and regulatory details plan. Since the release of the LUF in 2008, two of seven regional plans have been completed and have become an approved regional plan (See Table 6.1).

Regional Plan	Status
<i>Lower Athabasca Region</i>	Regional Plan Approved
<i>Lower Peace Region</i>	Not Started
<i>North Saskatchewan Region</i>	Online Survey Open
<i>Red Deer Region</i>	Not Started
<i>South Saskatchewan Region</i>	Regional Plan Approved
<i>Upper Athabasca Region</i>	Not Started
<i>Upper Peace Region</i>	Not Started

Table 6.5 Status of Regional Plans in Alberta

6.3.2.2 Institutions encouraging water governance innovation and responding to new needs for water governance practices.

Regional Planning Councils, Alberta Water Council, Watershed Planning and Advisory Councils, and Watershed Stewardship Groups are the institutions in Alberta that encourage water governance innovation at the provincial, regional, watershed and local level scales to respond to the new needs for water governance practices. Within the *Water for Life* strategy, the province identified three types of partnerships that are fundamental to the province’s water strategy: AWC, WPACs, and WSGs. Below is a chart summarizing the institutions and their role in river basin management in Alberta:

Institution	Purpose
<i>Regional Advisory Council (RAC)</i>	An individual Regional Advisory Council (RAC) is created for all regional plans composed of various individuals who live, work, recreate and/or have an interest in the region. They are able to strategically consider what is best for the entire region at a holistic level. The RAC meets several times during regional plan development. They provide strategic advice to cabinet and ceases to exist after it delivers its advice.
<i>Alberta Water Council (AWC)</i>	The primary tasks of the council are to advance the outcomes of <i>Water for Life</i> , provide advice that informs policy or actions, and provide a forum to discuss water perspectives.
<i>Watershed Planning and Advisory Councils (WPACs)</i>	11 independent, non-profit organizations designated by AEP to report on the health of their respective watershed, lead collaborative planning, and facilitate education and stewardship activities.
<i>Watershed Stewardship Groups (WSGs)</i>	WSGs are local community-level representatives that take action toward safeguarding water resources. These groups are volunteer-based partnerships actively engaged in environmental stewardship of their respective watershed. These groups can access support and resources through the Alberta Stewardship Network.

Table 6.6 Institutions Encouraging Water Governance Innovation in Alberta

6.3.2.3 Knowledge and experience sharing instruments to foster the science-policy interface in river-basin management.

In terms of tools for river basin management, the Alberta River Basins app from Alberta Environment and Parks is an online map-based tool that allows the user to explore real-time river flow data, water shortage advisories, and water quality from monitoring stations across the province. The app is available through a website or a mobile application and houses a visual database of water-related advisories and forecasts, snow pillow reports, ice observation reports, precipitation maps, flood identification, water flow summaries, reservoir reports, licensing and monitoring of water flows. Additional features include the ability to view all monitoring stations on a map, tap stations to view current data and whether flows are normal, receive notifications when new advisories and comments are issued and save personalized lists of important stations.

Another tool available for river basin management is the Alberta Water Tool (AWT). The AWT is a point-and-click tool that helps scientists, communities, and government decision-makers to understand accurate, real-time information about water resources in Alberta. It uses watershed reporting by clicking on a stream, lake, or river to see the watershed associated with that water feature and generate a detailed report about it. Streamflow monitoring is initiated by clicking on a point that represents current or historical streamflow to generate a detailed report about it. Water use analytics is initiated by clicking on a point to see reported water use for an allocation, multiple allocations, or even to get a water usage report for a full watershed. The AWT is provided for public use by the Petroleum Technology Alliance Canada's Upstream Petroleum Research Fund.

Water Use Reporting (WUR) system is a secure online system for water license holders to report their water use. The system supports the *Water for Life* strategy by requiring users to report their usage depending on their water license. Under the *Water for Life*, the principle that “Albertans must become leaders at using water more effectively and efficiently and will use and reuse water wisely and responsibility” was the impetus for achieving the short-term goal for water conservation to establish an electronic reporting system to monitor water use by all sectors. Prior to the *Water for Life* strategy and action plan, the method for reporting under *Water Act* licenses was a paper reporting method where the license holder was required to “record, retain and report as requested,” but conditions for reporting were not clear and as a result inconsistent. The new reporting method under the *Water for Life* strategy and action plan provides the platform for reporting in standardized units and improves accessibility to data reporting and analyzing.

The WUR improves upon the reporting previously required through the *Water Act* and enables better water management decisions as a result; however, a review of the WUR system in 2017 suggested that “not all municipalities with water licenses are consistently reporting on water use” (AUMA, 2017). There may be some confusion regarding reporting for municipal water and wastewater under the *EPEA*, and the new WUR tool under the *Water Act* reporting requirement for license holders wherein the license holder may believe they have completed their reporting requirements, but in reality, they have more reporting to do.

6.3.3 Inventory, Assessment, and Monitoring

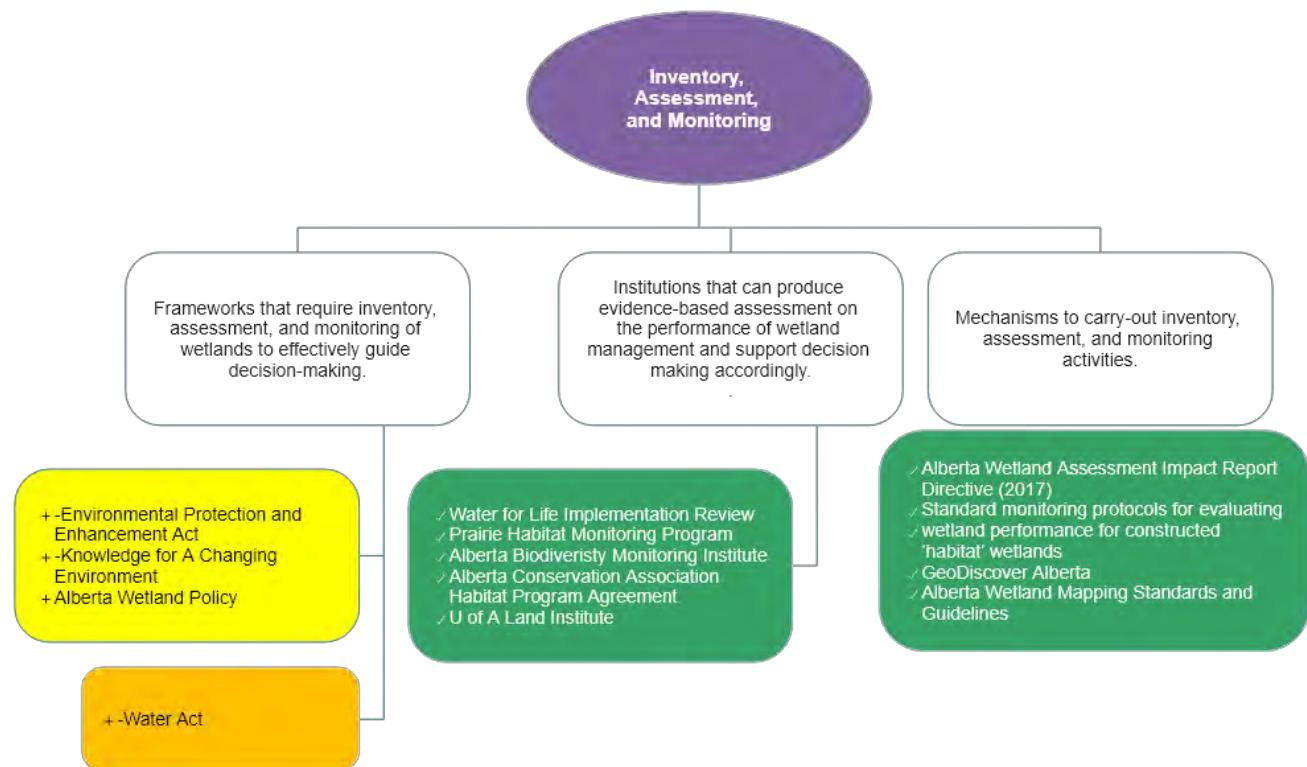


Figure 6.11 Inventory, Assessment, and Monitoring Documents Assessment Based on Appendix 10, Tables 6.3.3 a, b, c.

6.3.3.1 Frameworks, institutions, or mechanisms that require or produce inventory, assessment, and monitoring of wetlands to effectively guide decision-making.

The typical approach to wetland assessment, inventory, and monitoring is that they are carried out at discrete spatial scales using different but appropriate techniques for each (Ramsar, 2005). In other words, these components are usually planned or undertaken separately. An integrated inventory, assessment and monitoring program developed and conducted at a single appropriate scale is recommended (Ramsar, 2005). Furthermore, wetland assessment should be undertaken at a spatial scale compatible with the scale of information contained within the wetland inventory. Subsequent monitoring should also be undertaken at a

scale compatible with the assessment (Ramsar, 2005). For the purpose of this project, I looked at inventory, assessment and monitoring as one indicator, but these components are planned and carried out separately in Alberta.

Overall, the inventory, assessment and monitoring of wetlands in Alberta could be improved. The *Alberta Wetland Policy*, enforced through the *Water Act* and supported by other legislation, states that it “provides the strategic direction and tools required to make informed management decisions in the long-term interest for Albertans” (AWC, 2013, 2). Under the ‘Knowledge and Information System’ section, the policy identifies the need for, among a completed provincial wetland inventory (inventory), a provincial wetland value assessment system (assessment), and a wetland database and reporting tool (monitoring). The fact that within the policy, the “broad range of integrated data products [that] will be required to support and enable the *Alberta Wetland Policy*” (AWC, 2013, 21) are identified shows awareness and understanding on the part of policymakers of what is required for a wetland policy and management program to align with sustainable development. Although the specifics of implementation are not covered in the policy, the policy does describe how it aligns with principles from the *Water for Life* strategy. Other statutes that support or enable inventory, assessment or monitoring include the *EPEA* and the GoA’s science strategy.

Environmental monitoring is conducted in Alberta under the *EPEA*. The Act requires that the Minister report on the condition of the environment in Alberta. The Minister is also required to appoint a person as Chief Scientist to develop and implement an environmental science program to monitor, evaluate and report on the condition of the environment in Alberta. The *EPEA* describes the purpose of the environmental assessment process in four points:

- (a) to support the goals of environmental protection and sustainable development
- (b) to integrate environmental protection and economic decisions at the earliest stages of planning an activity,
- (c) to predict the environmental, social, economic and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity, and
- (d) to provide for the involvement of the public, proponents, the Government and Government agencies in the review of proposed activities.

Within the *EPEA*, Directors have the power to require environmental assessment if they are of the opinion that the potential environmental impacts warrant further consideration.

Furthermore, the Minister may choose to develop ambient environmental quality objectives in qualitative or quantitative terms for all or part of Alberta for the protection and wise use of the environment. In addition to developing environmental quality objectives, the Minister may develop standards, practices, codes of practice, guidelines, objectives or methods for

monitoring, analysis and predictive assessment. These provisions are not specific to wetlands but apply to any application made under the *EPEA*, which may include an application to disturb a wetland.

The document *Knowledge for a Changing Environment* is the GoA's five-year science strategy between 2019 and 2025. The Environmental Science Program has a mandate to monitor, evaluate and report on the condition of the ambient environment in Alberta (GoA, 2020). The program and related provincial monitoring networks are evolving towards an adaptive management design (GoA, 2019b). Component areas such as surface and groundwater, air, wetlands, land and biodiversity monitoring networks are undergoing review to define and focus the monitoring objectives and science questions that need to be answered. The goal is to combine adaptive management with Cumulative Effects Management systems in order to "create optimal monitoring strategies that better understand and consider site selection, spatial and temporal sampling frequencies, and relevant physical, chemical and ecological processes to assess environmental impacts" (GoA, 2019b, pg.8). The strategy identifies five priority areas where the environmental monitoring and science program will focus its capacity and integration efforts.

6.3.3.1a Inventory

The AWC has identified the need to complete the provincial wetland inventory and set a goal to complete the task by 2015. The *Alberta Merged Wetland Inventory* (AMWI) is made up of several different layers from different data sources. KI-9 writes that "Alberta is one of the few provinces in Canada to provide a publicly available, comprehensive wetland inventory dataset" (Appendix 6, pg.4). While the AMWI metadata and map layers are available on *GeoDiscover*, they are not easily accessible without prior knowledge of how to use the available data. The call to complete the inventory by the AWC back in 2015 suggests that as it was, the wetland inventory was insufficient to meet the needs of the policy implementation. KI-9 writes that the AMWI as it stands today

[was] achieved by assembling and harmonizing the best available spatial wetland inventory data to provide unified provincial coverage... The [AMWI] is a generalized, merged product of 35 component wetland inventories that utilized different types of remote sensing source data from different years, different data capture specifications and different classifications. The spatial representation of wetlands and the quality of the AMWI is variable across the province (Appendix 6, pg.4)

Through the ABMI website, it is possible to load a wetland inventory layer. However, the layer only includes the Green Area and seems to have the same boundaries as the map available on the DUC website. DUCs is working toward completing the national wetland

inventory, and according to the progress online, it seems that the Alberta portion of the inventory is completed in the region that resembles the Green Area, but progress on the White Area has not yet begun. It is possible that even though the layers for the White Management area are not publicly available, and that a deeper investigation will likely reveal that the White Area inventory is well underway. The document *Wetland Inventory Needs Assessment* was the result of a workshop to provide input to deal with the limited “information on location and state of Alberta’s wetlands” (Kariyeva et al., 2016, pg. i). The document verifies the idea that a lack of standardized baseline data and standards for a wetland and aquatic inventory threatens the province’s ability to properly execute and coordinate the goal and outcomes set out in related policies and frameworks, particularly the goals and outcomes desired from the *Alberta Wetland Policy*. The agency charged with wetland monitoring at the provincial level is the AMBI, but collaboration with government agencies, NGOs, industry and stakeholder partners are part of the process.

6.3.3.1b Assessment

Wetland assessments were not necessarily a requirement prior to the 2013 policy unless guided by the terms set out in application to disturb a wetland. The mitigation hierarchy was carried over from the interim policy, but it has shifted since then to be a more streamlined process with the AWP policy goal and outcomes. For example, relative wetland values were not a part of the interim mitigation hierarchy. The AWP implementation has required the introduction and development of a number of regulatory tools to support wetland assessment in order for proponents to be permitted to disturb the area in or around a wetland. The *Alberta Wetland Assessment and Impact Report Directive* outlines the pre-disturbance wetland assessment and reporting requirements of the wetland policy (GoA, 2017). All license applicants are required to follow the directive when submitting wetland assessment information as part of the process to disturb a wetland, which varies between two options depending on the type of activity and the proposed impacts. A wetland assessment and impact form (WAIF) is required for short-term activities or activities that have minimal permanent impacts. For all other activities, a *Wetland Assessment and Impact Report* (WAIR) is required and must be authenticated by a qualified professional (AP) as per the *Professional Responsibilities in Completion and Assurance of Wetland Science, Design and Engineering Work in Alberta*. The AP must complete a wetlands assessment that includes the wetland identification, classification (AWCS), and delineation, relative wetland value (ABWRET-A), mitigation proposal, species surveys, and any other necessary surveys (project dependent). The WAIR directive includes a checklist of information

that must be included in the report as part of the wetland application. Wetland assessments must not be more than three years old from the time of submission.

Guidance for Assessing Permanence of Wetland Basins provides land users and their environmental practitioners with a standardized methodology acceptable to AEP for assessing the permanence of one or more wetlands on one or more parcels of land. Those water features determined to be permanent are likely to have their ownership claimed by the provincial Crown under Section 3 of the *Public Lands Act*. The guidelines contained within the document can be used to assess the wetland permanence of an individual wetland basin on a single parcel of land or multiple wetland basins within multiple land parcels. The document protocol serves the functions of aligning with AEP's *Wetland Identification and Delineation Directive* and supporting the WAIR. The document protocol could also be applied as a stand-alone procedure for determining wetland permanence to support other land ownership enquiries, resource management, or other regulatory requirements such as compliance assurance.

6.3.3.1c Monitoring

Wetland monitoring happens at different scales and through different mechanisms. For example, proponents may be required to submit monitoring proposals as part of their authorization terms. A WPAC may choose to monitor a wetland complex for the purpose of managing their watershed. The PJHV also has a monitoring program in support of the NAWMP goals and the joint ventures. Furthermore, the provincial monitoring program monitors aspects of the environment to fulfil the requirements outlined in the EPEA. The ABMI has run a province-wide wetland monitoring program since 2007 to examine how human footprint influences wetland quantities and wetland quality. This positions the ABMI to report on two of the criteria to be used to assess wetlands: biodiversity and water quality improvement. As of 2014, the ABMI has collected field data on 1,005 wetlands across the province. This represents the most significant investment in wetland monitoring in the province's history. Every year the agency continues to monitor and re-assess the data collected on these wetlands to determine the status and trends in water quality and biodiversity. The ABMI has also produced the Southern Wetland Inventory, which is a polygon-based data set with spatially explicit information of wetland extents based on 2020 satellite imagery. This data set covers nearly all of the Grassland and Parkland Natural Regions of Alberta and is 90% accurate. This product represents the most up-to-date wetland data set created by the ABMI for Alberta/Canada and can provide users with high-quality data to meet their needs. In addition to the SWI, the Boreal Wetland Probability data is a raster-based product that describes the probability of wetland habitat at a 10 m resolution across Alberta's Boreal Forest Natural Region. The product results can correctly identify wetland

and upland areas with an accuracy of 83%. This data set is based on fully open-source data and processing software.

Alberta's boreal wetlands are a critical part of the boreal forest region, and even though they are covered under the provincial wetland policy, they are still referred to as belonging to the *Green Area*. Despite the wetland policy implementation and despite managing the boreal region within its own area, wetlands in this region remain vulnerable to anthropogenic impacts and are susceptible to projects that were excluded from the wetland policy requirements to propose "commitment or mitigation to replace wetland losses incurred on the post-closure landscape" (Huynh, 2018, pg.14). Portions of the Boreal Forest Natural Region are monitored by the *Oil Sands Monitoring Program* (OSMP). The OSMP monitors and assesses changes in environmental conditions in Alberta due to oil sands development. The program has been in operation since 2012 and is recognized as "one of the largest multi-media (air, water, land, and biodiversity) environmental monitoring programs in the world" funded by the oil and gas industry with up to \$50 million annually contributed through the Oil Sands Environmental Monitoring Program Regulation (AEP, Environment and Climate Change Canada, 2018. pg.3). The program is co-managed by the Governments of Alberta and Canada, and there are a number of other stakeholders involved, including local Indigenous communities. In 2020, the program made significant advances in improving administrative processes, increasing participation of Indigenous communities in both governance and monitoring, and providing increased access to OSMPP results and products via publicly accessible data through the OSMP Data Portal (AEP, Environment and Climate Change Canada, 2018). The OSMP generates products including peer-reviewed papers, technical reports, program reports, presentations and workshop material and since 2012 generated over 500 products.

Most KIs agreed with the statement that the *Alberta Wetland Policy* is very difficult to implement on private land, particularly agricultural lands, without an extensive and frequently updated monitoring program that currently does not exist. Of the KIs who were unsure or disagreed, each has decade(s) of experience in their field, whereas those who agreed have less than five years experience in their current role. One scientist noted that the definition of monitoring is unclear and that depending on the directive, the outcome would vary. Most KIs agreed that although the statement may be true, they suggest that "awareness and voluntary action may be a better approach" (KI-2) when implementing the policy on private lands. This can include awareness of the legal context around wetlands and can be backed up with enforcement when needed. It will also be necessary for regulatory agencies to be clear on what is expected from landowners. Actions at the community level can be very successful when local

influencers are identified and undertake projects on their land. An important matter to be examined is the issue of “priority areas” that KI-1 brought up. KI-1 writes that the ways that monitoring is being done today are “[r]elatively easily and cost-effectively using earth observation and remote sensing technologies” (Appendix 4, pg.4).

Most respondents in the first survey agreed with the statement that implementing the wetland policy in the Green Area will require an extensive and frequently updated monitoring program that currently does not exist. KI-1 said that “[n]either the Government of Alberta or industrial operators have a strong regional understanding of cumulative wetland losses or change,” and “current monitoring is focused on stressors such as air emissions or hydrologic changes relating to specific activities” (Appendix 4, pg.5). But ultimately, “[m]onitoring should be expanded to include simple metrics of wetland area affected by CWCS type and functional values” (KI-1). KI-9 writes that “Alberta monitors changes in wetland area over time across the province with periodic updates to the Alberta Merged Wetland inventory (AMWI), as well as monitoring changes in wetland loss and direct disturbances to wetlands by overlaying the AMWI with the human footprint inventory (updated every two years)” (Appendix 6, pg.4).

6.3.4 Restoration

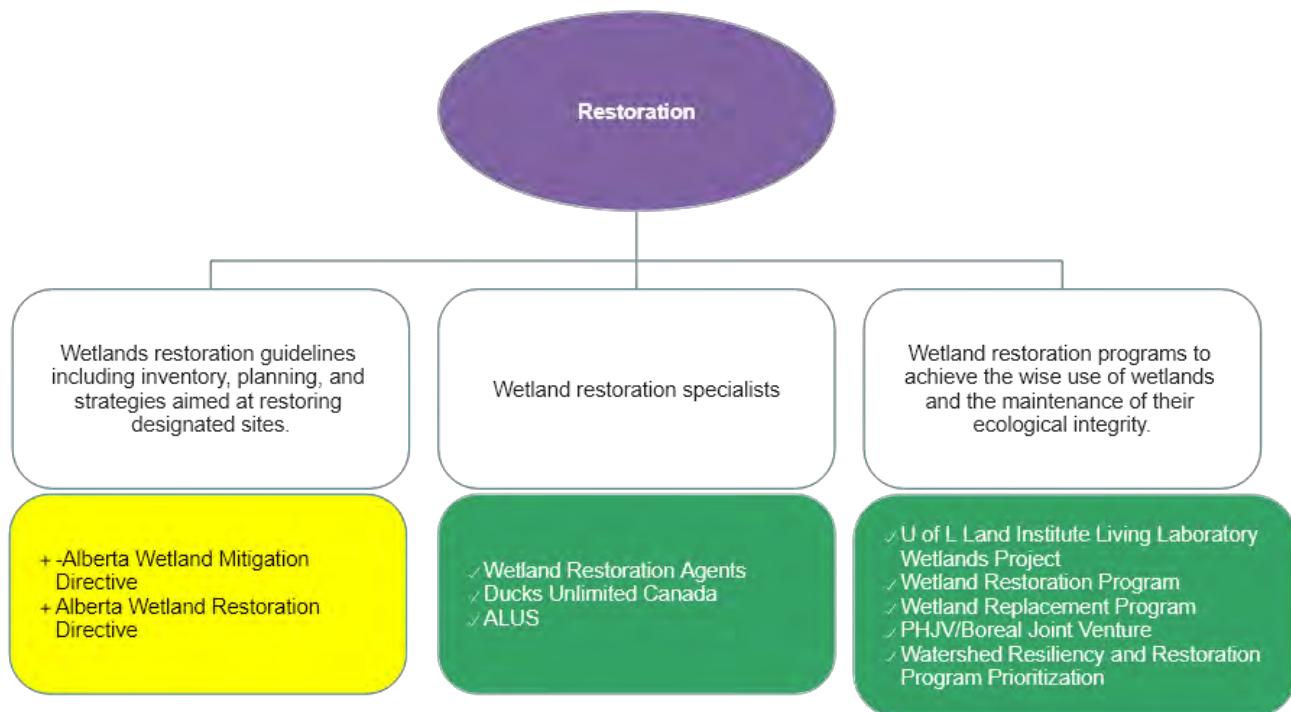


Figure 6.12 Restoration Documents Assessment Based on Appendix 10, Tables 6.3.4 a, b, c.

6.3.4.1 Wetlands restoration guidelines, including inventory, planning, and strategies aimed at restoring designated sites.

The examination of this indicator showed that the restoration of wetlands in the province is adequate but could be improved, particularly in the areas of policy direction and regulatory guidance and enforcement. Most KIs strongly agreed with the statement that the functional role of wetlands is not valued when wetland replacement fees are expended on restoration projects (in priority areas) that are not located in the watershed where the original wetland impact occurs. One respondent did not know how to respond, and another strongly disagreed with the statement. KI-4 finds that there is a responsibility “on the part of counties, knowledge holders [...] and watershed groups to do some strategic planning and retention of key wetland areas” (Appendix 4, pg.3). They also observed that “restoring some wetlands may be more important than keeping a type of wetland that may be plentiful in a certain area” (Appendix 4, pg.3). The respondent acknowledges that trade-offs need to be made considering the local and regional context of wetlands slated for development or restoration. Furthermore, KI-4 sees value in stakeholders working together to make decisions that encourage sustainable development.

Another respondent, a member of a rural municipal government, understood wetland functional values to mean the values and services made available to the local environment and that the greater the loss of these local functions, the greater the cumulative impacts to the province. Cumulative impacts are to be managed using environmental management frameworks, a relatively new approach in the province. It is not clear what role the policy and its tools will play in the development and implementation of the frameworks, but we do know they will establish outcomes and objectives along with the strategies and actions to achieve them. The frameworks are meant to be used as a tool to provide context for decision-makers about the management of existing and future activities related to air, land and water.

In a different interpretation of “functional role,” KI-11 disagreed with the question and instead asked for more clarity about the meaning of “functional role of wetlands” (Appendix 4, pg.3). The respondent said that wetlands function locally and regionally, so if “[h]aving a wetland replaced in another RWVAU up higher in the watershed fulfills an important functional role,” that is an acceptable option, even if it might not be the best choice for wildlife habitat (Appendix 4, pg.3). Although her answer shows that trade-offs are context-dependent and part of science-based decision-making, the respondent felt that more specificity was needed to answer the question properly. Her responses also bring awareness to the issues that decision-makers deal with regularly, such as prioritizing local and regional needs and/or choosing an acceptable trade-off. Ideally, trade-off decisions are undertaken as project assessments that should be

guided by a strategic plan. This plan determines priorities in ecosystem retention (including wetland retention) and trade-off (even any) with development priorities. KI- 1 shared their experience reviewing *Environmental Impact Assessments*⁵⁸ (EIA) with a focus on impacts to wildlife; they observed that within the context of EIAs, “it is clear that wetlands are still given low priority during siting decisions and are seen as an impediment to development” (KI-1, Appendix 4, pg. 2). Issues of transparency and clarity, political will, societal values, government and proponent responsibility, private landowners, and monitoring the policy process are issues that surround this question and will need to be addressed.

Wetland restoration in Alberta is guided by the *Alberta Wetland Mitigation Directive* (AWMD) and the *Alberta Wetland Restoration Directive* (AWRD). For this section, the focus is on restoration, which is the last option on the mitigation hierarchy. Going on the path of restoration requires compliance with both the AWMD and AWRD. The AWMD is one of the first steps in determining the course of action for development impacts that may affect wetlands. The AWMD informs planning and guides decision-making when the path to development leads to avoiding, minimizing, or replacing lost wetland area and value. Wetland mitigation is the most consistent method used to manage wetland development in the province under the interim policy and the 2013 policy.

If a proponent demonstrates that avoiding impacts to wetlands is not a feasible approach for their project and that they have tried to avoid a wetland, the proponent can choose to minimize impacts to the wetland(s) in question. Minimization refers to “reducing negative impacts on wetlands to the smallest practicable degree” (GoA, 2013a, pg.24), and for the purpose of the AWMD, minimization also encompasses wetland reclamation. If minimization is not an option, and where the permanent loss of wetland area is approved, the applicant must comply with wetland replacement requirements. The mitigation hierarchy option to “replace” wetland acreage and value allows the applicant to fulfill their replacement obligations under the guidance and/or combination of permittee-responsible replacement or pay a wetland replacement fee (GoA, 2017b). The AWMD shows the wetland replacement matrix, which is a chart that visually represents the replacement ratios used to calculate wetland replacement fees. The ratios and fees must also be considered using the replacement rates table, which has different values according to the regional location of the wetland being replaced. Under the AWRD, two types of wetland replacement actions are recognized: restorative and non-restorative (GoA, 2016). Restorative replacement includes replacement in the form of wetland

⁵⁸ EIAs are enabled through the *EPEA* but could also be applied through *REDA* and the *Water Act*.

banking credits,⁵⁹ payment to the in-lieu program, or the applicant themselves undertaking the restoration, construction, or enhancement of a wetland themselves. It is important to note that wetland restoration in this directive applies only to mineral wetlands, not peatlands, so in other words, restoration activities under this directive apply to mainly the White Area and not the Green Area.

6.3.4.2 Wetland Restoration Specialists.

Under the 2013 policy and directives, a Wetland Replacement Agent (WRA) is required for any activity related to wetland restorative replacement action. A WRA is an “is an entity that is responsible for undertaking replacement action, including submitting required documents to the regulatory body” (GoA, 2016, 6). The work of a WRA and its employees must be authenticated by a professional who is governed by a professional regulatory organization in accordance with practice standards set out in the *Professional Responsibilities in Completion and Assurance of Wetland Science, Design and Engineering Work in Alberta*. Prior to the new policy, the province used the *Provincial Wetland Restoration/Compensation Guide*. The Guide identified Ducks Unlimited Canada (DUC) as the only wetland restoration agency in Alberta⁶⁰ that collected funds and guided restoration projects in Alberta. As of December 1, 2018, the GoA transitioned to a Wetland Restoration Program (WRP) that includes a new centralized wetland restoration fund administered by the province (Government of Alberta, 2019a). As of 2018, the new WRP has eliminated designated restoration agents and created the new centralized wetland restoration fund administered by the GoA. Wetland restoration in Alberta today includes “opportunities for any interested organization(s) that qualify for the work through a competitive bidding process” (Fiera Biological Consulting, 2019, i). The *Fiera* report identified this measure as a way for the GoA to tighten up controls on where wetland restoration happens⁶¹ and where the money for restoration is directed.⁶²

6.3.4.3 Wetland restoration programs to achieve the *wise use of wetlands* and the maintenance of their ecological integrity.

Wetland restorative replacement action is guided specifically by the AWRD, and more generally, by the wetland management program as a whole, including water law, wetland policy,

⁵⁹ Wetland banking in Alberta is in its infancy as a viable option for replacement activities. See Wetland Offset Program Description (Government of Alberta, 2015d)

⁶⁰Although DUC was the only designated wetland restoration agent in Alberta, their designation did not preclude other agencies becoming involved in wetland restoration work.

⁶¹Under the DUC-led restoration program, wetlands were being restored or replaced according to geographical need, but often times this would be far from where the wetland loss occurred.

⁶²The Auditor General recommended on at least two occasions that the GoA needed to tighten up control over WRAs by means of a more formal agreement.

water strategy, and wetland directives. The Wetland Restoration Plan (WRP) is the first step in restorative replacement. The WRP supports the “re-establishment of natural hydrology, vegetation, and wetland processes within a previously drained wetland” (GoA, 2016, pg. 7).⁶³ An authenticated WRP must be submitted as part of the regulatory application before a restoration project begins. Important information is collected at this stage, including landowner and third-party agreements, team roles; wetland objectives; site assessment; wetland restoration methods, and a Restoration Plan Statement (RPS).

The RPS is another important document that not only requires authentication from a professional but also collects information for the restoration in question. The information collected will presumably be added to the data collection for wetland restoration and wetland policy goals in general. The information collected at every point of authentication will likely feed into the provincial wetland registry that is planned for the future, wherein a WRA will be able to submit verified restoration sites.

The 2018 WRP, in general, aims to re-establish wetlands in partnership with Albertans by providing resources for collaborative restoration projects across the province. Under the *Alberta Wetland Policy*, WRP will offset wetland habitat loss due to development activities. A priority of the *Alberta Wetland Policy* and WRP is to replace wetlands within municipalities and watersheds that have had the highest amount of lost wetland area and value since 2015, as well as areas of high historical loss. WRP will focus on fostering partnerships with municipalities that have a vested interest in wetland replacement. AEP has funding available for eligible wetland replacement projects and is seeking to establish partnerships with municipalities. Municipalities that are committed to identifying and managing wetland replacement projects within their municipality and meet minimum pre-qualification requirements are eligible to apply. For the 2020/2021 program, WRP is prioritizing partnerships with municipalities that have already invested resources into identifying projects for wetland replacement.

⁶³ The site chosen for restoration must meets site assessment criteria to qualify for restoration.

6.4 Enhancing Implementation

6.4.1 Scientific Guidance

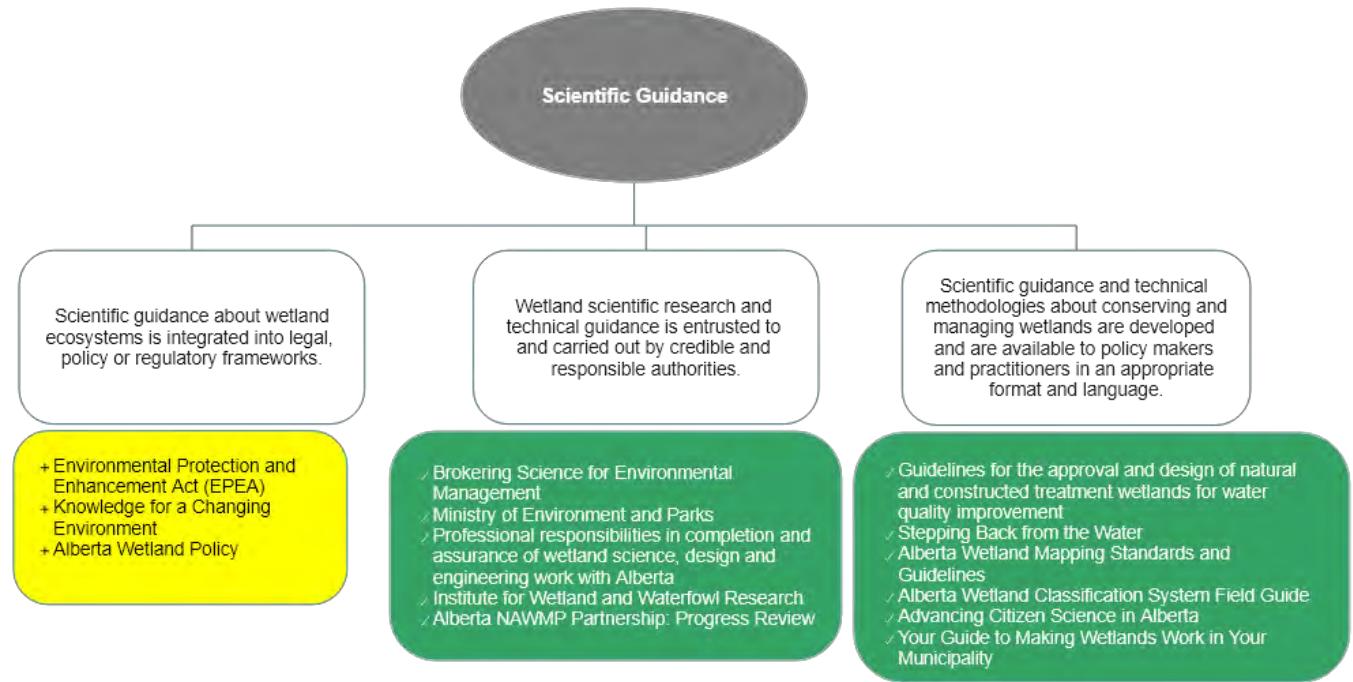


Figure 6.13 Scientific Guidance Documents Assessment Based on Appendix 11, Tables 6.4.1 a, b, c.

6.4.1.1 Scientific guidance about wetland ecosystems is integrated into legal, policy or regulatory frameworks.

Legislation for scientific guidance exists in the form of the EPEA. The purpose of the Act is to support and promote the protection, enhancement and wise use of the environment while recognizing a number of sustainable development principles. One of the ways the Act enables the protection and wise use of the environment is by appointing the Chief Scientist through Ministerial Order under section 16.4 (1) of the Environmental Protection and Enhancement Act.

The role of the Chief Scientist is to communicate environmental science information to Albertans and the government and provide scientific oversight on the provincial environmental monitoring and science program. This role encompasses the following five responsibilities:

- Act as a champion of science, research, and the role of evidence, as a recognized expert and active researcher in environmental sciences.
- Provides scientific advice to address complex environmental challenges and opportunities facing the province and the government.
- Promote and build scientific excellence through partnerships with Universities and other credible scientific and research-based institutions and organizations.
- Ensures scientific information coming from Alberta Environment and Parks meets rigorous ethical and scientific standards.
- Establishes and upholds a public schedule for environmental science reporting to inform the Government of Alberta and Albertans.

The document entitled *Knowledge for a Changing Environment:2019-2024 Science Strategy* (GoA, 2019b) is the current government's five-year strategy for the environmental monitoring program to monitor, evaluate and report on the condition of the ambient environment in Alberta. In the strategy, the acknowledgement is made that "Alberta's environmental science program and related provincial monitoring networks are evolving towards an adaptive design" and that "component areas such as surface and groundwater, air, wetlands, land and biodiversity monitoring networks are undergoing review to define and focus the monitoring objectives and science questions that need to be answered" (GoA, 2019, pg. 8) The five priority areas of the strategy: The five priority areas are (1) biological and ecological change, (2) consequences of a changing and variable climate, (3) condition and sustainability of Alberta's water resources, (4) chemical contaminants and biological stressors in the environment, and (5) environmental responses to natural resource development. Although all of the priority areas could involve wetland management, the first and the third priority areas are the most relevant to wetland management.

The biological and ecological change priority aims to monitor, assess and predict the status and trends in environmental stressors and stressor responses of Alberta's plants, animals, habitats and ecosystems, including changes in accumulated condition and cumulative effects. The strategy recognizes that conservation, protection and restoration of Alberta's biological and ecological resources "require relevant information to understand the current environmental conditions and predict the future condition of these resources as well as their trends over time and space" (GoA, 2019, pg.12). For wetlands, the priority focus on ecological change indirectly supports the wise and sustainable use of wetlands and the maintenance of their ecological character. In fact, the strategy recognizes that "aquatic and terrestrial ecosystems provide vital direct and indirect ecological goods and services that contribute to human well-being and socio-economic benefits received from the environment" and goes on to cite the ecosystem services provisions laid out in the *Millennium Ecosystem Assessment* including the purification of air and water, and mitigation of floods and droughts.

The *Alberta Wetland Policy* (2013) requires scientific knowledge and guidance to carry out the policy goal, outcomes, and key directions. The policy's guiding principles are useful for understanding how the policy implementation will be designed. According to the policy, it will "incorporate the best available knowledge and science, and note gaps or assumptions where improved information is needed" (GoA, 2013, pg. 10). There are a number of ways to accomplish this, but the wetland policy itself only provides the strategic direction. Since design interventions for addressing policy gaps are not built into the policy, it is likely that these issues

will be addressed outside of the policy. Both the *Water for Life* strategy and the science strategy lend themselves to seeing the strategic direction through to implementation. Moreover, wetland policy regulatory tools like the wetland mitigation system will have to “be adaptable, acknowledging and incorporating new information, as wetland science and public policy continue to evolve” (pg.15).

6.4.1.2 Wetland scientific research and technical guidance are entrusted to and carried out by credible and responsible authorities.

The Office of the Chief Scientist establishes a schedule for reporting to the public on the condition of the environment in Alberta on the basis of scientific evaluations and assessments of data collected by the environmental science program. The public reporting schedule will share the trend analysis of data collected over time through the long-term provincial monitoring networks to show Albertans how a set of environmental indicators are changing over time. The plan to provide information in an online, easy to access format was first presented in the report *Brokering science for environmental management: progress report from the Chief Scientist: A Term in Review* (GoA, 2019a).

The Office of the Chief Scientist also consults and supports the independent *Science Advisory Panel* (SAP) and *Indigenous Wisdom Advisory Panel* (see section 6.3). The advice and recommendations of the SAP and IWAP aim to improve the quality, integrity and relevance of Alberta’s environmental monitoring and science program. The independent Science Advisory Panel (SAP) is appointed by the Minister as per the EPEA. The SAP is made up of six scientific experts from a diverse range of environmental, biological, and ecological fields, experience, and research contributions. The panel provides scientific peer review and validation of science implementation to the Chief Scientist and the Minister of Environment and Parks. Their responsibilities are enabled by and outlined in the EPEA.

AEP is recognized as the regulatory authority under the *Water Act*, and technical expertise lies within the AEP. To support the mandate of the ministry, the Environmental Monitoring and Science Division (EMSD) within the AEP was formed. EMSD is the program that houses the Chief Scientist, IWAP, and SAP. The department will be accountable for the provision of scientific leadership for the planning, coordinating and conducting of environmental monitoring and science in Alberta and the subsequent reporting of the analysis, evaluation and assessment of the information. EMSD scientists, together with partner and collaborative organizations, are designing and implementing adaptive monitoring in the province. In addition to the EMSD, and with a specific focus on wetlands, the AEP requires an authenticating professional to sign off on regulatory documents submitted under the *Alberta Wetland Policy*.

These same individuals will provide professional oversight on wetland replacement projects. The reasoning behind authenticating professionals is to mobilize an already highly qualified workforce to “provide assurance to Albertans that wetlands in the province are being managed to a high standard of professional excellence” (Competency Advisory Group, 2017). This is ensured through the work that AEP and ten professional regulatory organizations in Alberta have achieved by developing a common set of standards that define the responsibilities and requirements for authenticating professionals in the province.

The Institute for Wetland and Waterfowl Research (IWWR) and the Alberta NAWMP are examples of credible and responsible institutions who have become authorities in wetland management and conservation through the decades of work they have put into their reputation. The IWWR is the scientific research arm of Ducks Unlimited Canada. Their research delves into the unique relationships between wetlands, waterfowl, watershed health, biodiversity and more. The data acquired from research activities give the organization credibility and influence with governments, industries, and landowners; it also guides on-the-ground conservation work. The IWWR has four objectives: Discover new information that will help solve fundamental problems facing North American waterfowl and wetland ecosystems; Develop highly skilled professionals in wetland and waterfowl conservation; Enhance communication of the latest information on wetland and waterfowl biology and conservation; Broaden support for wetland and wildlife conservation. Similarly, the Alberta NAWMP is founded on scientific principles to deliver on their work because research and science make it possible to design programs that conserve wetlands. The Alberta NAWMP works closely with the top waterfowl and wetland scientists and funds science projects related to their priorities. For example, Habitat Joint Venture science activities evaluate the effects and inform the future improvement of the North American Wetlands Conservation Act (NAWCA) program throughout the PHJV (Alberta NAWMP Partnership, 2019, pg.12).

6.4.1.3 Scientific guidance and technical methodologies about conserving and managing wetlands are developed and are available to policymakers and practitioners in an appropriate format and language.

There are a number of technical guidance documents that support wetland management in Alberta. *Guidelines for the approval and design of natural and constructed treatment wetlands for water quality improvement* was prepared to provide standardized guidelines for the approval of candidate treatment wetland sites by the Alberta Environment Regional Services Engineers and to provide design guidance to agencies and consultants for natural and constructed wetlands for wastewater polishing. This document was cited in the NAWCC (2003) report as

supporting the protection of natural wetland functions because it provides a detailed understanding of the wastewater loadings and the condition and function of wetlands. It also noted that the manual could be used to provide national standardized controls to the approach presented.

Alberta Wetland Mapping Standards and Guidelines This standard is intended to be used by those in Alberta that have a professional interest in/or are working on wetland conservation and management, including wetland mapping and inventory development. These were developed based on minimum standards and guidelines to promote consistency and improve data quality in wetland mapping at a provincial scale within the Prairie/Parkland and Boreal/Foothills zones of Alberta.

Alberta Wetland Classification System Field Guide is based on the *Alberta Wetland Classification System*. Funding and support for the guide were sponsored by Alberta Innovates' *Water Innovation Program* and the Alberta NAWMP. Ducks Unlimited Canada (DUC) is leading the development of the wetland field guide that will result in a free, online field guide available to the public beginning in April 2021. I volunteered to offer editing inputs for the project, and I can say that the field guide is user-friendly with simple language, directions, instructions and detailed photographs. From April to September 2021, DUC will offer information webinars and field demonstrations to educate users on how to use the field guide.

6.4.2 Communication, Education, Participation and Awareness (CEPA)

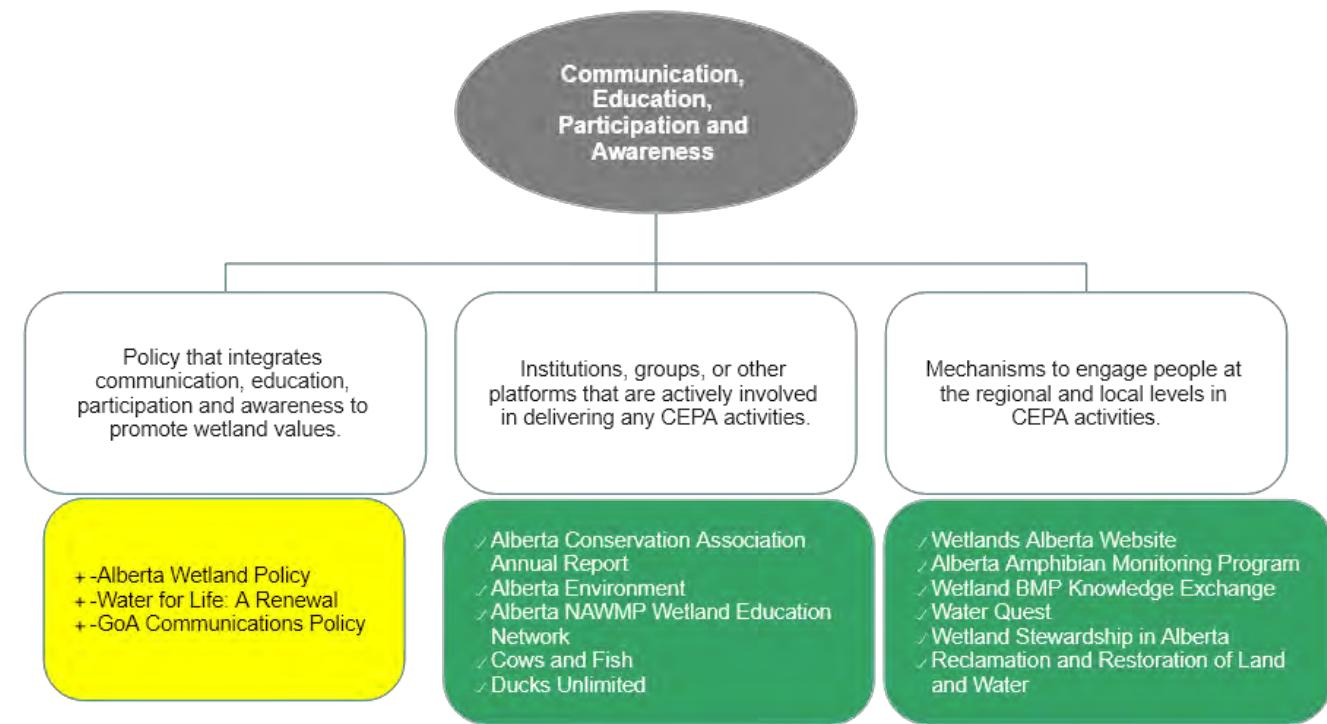


Figure 6.14 Communication, Education, Participation and Awareness Documents Assessment Based on Appendix 11, Tables 6.4.2 a, b, c.

6.4.2.1 Policy that integrates communication, education, participation and awareness to promote wetland values.

Most respondents agreed that developing and continuing support or new or existing program to manage wetlands on private lands is an important aspect of wetlands management (Appendix 4, pg.13). The AEP is the ministry responsible for communicating to water users in Alberta, but “Much more effort is needed to get information to landowners about the wetland policy. Until it negatively affects them, they do not seem to realize that it is important when advertising and communication attempts are made” (KI-10, Appendix 4, pg. 13). KI-1 writes that “Landowners are the key ‘boots on the ground’ implementers on private lands. They can be strong influencers within the community. Wetland values are societal, and the types of programs mentioned ensure that a few landowners do not shoulder an unfair proportion of burden” (Appendix 4, pg.13). Getting through to landowners through specialized programs and support networks will support wetland management in conservation in Alberta, but landowners must also have a way to communicate their needs and be heard.

Following the protocol under the GoA’s communication policy, the ministry is empowered to develop communication plans about the issues that fall within their jurisdiction. For example, in an effort to modernize existing communication tools with the goal of improving how

information is shared about concepts and approaches in land and environmental management, the ministry produced five short videos released on *YouTube* entitled: Footprints. In addition to modernizing the communication strategy, the fourth outcome in the AEP's annual report is *Public health and safety from environmental conditions and events* (GoA, 2020). The key objective for the outcome is that Albertans are resilient to environmental impacts through increased awareness, skills and capacity for adaptation. The key objective was supported through a series of environmental education programs and initiatives that aimed "to deliver collaboration environmental education to enhance Albertans' stewardship of the province's air, land, water and biodiversity" (GoA, 2020, pg.46). The most pertinent education initiatives to wetland conservation and management were the activities directed toward water and fisheries education programs through *Water for Life* and the *Aquatic Invasive Species* program.

A key direction in the *Water for Life* strategy is that Albertans will have access to the knowledge needed to achieve safe drinking water, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy. One of the specific outcomes for the key direction is the incorporation of education tools and strategies into all *Water for Life* actions. For example, the Alberta *WaterPortal* was founded in 2006 "in the spirit of the *Water for Life* strategy" (Alberta Water Portal Society, 2020). The *WaterPortal* provides inclusive research, community engagement, and educational activities to improve the public's understanding of the importance of water in Alberta, as well as to provide Albertans with the knowledge needed to make better water management decisions (Alberta Water Portal Society, 2020). Another key direction is for coherence among sectors to understand how their behaviours impact water quality, quantity and the health of aquatic ecosystems. The need for education among water users of all types is identified in the water strategy as well as the wetland policy, as such the "will expand the use of education as a strategy for influencing and helping Albertans make personal and public decisions regarding Alberta's water resources" (GoA, 2008, pg.15). The GoA is also improving its own knowledge by incorporating the AWC's recommendations to improve the *Water for Life: A Strategy for Sustainability* (GoA, 2003) by clarifying roles and accountabilities, improve data collection and analysis, and increase public awareness about water and water resources.

6.4.2.2 Institutions, groups, or other platforms that are actively involved in delivering any CEPA activities.

There are a number of institutions that are actively involved in delivering any CEPA activities in Alberta. For example, the Alberta Conservation Association (ACA) is a delegated administrative organization established under the Alberta *Wildlife Act* and *Wildlife Regulation*.

The ACA undertakes projects and programs to address ESRD priorities with respect to fisheries and wildlife resources. The ACA and the ESRD have an Education and Communication Program Agreement. The program aims to “address communication, and education needs emerging from the implementation of delegated programs” (AESRD and ACA, 2014). Other organizations involved in CEPA activities related to wetlands management in Alberta include the Alberta NAWMP Wetland Education Network, Ducks Unlimited Canada, and Cows and Fish (Alberta Riparian Habitat Management Society). These organizations are the largest in size and scope, but there are other organizations actively involved in wetland CEPA at the local levels.

6.4.2.3 Mechanisms to engage people at the regional and local levels in CEPA activities.

There are a variety of mechanisms to engage people in wetland CEPA. In this section, I will discuss some of the mechanisms that CEPA organizations mentioned in the previous section have developed and implemented themselves. The wetlandsalberta.ca website aims to engage Albertans to conserve and protect wetlands by providing timely and relevant information and is sponsored by Alberta NAWMP Partnership, Ducks Unlimited Canada, and the GoA. The site offers information about Alberta wetlands, stewardship, policy and legislation, conservation, resources and contact information. One of the pages lists a number of wetland sites to visit, some of which have information centres. The *Visit a Wetland Map* tool would be more useful if the links on the website work, but if someone is very interested in finding out more, they are able to search the wetland name on the internet and access its page through a search engine. Most of the wetland sites listed have at least their own page on the AEP site or on a municipal site. The Amphibian Monitoring Program, Wetland Stewardship in Alberta, Water Quest, and the Grade 5 curriculum are all under the umbrella of the AEP.

KI-1 suggests that on private lands, “awareness and voluntary action may be a better approach. This can include awareness of the legal context around wetlands and can be backed up with enforcement when needed. It will also be necessary for regulatory agencies to be clear on what the expectations of landowners are. Actions at the community level can be very successful when local influencers are identified and undertake projects on their land” (Appendix 4, pg.4). This points to the importance of CEPA activities in bridging the gap between municipal capacity and conservation of wetlands on private lands. In fact, the point about CEPA activities having a positive influence on municipal capacity is echoed by KI-4 “[T]here needs to be less of the top-down type of monitoring of [agricultural] lands, and more working with landowners. Alberta Agriculture does a much better job of this type of education and working with landowners than AEP. AEP is a very regulatory type of ministry and often does not work well

with sharing responsibility and power. As such, I would like to see the wetland policy with shared oversight with Alberta Agriculture" (Appendix 4, pg.4).

6.4.3 Financial Resources

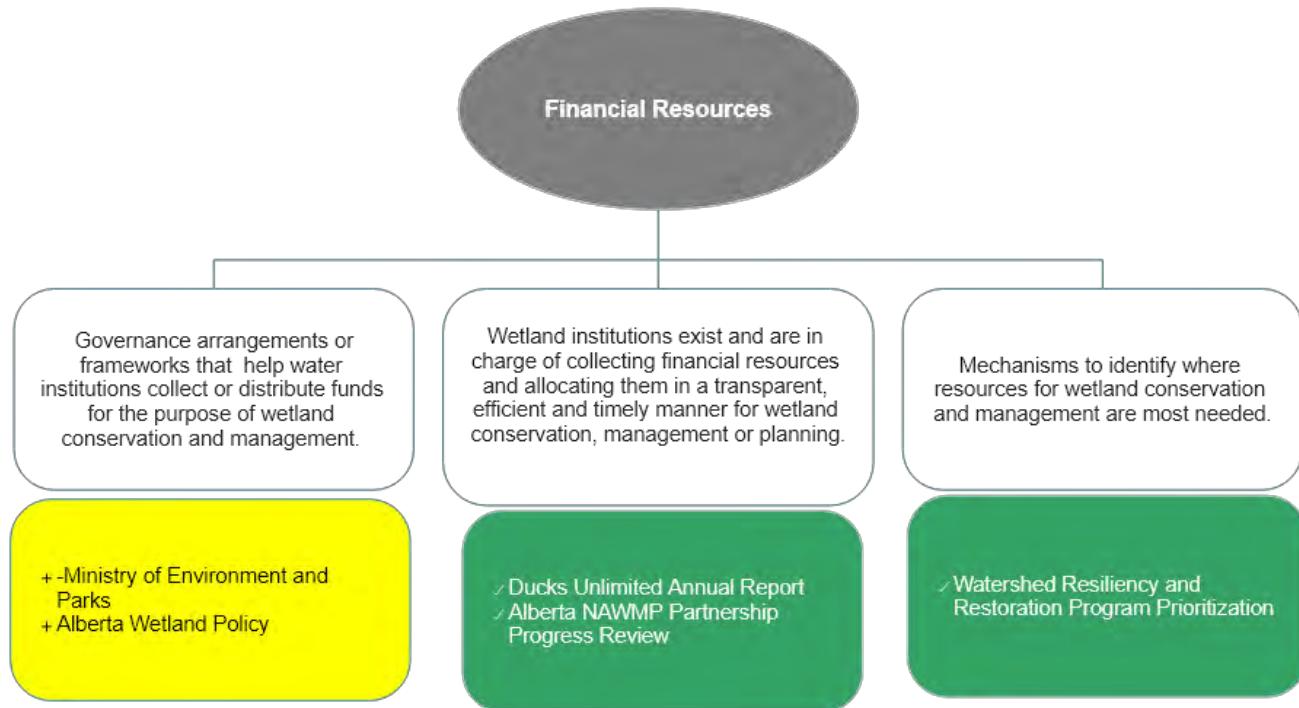


Figure 6.15 Financial Resources Documents Assessment Based on Appendix 11, Tables 6.4.3 a, b, c.

6.4.3.1 Governance arrangements or frameworks that help water institutions collect or distribute funds for the purpose of wetland conservation and management.

The Ministry of Environment and Parks manages the budget for legislation, regulation, policy and programs for things that fall under their mandate. Under the budget, there are many categories where money could be directed toward wetland conservation and management. For example, under the "Water Program," the following categories could apply to wetlands in Alberta: Water Partners and Stewardship, Water Management, and Flood Adaptation. Other programs like Fish and Wildlife, Science and Monitoring, and Integrated Planning could also channel funding to wetland conservation and management, but it is likely the case that most wetland funding comes from the Water program budget. Through *Water for Life*, the GoA commits to ensuring the AWC, WPAC and WSG partnerships are resourced and have the scientific information required to fulfill their mandates. The AWC is dependent on funding from the GoA, and since the AEP is the ministry in charge of water, the AWC is dependent on funding from the AEP (Metrix Group LLP, 2019). This matters for wetlands because the AWC is charged with overseeing the implementation of the *Water for Life* and the wetland policy.

The Wetland Restoration Program (WRP) operates under the *Alberta Wetland Policy* and the *Alberta Wetland Mitigation Directive*. Through AEP, the GoA works with stewardship partners to fulfil the goal of the AWP to conserve, restore, protect and manage Alberta's wetlands through projects that support healthy watersheds, manage flooding, address water quality issues, provide habitat for biodiversity and offer recreational and educational opportunities. In the budget year 2019/20, the ministry collected \$9.1 million in new wetland replacement fees and \$1.5 million through WRP premiums, fees and licencing (GoA, 2020a). In September 2019, the ministry took back the collection of replacement fees from DUC and finalized the transfer of \$18.9 million from DUC to the ministry. KI-10 is of the opinion that "The wetland replacement function intended to make use of compensation fund dollars is thus far not sufficient for returning value to the landscape in my opinion, and I question whether it will achieve its purpose" (Appendix 6, pg.1). As it stands, the transparency of the restoration process is limited. Part of the process of the restoration program should be that priority areas and restoration activities, including replacement activities, should be made publicly available and updated often, and if these things are not possible, an annual report on progress should be created.

The Land Stewardship Fund receives proceeds from Alberta public land sales to be used for conservation purposes, either through purchasing private lands or through providing grants to registered land trust organizations for the acquisition of conservation easements and conservation land management (GoA, 2020). The AEP also grants funding for water projects through the *Watershed Resiliency and Restoration Program* (WRRP). The purpose of the WRRP is to promote the long-term ability of watersheds to mitigate the effects of future flood and drought events. The document *Watershed Resiliency and Restoration Program: 2020-2021 Overview and Application Guide* (GoA, 2020b) is written with the purpose of informing applicants about the program and how to apply for funding. The primary objective of the program is to increase the natural capacity of provincial watersheds to reduce the intensity, magnitude, duration and effects of flooding and droughts. Funding priorities for the WRRP include wetland restoration and creation and projects geared toward wetland enhancements. In 2019/20, the \$3.5 million allocated in the budget for the WRRP was paid out through the execution of 30 capital grants to municipalities, stewardship groups, other not-for-profit associations, and First Nations for science and engineering consultants, restoration practitioners, educators and outreach specialists (GoA, 2020). The AEP also received revenues from the federal government that are meant for flood mitigation and biodiversity.

6.4.3.2 Wetland institutions exist and are in charge of collecting financial resources and allocating them in a transparent, efficient and timely manner for wetland conservation, management or planning.

The NAWMP in Alberta has received contributions to its program since 1986 from numerous different governments, agencies, businesses, not-for-profit organizations and individuals. The cumulative total of contributions received between 1986 to 2019 for the Alberta NAWMP is just over \$550 million (CAD). The AWMP received just over \$17 million for the 2018-19 fiscal year. The data includes figures from the Prairie Habitat Joint Venture and is tracked using the NAWMP National Tracking System. Ducks Unlimited Canada is a charitable organization, and its goal is to direct 80% of expenditures into habitat conservation annually. Despite the global pandemic in 2020, DUCs invested 82% of its expenditures into habitat conservation and will not run a deficit as a result of their responsible approach to the charitable money they receive.

WPACs are important stewards of Alberta's major watersheds. They are independent, non-profit organizations designated by AEP to report on the health of our watersheds, lead collaborative planning, and facilitate education and stewardship activities. There are currently 11 watershed councils/alliances in Alberta. They were collectively granted \$2.7 million by the ministry in 2019-20. To support their ability to continue engaging Albertans in the shared stewardship of watershed resources, they will also be granted \$2.7 million annually until 2022-23. The suggestion was made to KI-s about developing working groups within each WPAC to report on wetlands and best management practices, and most KI-s agreed or strongly agreed with the statement. KI-11 notes that “[WPACs] would need to hire a wetland practitioner to complete this work, so the WPACs would need a large infusion of funds” (Appendix 4, pg.14).

6.4.3.3 Mechanisms to identify where resources for wetland conservation and management are most needed.

The purpose of the *Watershed Resiliency and Restoration Program Prioritization* document is “to identify and rank priority wetland and riparian restoration and conservation [areas in Alberta]” (Summit Environmental Consultants [Summit], et al., 2015) in support of the WRRP and the Agricultural Watershed Enhancement Program (AWEP). At the time, both the WRRP and the AWEP shared the goal of increasing sustainability through the restoration and protection of watershed function, primarily through wetland and riparian habitat restoration and the implementation of best practices. The summary report identified three priority areas to achieve the overarching goal: 1. Flood, 2. Drought, and 3. Water Quality (Summit et al., 2015). The report provides decision-makers with three priority maps, one for each priority area. The maps applied a criteria and indicators framework, where specific indicators representing each of

the criteria (hazard, consequence, and resilience) were selected and quantified to represent overall priorities for flood, drought, and water quality at the watershed scale. The information within the summary report can be used to inform program decisions.

6.4.4 Capacity

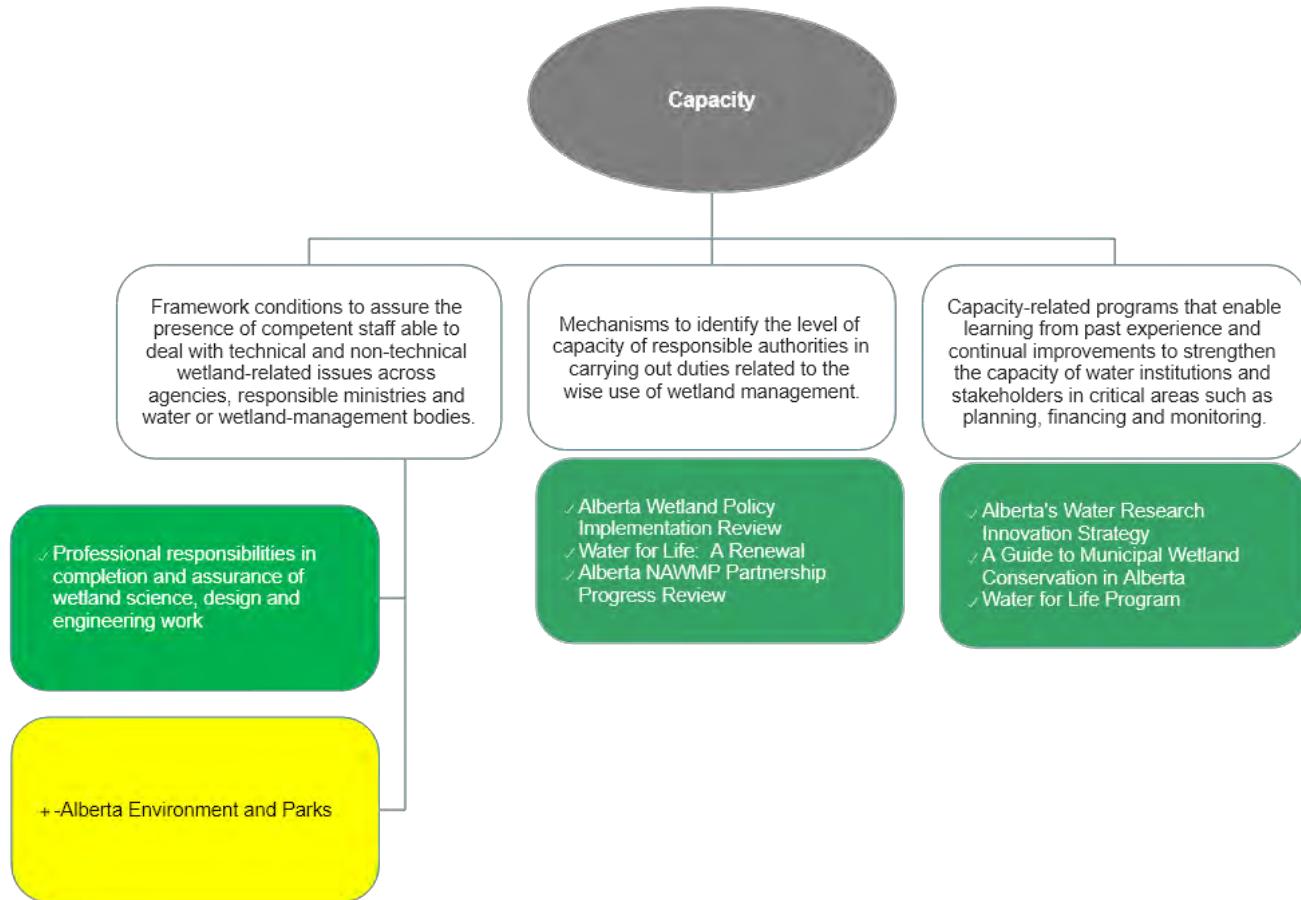


Figure 6.16 Capacity Documents Assessment Based on Appendix 11, Tables 6.4.4 a, b, c.

6.4.4.1 Framework conditions to assure the presence of competent staff able to deal with technical and non-technical wetland-related issues across agencies, responsible ministries and water or wetland-management bodies.

The Ministry of Environment and Parks is responsible for protecting and enhancing Alberta's environment and ecosystems to ensure a sustainable future. The ministry is also responsible for working with Albertans to ensure sustainability goals are achieved and that everyone understands the challenges that achieving sustainability can involve. In terms of capacity, the ministry can enable capacity and direct resources to wetland conservation and management. The *2019/20 Annual Report* addresses capacity in several of the outcome

categories. The first example commits close to \$450,000 to *Cows and Fish*⁶⁴ for the first year of a three-year grant and *Memorandum of Understanding* for implementing the *Eastern Slopes Riparian Management Initiative*. The initial funds are meant “to set up capacity with systems, staff and to establish partnerships that the final three years of the agreement will build on” (GoA, 2020, pg.17).⁶⁵ Partnerships in the eastern slopes area with wetland conservation actors and stakeholders will likely be a result of this grant.

Another project where the ministry addresses capacity is within the provincial environmental monitoring and science program. Among other things, the program “leverage[ed] expertise and capacity to plan, design and deliver community-based science and monitoring programs of mutual interest to place-based partners” (GoA, 2020, pg. 20). Examples of ‘leveraged expertise and capacity’ went to the *Indigenous Climate Change Observation Network* (ICCON) and bringing *Traditional Ecological Knowledge* (TEK) and Indigenous wisdom into monitoring, evaluation, and reporting activities. It is not clear to what extent expertise and capacity have improved within the ICCON or as a result of the integration of TEK, but it would be wise to measure if sufficient capacity and expertise have been leveraged for these important projects. The knowledge and lived experience of Indigenous communities is undoubtedly an asset to environmental management in general, and specifically for wetland conservation and management in Northern Alberta because of their knowledge of native plants and species. For wetland approvals under the jurisdiction of the AER, capacity is addressed within the AER framework but always under the guidance of the ministry. AEP is recognized as the regulatory authority under the *Water Act*, and technical expertise lies within the AEP.

6.4.4.2 Mechanisms to identify the level of capacity of responsible authorities in carrying out duties related to the wise use of wetland management.

The *Water for Life* strategy is Alberta’s water management framework that enables learning from past experience and applying the learned knowledge through a number of different programs, mechanisms, and partnerships. For example, through the *Water for Life* program, municipalities can apply for funding for new regional water supply and treatment facilities and wastewater treatment facilities. In terms of learning from past experience, the strategy was first released in 2003 but then rereleased in 2008 as *The Water for Life Strategy: A Renewal*. The renewed strategy was written to address the growing demand for water resources as a result of a rapidly increasing population and major economic growth at the time. Although

⁶⁴ The Cows and Fish (Alberta Riparian Habitat Management Society) program creates awareness, monitors, evaluates, develops tools and promotes community-based actions for riparian conservation and stewardship.

⁶⁵ Funding in years 2 to 4 could be as high as \$1 million per year based on matched funding from partnerships.

the growth came to a halting stop, the improvements to the strategy were a mainstay for the province's water strategy. The document itself is more polished. For example, the goals in the 2008 strategy were supplemented with specific outcomes and key actions; moreover, the *Water for Life: Action Plan* (GoA, 2009) outlined the timing of implementation. Another example of a difference between the strategies based on learning from past experience is evidenced by the more nuanced principles (See Table 6.6). Although it appears to be that there are four new principles, that is not the case. The first three "new" principles that appear were actually in the 2003 document as goals, whereas in the 2008 strategy, they are built-in as guiding principles. The only new principle guides the integration of the strategy into other policies like the LUF.

Water for Life (2003) Principles	Water for Life (2008) Principles
All Albertans must recognize there are limits to the available water supply.	Albertans must recognize there are limits to the available water supply.
Alberta's water resources must be managed within the capacity of individual watersheds.	Alberta's water resources must be managed within the capacity of individual watersheds.
Citizens, communities, industry and government must share responsibility for water management in Alberta and work together to improve conditions within their local watershed.	Citizens, communities, industry and government must share responsibility for water management in Alberta and work together to improve conditions within their local watershed.
Knowledge of Alberta's water supply and quality is the foundation for effective decision-making.	Knowledge of Alberta's water supply and quality is the foundation for effective decision-making
Albertans must become leaders at using water more effectively and efficiently and will use and reuse water wisely and responsibly.	Albertans must become leaders at using water more effectively and efficiently and use and reuse water wisely and responsibly.
Alberta must preserve the "first-in-time, first-in-right" principle for granting and administering water allocations. Allocations will be transferable to ensure societal demands and needs are met.	Alberta currently recognizes "first-in-time, first-in-right" for existing water allocations, which can be transferable to ensure societal demands and needs can be met.
Healthy aquatic ecosystems are vital to a high quality of life for Albertans and must be preserved.	Healthy aquatic ecosystems are vital to a high quality of life for Albertans and must be preserved.
Groundwater and surface water quality must be preserved in pursuing economic and community development.	Groundwater and surface water quality must be preserved while pursuing economic and community development.
Alberta will continue to be a leader in drinking water quality and standards to ensure Albertans have safe, secure drinking water.	Alberta will continue to be a leader in drinking water quality and standards to ensure Albertans have safe, secure drinking water.
	Alberta will administer and operate the water management system to meet transboundary agreements in cooperation with neighbouring jurisdictions.
	The GoA and partners will manage Alberta's water infrastructure for long-term sustainability.
	Best available practices & market-based tools will be used in order to maintain flexible & adaptive water management.
	[W]ill be integrated into other policies and plans, such as LUF planning, ensuring better resource management integration.

Table 6.7 Comparison of 2003 vs 2008 *Water for Life* Principles

As stated throughout this document, the AWC is charged with overseeing the implementation of the *Water for Life* Strategy. The importance of this water institution for the wise use of water and wetlands is founded in the council's core business, which is to:

1. Advance the outcomes of *Water for Life*.
2. Provide advice that informs policy or actions.
3. Provide a forum to discuss water perspectives.

The core business of the council can be summarized as strengthening the capacity of water institutions (including itself) and stakeholders in critical water management areas. For example, the AWC is currently working on reporting for the *Alberta Wetland Policy Implementation Review*, which is set to be released in March 2021. The report aims to identify potential performance measures for the goal, outcomes, and strategic directions of the *Alberta Wetland Policy*; and describe the challenges, opportunities, or unintended consequences experienced by sectors in the implementation of the *Alberta Wetland Policy*. The report on the AWC implementation will be critical in assessing the goals of the policy and its outcomes. The report also has the potential to measure the capacity of responsible authorities such as the AEP to deliver on the wise use of water and wetlands guided by the *Water Act*.

6.4.4.3 Capacity-related programs that enable learning from past experience and continual improvements to strengthen the capacity of water institutions and stakeholders in critical areas such as planning, financing and monitoring.

Alberta's Water Research and Innovation Strategy (GoA, 2014) provides direction for water research and innovation in Alberta within a context of interconnectedness and interdependence for the next ten years. The strategy outlines a systems-based, strategic approach that focuses investment in water research and innovation on those areas that have direct relevance to Alberta, such as, but not limited to, water quality and flood and drought mitigation. The strategy aims to capitalize and build on strengths that Alberta has established through past investments with the goal of ensuring Alberta's water resource system remains robust. By encouraging the effective mobilization of knowledge-enabling policies, practices, products and services, the strategy functions to capture the benefits of Alberta's investments in water research.

As we have learned throughout this document, the Alberta NAWMP coordinates joint projects, communications, planning and policy support, and it facilitates funding options among the partners. It also supports partner activities through technical and logistical assistance and by advancing innovative ideas through facilitation, funding support and capacity building. An example from the NAWMP that provides technical support and enables capacity building is *Your*

Guide to Making Wetlands Work in Your Municipality (AB NAWMP, 2016). The document is meant for municipal decision-makers engaged in wetland conservation within their municipality. The document encourages the reader to develop a wetland conservation workplan as a first to identify which steps are required, which are priorities, and which can wait. The workplan can also identify sources of funding, including potential grants that might be applied for before work is initiated. Most notably, the documents present the idea that “a wetland conservation workplan may not need its own budget or separate resources” because there can be “benefits to aligning multiple priorities or objectives when facing resource constraints” (AB NAWMP, 2016, pg.16). Within this document, there are suggestions and resources for municipalities to find ways of increasing their capacity to conserve and manage wetlands. Capacity for municipalities, particularly for municipalities with agricultural lands, is an issue that was brought up by many KIs over this research (Appendix 2, 4, and 6)

Chapter 7 Summary of Findings, Recommendations, & Future Directions

7.0 Summary

This thesis project was an exercise in making normative assessments about wetland management planning in Alberta. It is based on studying and evaluating a range of publicly available documents and consultations with water and wetland management professionals. This project aims to identify the elements required in a wetland management program to achieve the wise and sustainable use of wetlands in a regional⁶⁶ setting (Chapter 5) and to establish a baseline for how well these elements integrate into the Alberta context (Chapter 6).

The study identified common elements that could define a framework for managing wetlands in the context of *wise use* to maintain their ecological integrity. The *wise use of wetlands* principle is based on the work of the *Ramsar Convention on Wetlands*. The *Convention* is an international intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and *wise use of wetlands* and their resources (Alberta Water Council [AWC], 2008b). This study adapts international wetland management planning standards to a regional setting. While the project attempts to address the research questions comprehensively, it was limited by capacity, resources, and access to information.⁶⁷ Thus, the project aims only to identify the essential elements available in the Alberta context and evaluate their ability to deliver the *wise use of wetlands* in a regional setting.

This final chapter makes recommendations based on the literature review, KI survey answers, KI feedback responses, and a criteria-based assessment of Alberta's wetland management and policy program. Furthermore, the researcher endeavours to assess the level of implementation of indicators. The criteria and indicators guided the process in a way that may not necessarily measure the true level of an element's performance in the regional context—only that it exists and the degree to which it is employed. KI interviews also helped to balance the limitations of the project and the researcher. This project delivers the first iteration of a planning tool that shows how well the GoA is poised to deliver the *wise use of wetlands* in Alberta and to make recommendations that will enhance that delivery.

⁶⁶ "Region" here refers to a province within a country.

⁶⁷ Within this research there were important issues that were excluded because they were beyond the scope of this project. The following indicators should be included if a second iteration of this project is completed: accountability and transparency; groundwater; data and information needed.

7.1 Elements of a Regional Wetland Management Program

The elements required for a regional wetland management program to support the *wise use of wetlands* are 1. Enabling Environment; 2. Addressing Drivers of Wetland Loss; 3. *Wise Use of Wetlands*; and 4. Enhancing Implementation. Figure 7.1 shows the four elements required in a regional setting to achieve the *wise use of wetlands*. Each element is made up of four indicators, as shown in Figures 7.3 to 7.6. Four levels were used to “measure” the extent to which each element and its corresponding indicators have been recognized in the Government of Alberta’s wetland management and policy program; they are shown in Figure 7.2. Assessment tables are shown in Appendices 8-11. The assessment tables inform recommendations, but recommendations are not solely based on the assessment tables. Recommendations are also based on the literature review, KI responses, and the document analysis and assessment.



Figure 7.1 Elements required to achieve the *wise use of wetlands*. Each element is comprised of four indicators shown in Figures 7.3 to 7.6.

Baseline	<i>Represents an assessment of the wetland management and policy program in Alberta for how it delivers the wise and sustainable use of wetlands according to the criteria and indicators developed in this body of work.</i>
	Indicator is mentioned, defined and a clear implementation plan for the element is included.
	Indicator is mentioned and defined, but no direction or guidance for implementation is given.
	Indicator is mentioned but no definition and/or no further elaboration is given.
	Indicator is not mentioned, not defined, and no further elaboration is given.

Figure 7.2 Legend for Summary of Findings Figures 7.3, 7.4, 7.5, 7.6 and 7.7.

7.2 Summary of Findings and Recommendations

7.2.1 Enabling Environment Summary

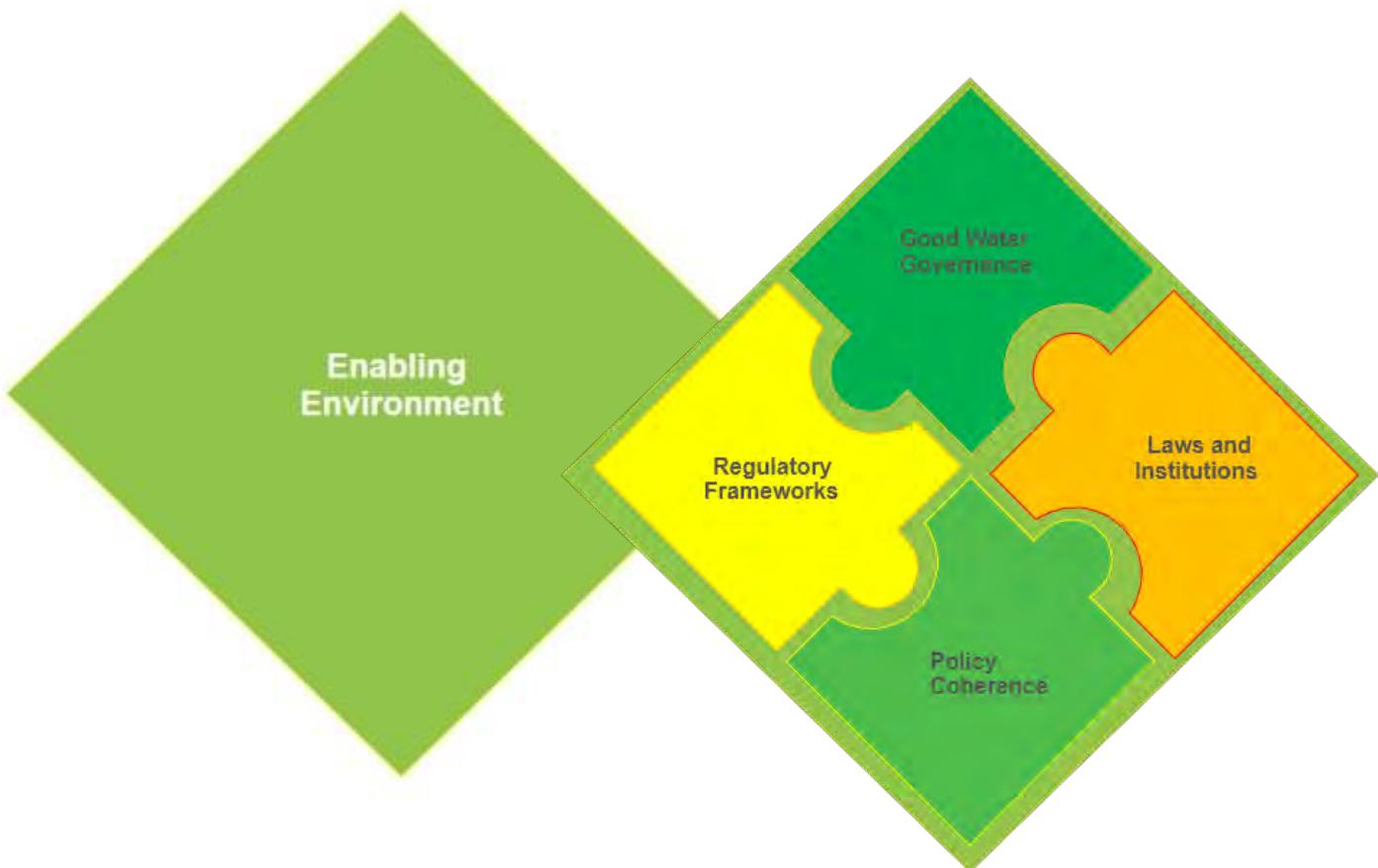


Figure 7.3 Enabling Environment Indicators: Good Water Governance, Laws and Institutions, Policy Coherence and Regulatory Frameworks. These indicators are referenced in detail in Appendix 8, Tables 6.1.1; 6.1.2; 6.1.3; 6.1.4.

The indicators considered for the Enabling Environment criteria in this research are 1. Good Water Governance; 2. Laws and Institutions; 3. Policy Coherence; and 4. Regulatory Frameworks. The document analysis and assessment identified the *Water for Life* strategy as a fundamental approach to guiding Alberta's path toward good water governance. The partnerships identified in the strategy, particularly the AWC, should get the province where it needs to be over time if the council's recommendations are implemented and if outcomes are measured, evaluated and adapted to changing needs. Without these institutional environments and enabling conditions, the *Alberta Wetland Policy* (2013) and the supporting wetland management program will likely not be effective at implementing the *wise use of wetlands*.

Overall, the indicators show that the enabling environment for the *wise use of wetlands* in Alberta is on the path toward improved water governance. But existing laws and regulatory frameworks may not adequately consider the *wise use of wetlands* and require more attention. Clarifying roles and responsibilities about wetland management for all levels of government, partnerships, key industries, agencies, landowners, Indigenous peoples, and citizens would be beneficial for improving coherence and consistency in applying the wetland policy its regulatory tools. KI-8 recommends a full legislative review and explains that “Land and resource use legislation is plentiful and diverse [...] Some acknowledge wetland loss, and some do not. I would recommend a comprehensive review with the goal of ensuring that land and resource development laws acknowledge and address wetland loss” (Appendix 6, pg.2).

Wetland loss remains a significant issue in the province (Clare & Creed, 2014). Before the implementation of the 2013 policy, the GoA managed wetlands with the 1990 interim policy. During this time, interpreting the interim policy goal and direction was at the discretion of approval managers, as were applications to disturb wetlands (Clare et al., 2011). Moreover, the support tools available to enable the interim policy were a patchwork of inventories, the mitigation hierarchy, and the *Provincial Wetland Restoration/Compensation Guide*. As a result of insufficient coordination, policy coherence, and regulatory tools to manage the loss of wetlands due to anthropogenic disturbance, wetland losses continued for at least 23 more years under the interim policy.

Since the 2013 wetland policy implementation, wetland loss issues remain, but the opportunity to identify and address gaps in the regulatory process exists. For example, many KIs discussed the unique needs of private agricultural landowners and municipalities, including compliance and support needs. Stewart (2009) suggests that a municipality’s statutory authority under section 60 of the MGA “needs to be further translated into provincial policy to ensure that municipalities embrace their responsibilities for local “direction, control and management” of wetlands and associated riparian lands and aquifers” (pg.123). Empowering municipalities in this way would show support for wetland conservation by the province. The regulatory process for agricultural or private owners of smaller land parcels should be streamlined to improve reach and compliance. Streamlining the regulatory process for small parcel landowners could take the form of support from an NGO that is familiar with the regulatory process. Increased industrial and urban development across the province will impact wetland retention in the province. Many proponents seeking to disturb a wetland claim that they will apply adaptive management techniques in their management plans, but it is not clear to what extent this is being measured or corroborated (See section 7.2.4 about adaptive management).

The *Alberta Wetland Policy (2013)* aims to “[c]reate a level playing field in terms of regulations and ensure that there is consistency and compliance across all industries” (KI-6, Appendix 2, pg. 2). While it is true that several regulatory and assessment tools, as well as the *Water for Life* strategy, support the 2013 policy, it is not yet clear to what extent wetland losses are adequately considered or decreased. Wetland assessments, inventories, and monitoring actions are only recently coordinated under the regional policy. Addressing private landowner issues, effective and efficient monitoring, and ensuring that adaptive management is actually being employed could improve our knowledge about wetland loss in the province and possibly enhance compliance in the regulatory process.

According to the documents reviewed in this research, the 2013 policy and its associated regulatory tools improve wetland management coherence across the province when compared to the interim policy; however, issues of illegal wetland drainage remain a concern according to the literature and KI interviews and surveys. Continued illegal drainage points to a gap in the regulatory process regarding enforcement and compliance, but policy coherence could also be an issue.

7.2.1.1 Enabling Environment Recommendations

Based on the literature review, KI responses, document analysis and document assessment, the following enabling environment recommendations are provided to improve the GoA's ability to deliver the *wise use of wetlands* in the province:

7.2.1.1a Review laws that impact wetlands to ensure wetlands are clearly and directly included and align to the *wise use of wetlands* principle and associated practices.

7.2.1.1b Clarify roles and responsibilities for wetland management for all levels of government, partnerships, industry, agencies, landowners, Indigenous peoples, and citizens.

7.2.1.1c Streamline the regulatory process for small plot landowners (whether private or agricultural), particularly those with limited resources or agricultural time constraints.

7.2.1.1d Ensure adaptive management techniques are actually employing adaptive management processes by ensuring all proponents who claim adaptive management techniques will be applied in their management plans are held accountable.

Issue	Importance	Recommendation	Responsible Agency	Barriers
Laws that impact wetlands should be revised and improved. (See section 6.1.1 and Appendices 2, 6, and 8)	High	Review laws that impact wetlands to ensure wetlands are included in a clear and direct manner. Coherent policies and coordination across government, industry, stakeholder, landowners, and the public would benefit wetland protection and conservation.	1. GoA - Cabinet - AEP	- GoA priorities - Political agendas
	High	Clarify roles and responsibilities about wetland management for all government, partnerships, industry, agencies, landowners, Indigenous peoples, and citizens.	1. GoA - Cabinet - AEP	-Dependent on review of legislation affecting wetlands.
Consistency and accountability in the application of regulatory frameworks (See Section 6.1.4 and Appendices 2, 4, 6, and 8)	High	Streamline the regulatory process for individuals or agricultural landowners with limited resources or agricultural time constraints.	1. GoA	-Requires additional resources that may not be available
	High	Ensure adaptive management techniques are actually being employed by monitoring all proponents who claim to be using them.	1. GoA - AEP - AER	- Requires additional resources that may not be available

Table 7.1 Recommendations for Enabling Conditions to support the *wise use of wetlands* in Alberta

7.2.2 Addressing Drivers of Wetland Loss Summary

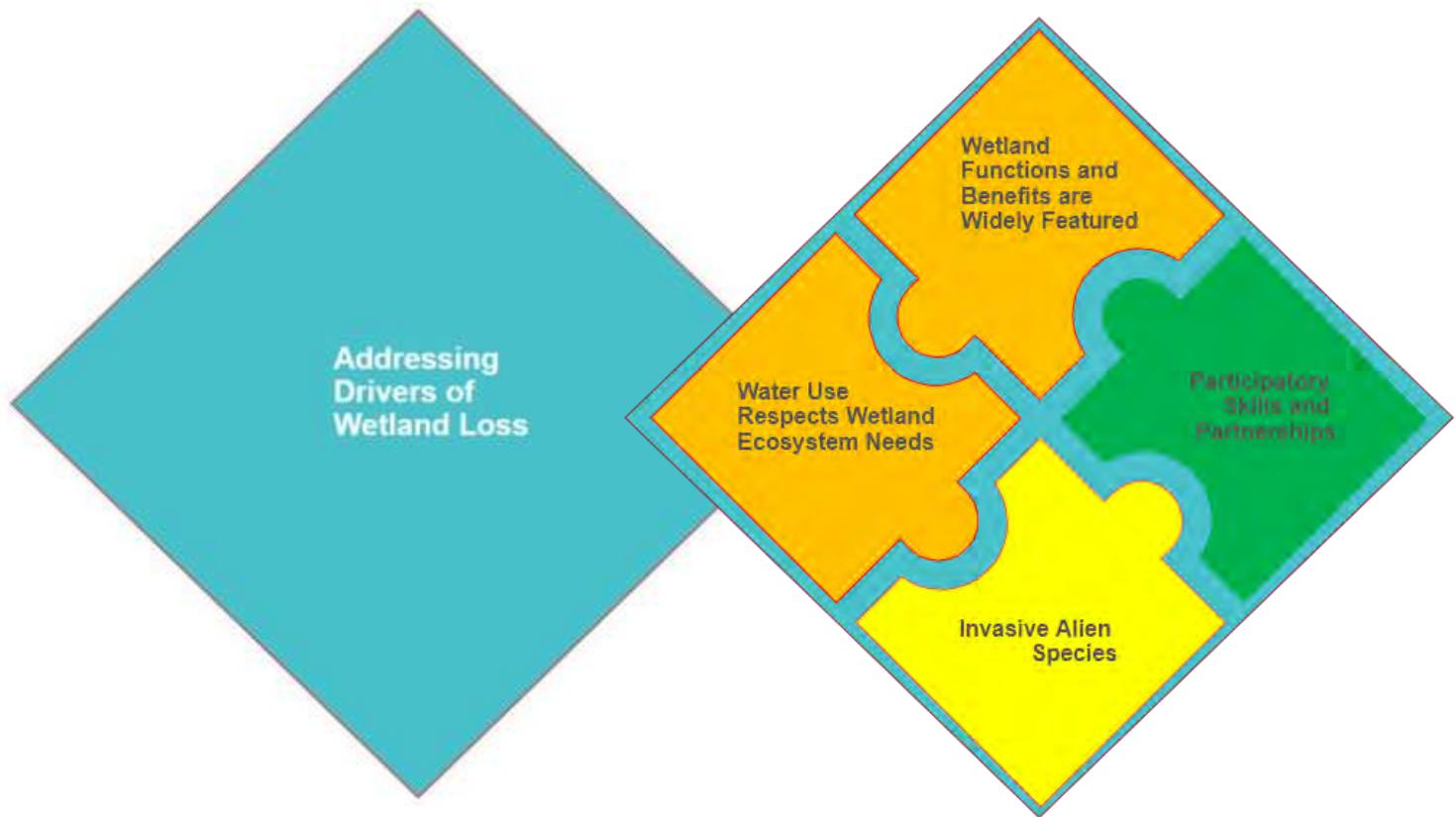


Figure 7.4 Addressing Drivers of Wetland Loss Indicators: Wetland Functions and Benefits are Widely Featured in Plans and Strategies; Participatory Skills and Partnerships, Invasive Alien Species, Water Use Respects Wetland Ecosystem Needs. These indicators are referenced in detail in Appendix 9, Tables 6.2.1; 6.2.2; 6.2.3; 6.2.4

The indicators for *Addressing the Drivers of Wetland Loss* show that water use in the province does not explicitly consider the needs of wetland ecosystems. Mitsch & Gosselink (2015) acknowledge that “the uncertainty in the scientific literature concerning many wetland processes [...] is often closely related to unquantified hydrologic parameters” (pg.155). In Alberta, protecting the ecological integrity of rivers is a priority in the *Water for Life* strategy (AENV; DFO, 2007). However, based on the documents reviewed for this indicator, and understanding that “nothing in the *Water Act* itself requires that the [wetland policy] be considered in approval applications” (KI-8, Appendix 6, pg.2), it seems that water needs for wetland ecosystems are not well understood in the province. Mitsch & Gosselink recommend “careful attention to the quantification of pertinent hydrologic parameters in wetland research studies [...] to improve our understanding of the ecological processes that control wetlands” (pg.155). The opportunity to explore this for wetlands in Alberta is now.

The province's water budget could benefit from understanding more about the hydrology of wetlands in Alberta. But water needs for wetland ecosystems are not directly acknowledged under the current water management framework. While it may not be economically feasible or timely to complete an assessment of water needs for wetland ecosystems in Alberta at the moment, it is possible to identify wetland targets and thresholds for each watershed.⁶⁸ All respondents agreed or strongly agreed with the practice to identify wetland targets and thresholds for each watershed (see section 7.54). One respondent explained that these measures should be a part of LUF plans and that there is a multitude of "ecologically meaningful units" that can be measured from scales as large as the LUF regions to more specific hydrological unit codes (KI 1, Appendix 4, pg. 11). While it is true that these measures are part of the approved LUF regional plans, it is not clear how or when they will be completed. Another respondent identified the WPACs as the group that should take responsibility for identifying wetland targets and thresholds (KI 4, Appendix 4, pg.11).

Most respondents agreed that the recommendation to develop and fund working groups from each WPAC to report on wetlands and best management practices should be implemented (Appendix 4, pg. 14). One primary concern is that wetland monitoring is a science-based practice and requires a certain level of expertise to be carried out correctly. Unless experts volunteer, acquiring high levels of expertise requires funding, which is a significant consideration if WPACs were to take this on, "[WPACs] would need a large infusion of funds" to hire a wetland practitioner to do the work necessary (KI-11, Appendix 4, pg.14). The cost of accessing wetland expertise (e.g., wetland practitioners, qualified professional wetland personnel) is a recurring theme suggesting that access to funding or access to training and education could be improved. One respondent suggested WPACs "may be better suited to provide an oversight/audit role" (KI-1, Appendix 4, pg.14); however, it is possible that professionals capable of participating in these roles can be sought out to volunteer in the WPAC as an expert member. Another respondent expressed interest in joining such a working group. Working groups related to wetlands were formed for the policy planning phase, and since then, the AEP has been charged with the implementation process. The AWC is currently reviewing the *Alberta Wetland Policy* implementation (AWC, 2020), and they could offer support and guidance for WPACs in integrating wetland working groups.

Information about wetland functions and benefits is generally increasing (Appendix 6, pg.3) but it is not sufficiently integrated into plans, policies, and strategies. This is evident in light

⁶⁸ This could mean identifying the number of wetlands required on the landscape at any time to maintain HAE, etc.

of both the interim policy and regional wetland policy's inability to curb unregulated wetland loss in the province.⁶⁹ As mentioned in section 7.2.1, KI-8 recommends “[...] a comprehensive review with the goal of ensuring that land and resource development laws acknowledge and address wetland loss” (Appendix 6, pg.2). Such a review could also integrate more use of the terms and definitions of “wetlands,” “wetlands ecological services,” “wetland biodiversity,” “maintenance of ecological integrity,” and “wise use” in publicly accessible documents relevant to land-use, water management, and wetland management. The inclusion of wetland benefits across Alberta and completing threshold and environmental limits for wetlands in each respective basin would also support the acknowledgement and maintenance of wetland functions and benefits in the province.

Engaging landowners through education and partnerships is well underway in the province, but ultimately the Minister has discretionary power over what happens to water in the province. Without more information about wetland limits and thresholds, wetland management and conservation will remain at the Minister's discretion. Furthermore, KI-4 explains that in terms of working with landowners,

Alberta Agriculture [AG] does a much better job of this type of education and working with landowners than Alberta Environment [AEP]. [AEP] is a very regulatory type of ministry and often does not work well with sharing responsibility and power. As such, I would like to see the wetland policy with shared oversight with [AG] (Appendix 4, pg.4)

The recommendation to split oversight between AEP and AG seems reasonable, but KI-4 also explains that sharing power and responsibility could create tension between the ministries. Thus, due to their established rapport with agricultural landowners, AG should provide education and support to landowners about wetland ecosystem services and benefits on their land and the reality of wetland loss and development processes in Alberta.

Lastly, although the Invasive Alien Species (IAS) indicator received a yellow “grade,” the *Aquatic Invasive Species* program and mechanisms are in place in Alberta. At a minimum, an IAS program does exist in the province.

7.2.2.1 Addressing Drivers of Wetland Loss Recommendations

Based on the literature review, KI responses, document analysis and document assessment, the following recommendations for addressing the drivers of wetland loss are provided to improve the GoA’s ability to deliver the *wise use of wetlands* in the province:

⁶⁹ Effort is being made to reach landowners through wetland restoration and compensation programs, but the documents do not show how provincial plans deal with unregulated wetland loss other than the enforcement and compliance mechanisms that are already in place.

7.2.2.1a Identify wetland targets and thresholds for each watershed.

7.2.2.1b Address wetland ecosystem needs with a coordinated effort by completing the AMBI ecosystem services project.

7.2.2.1c Identify the costs/benefits of wetland ecosystem services in each region and make it public.

7.2.2.1d MA findings can and should be applied to raise awareness of the role of wetlands in securing sustainable water supplies and providing a range of other vital ecosystem services.

7.2.2.1e Expand the education role of Alberta Agriculture about wetland ecosystem services and benefits, wetland loss, and development processes to better engage rural landowners.

7.2.2.1f Develop and fund working groups from each WPAC to report on wetlands and best management practices.

7.2.2.1g More use of the terms and definitions of “wetlands,” “wetlands ecological services,” “wetland biodiversity,” “maintenance of ecological integrity,” and “wise use” in publicly accessible documents relevant to land-use, water management and wetland management.

Issue	Importance	Recommendation	Responsible Agency	Barriers
Water use does not respect wetland ecosystem needs. (See Section 6.2 and Appendix 6)	High	Identify wetland thresholds or wetland environmental limits	1. AEP 2. WPACs	-GoA priorities. -Political agendas.
	High	Address wetland ecosystem needs with a coordinated effort by completing the AMBI ecosystem services project (ESP).	1. AEP 2. ABMI	-Financial
	Medium	Develop and fund working groups from each WPAC to report on wetlands and best management practices.	1. GoA 2. AWC 3. WPACs	-Financial -Access to expertise.
Wetland functions and benefits need to be better integrated into society (See Section 6.2 and Appendices 4, 6)	High	MA findings can and should be applied to raise awareness of the role of wetlands in securing sustainable water supplies as well as providing a range of other vital ecosystem services.	1. GoA 2. NGOs	-Adds complexity to the regulatory process. -Requires additional resources.
	Medium	Identify the cost/benefit of wetland ecosystem services in each region and make it public.	1. GoA 2. AWC 3. ABMI	-Priorities -Resources -Complete ESP first
	High	More use of the terms and definitions of "wetlands," "wetlands ecological services," "wetland biodiversity," "maintenance of ecological integrity," and "wise use" in publicly accessible documents relevant to land-use, water management and wetland management.	1. GoA 2. Wetland 3. NGOs	-Time -Financial
	High	Expand the education role of Alberta Agriculture with regard to wetland ecosystem services and benefits, wetland loss, and development processes to better engage rural landowners.	1. AEP 2. AG	-Coordination -Resources

Table 7.2 Recommendations for Addressing Drivers of Wetland Loss to support the *wise use of wetlands* in Alberta.

7.2.3 Wise Use of Wetlands Summary

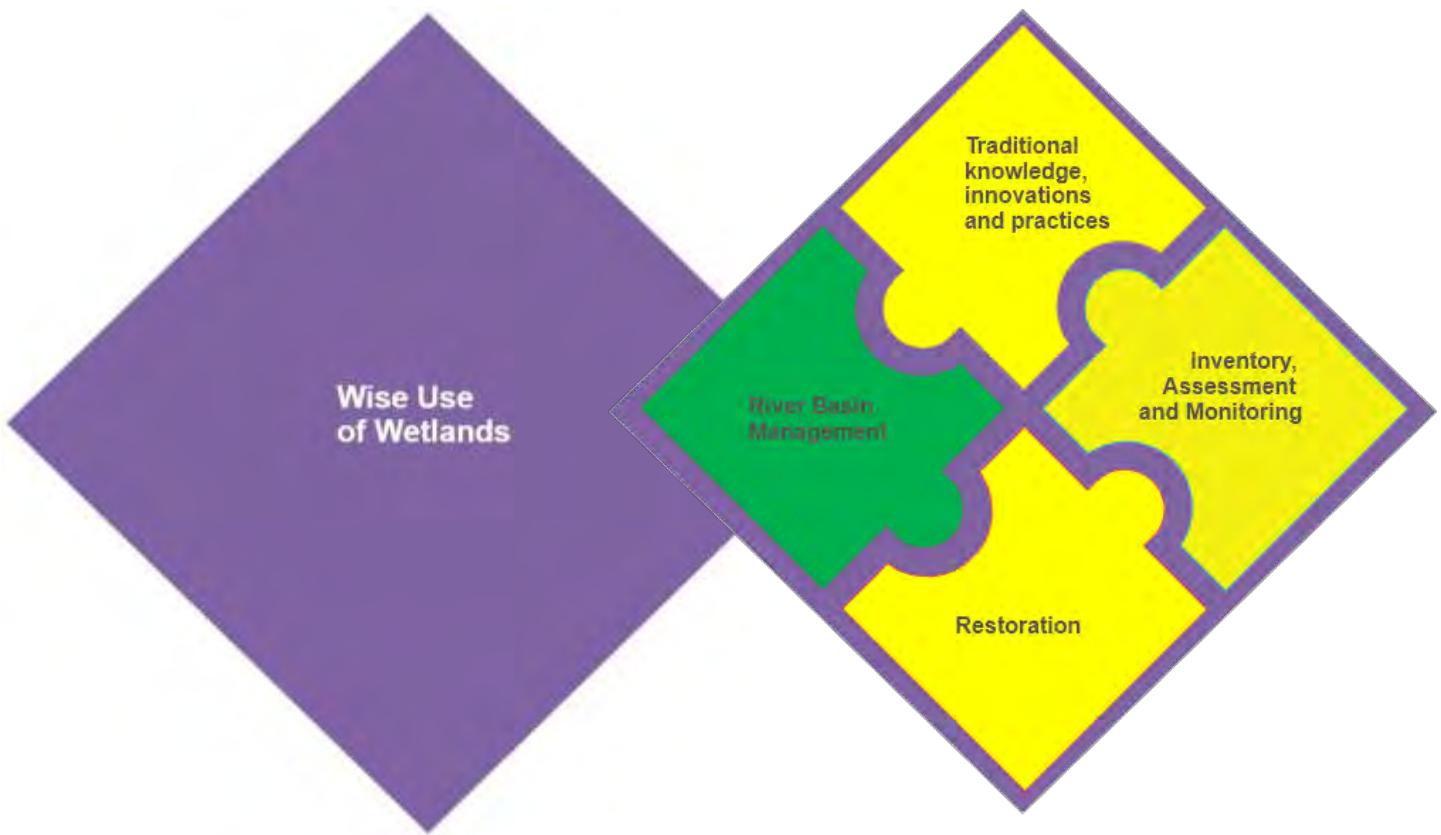


Figure 7.5 *Wise use of wetlands* Indicators: Traditional Knowledge, Innovations and Practices; Inventory, Assessment and Monitoring; Restoration, and River Basin Management. These indicators are referenced in detail in Appendix 10, Tables 6.3.1; 6.3.2; 6.3.3; 6.3.4

The wise and sustainable use of wetlands is an essential aspect of Alberta's wetland management. Still, there is not sufficient guidance or direction for implementation. For example, traditional knowledge, innovations, and practices are fundamental to exercising the wise and sustainable use of wetlands. While Alberta has shown some direction towards integrating Indigenous knowledge and traditions in wetland management, it is not happening across the province. Some Indigenous groups that are engaged in land use planning feel that they are not being heard. For example, concerning the *Biodiversity Management Frameworks* that are to be included in the regional plans, the Fort McKay First Nation offered their critical take on the GoA's proposal:

A review of Aboriginal criteria and indicator frameworks indicated that the framework objectives need to more directly include the objectives of Aboriginal peoples to ensure their voice is heard. Until Aboriginal goals and their relationship with the land are recognized, Aboriginal values will never truly be included in criteria and indicator frameworks. By assuming that Constitutional rights will be protected as a natural extension of protecting the environment, Alberta continues to

misunderstand the nature of Constitutional rights and marginalize the needs of Aboriginal people in land use planning. (Fort McKay First Nation, 2015)

It appears that this is not the first time the GoA has missed the mark on listening to and acknowledging the needs of this particular Indigenous group. It is not clear from the other documents reviewed in this research if the issues raised in the *Draft Biodiversity Management Framework* were ever addressed.

Inventory, assessment, and monitoring could all be separate categories on their own. However, I looked at these as a group for the purpose of the project. Ramsar recommends an integrated framework, “Whenever possible, an integrated inventory, assessment and monitoring programme should be developed and conducted at a single appropriate scale [...]. However, these components are typically planned or undertaken separately” (Ramsar, 2005, pg.6). Work has been done to improve these critical aspects of wetland management in the province, mainly through the ABMI, but the technical and scientific requirements, as well as the cost relative to the amount of money that wetlands “make” ultimately limit the number of people and agencies that can be involved.

The *Wetland Database and Reporting Tool* (WDRT) could improve the inventory, assessment and monitoring of wetlands in Alberta. The WDRT would be a repository for all information about wetlands and their management in Alberta. This tool was already proposed in the *Alberta Wetland Policy (2013)*. The data contained in the tool should include quantitative values of wetland losses, wetland restoration, enhancement, and construction efforts, as well as wetland assessment and monitoring data. The tool could also link regulatory approval information to wetland replacement projects. The database should include financial data about restoration and compensation funds. This tool could serve to improve the management and coordination of wetlands in the province at all levels.

In addition to the WDRT, the *Inventory of Wetland Restoration Opportunities* (IWRO) should be implemented. The IWRO would keep an inventory of drained wetlands and wetland restoration opportunities in the province. These tools were first mentioned in the *Alberta Wetland Policy (2013)*. They could help address unpermitted loss and wetland restoration issues in places other than where the impact occurred initially (Appendix 2). The recommendation to *Develop programs that monitor, and sanction illegally drained wetlands* could be built into the tools or developed on its own (Appendix 4, pg.7).

7.2.3.1 Wise Use of Wetlands Recommendations

Based on the literature review, KI responses, document analysis and document assessment, the following recommendations are provided to improve the GoA's ability to deliver the *wise use of wetlands* in the province:

7.2.3.1a Address concerns and recommendations made by the Fort McKay First Nations in the Draft Biodiversity Management Document.

7.2.3.1b If wetland destruction cannot be avoided, replacement should occur in the same basin near the original impact. If this is not possible, or if another priority area is deemed more urgent, sufficient evidence should be provided to the municipality that will be impacted.

7.2.3.1c Complete the Inventory of Wetland Restoration Opportunities.

Issue	Importance	Recommendation	Responsible Agency	Barriers
It is not clear to what extent traditional knowledge, innovations and practices are integrated into wetland management. (See Section 6.3.1 and Appendix 10)	High	Address concerns and recommendations made by the Fort McKay First Nations in the <i>Draft Biodiversity Management Document</i> .	1. AEP 2. WPACs	-GoA priorities -Political agendas
	High	Work with Office of the Chief Scientist and <i>Indigenous Wisdom Advisory Panel</i> to find solutions or to bridge gaps	1. Office of the Chief Scientist 2. IWAP	-Priorities -Financial
Inventory Assessment and Monitoring should be integrated. (See Section 6.3.2 and Appendix 4, 6, and 10)	High	Complete and release the WDRT proposed in the 2013 policy.	1. GoA 2. AEP	-Financial
	High	Complete the Inventory of Wetland Restoration Opportunities proposed in the 2013 policy.	1. GoA 2. AWC 3. ABMI	-Priorities -Financial
Restoration and compensation practices should be more transparent. (See Section 6.3.3 and Appendix 2, 4, 6, 8, 9, 10)	High	If wetland destruction cannot be avoided, replacement should occur in the same basin near the original impact. If this is not possible, or if another priority area is deemed more urgent, sufficient evidence should be provided to the municipality that will be impacted.	1. GoA 2. AEP	-Status quo -Mitigation -Relative wetland values

Table 7.3 Recommendations for the Wise Use of Wetland to support the *wise use of wetlands* in Alberta

7.2.4 Enhancing Implementation Summary

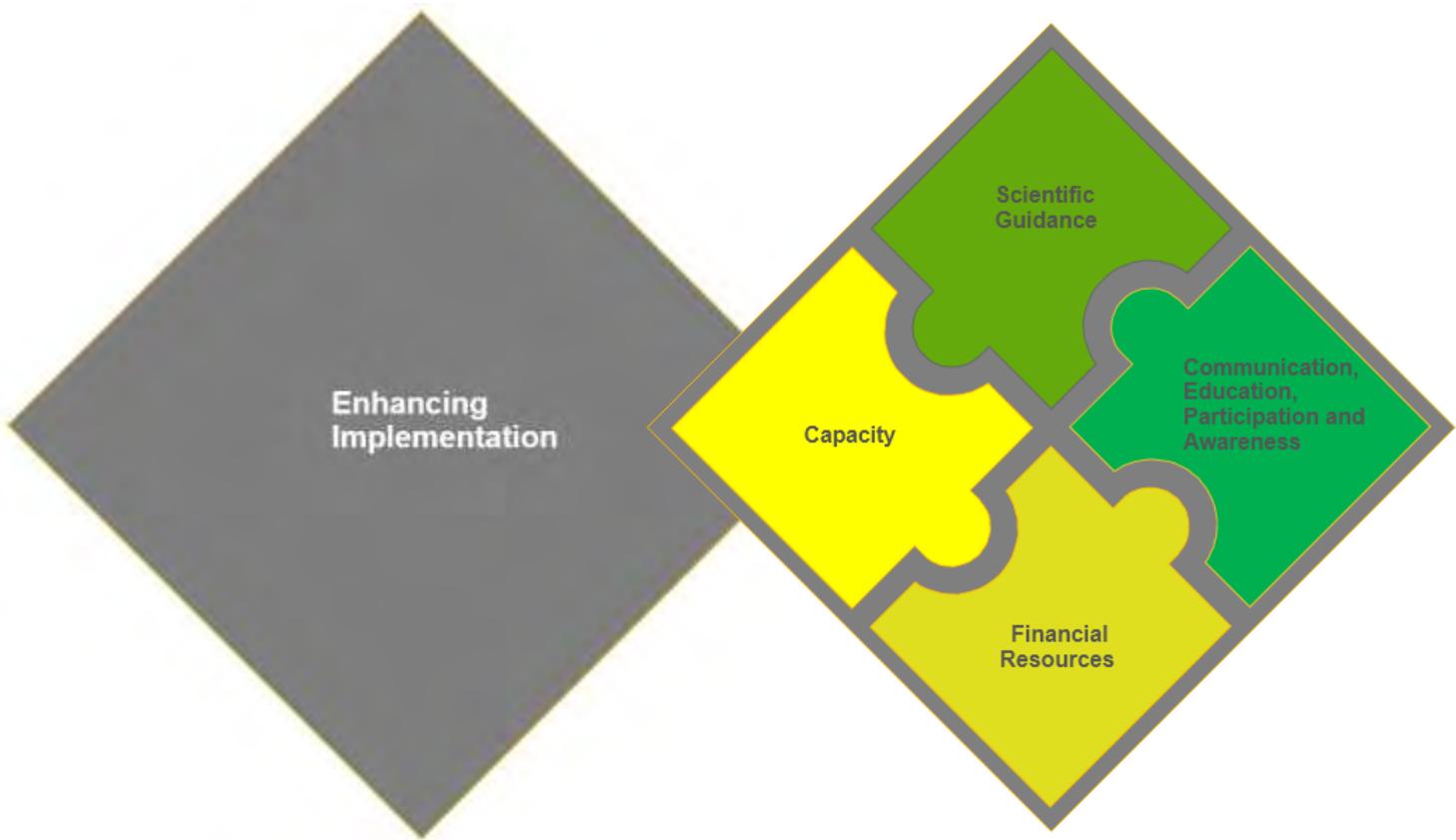


Figure 7.6 Enhancing Implementation Indicators: Scientific Guidance; Communication, Education, Participation and Awareness; Financial Resources; Capacity. These indicators are referenced in detail in Appendix 8, Tables 6.4.1; 6.4.2; 6.4.3; 6.4.4

The Enhancing Implementation criteria indicators suggest that the elements for scientific guidance and wetland CEPA have a strong foundation for supporting the *wise use of wetlands* in Alberta. However, the assumption is that the GoA will implement the Chief Scientist's recommendations as they become available. To date, the lack of effective implementation of the wetland policy is identified as an issue that hinders the achievement of the policy goals and outcomes (Appendix 2, 4, and 6). Adaptive management (AM) has been promoted as the way to deal with the effective implementation of regional land-use policies such as the *Alberta Wetland Policy* (2013). AM is “a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs” (Regional Aquatics Monitoring Program, n.d.). It can also be referred to as *learning by doing*. The Chief Scientist is well-suited to offer scientific evidence to support the execution of AM. AEP can and should be responsible for delivering guidance for and overseeing the effective implementation of AM. Even though AM

is a major strategy for dealing with Alberta's environmental and natural resources, it remains an experimental approach to managing these resources that has yet to be proven effective. In fact,

[adaptive management] can be used as a smokescreen for open-ended and discretionary decision-making that fails to meet legal standards, lacks accountability, and fails to incorporate some of the most important aspects of the adaptive management paradigm.

The *Battle River Watershed Alliance* discusses the benefits of adaptive management as a wetland management practice with the intention of taking an adaptive management approach to managing wetlands within their boundary. The adaptive management process is communicated through diagrams and conceptual frameworks, but actual plans, learnings, and changes to operations as a result of adaptive management are not well recorded in the province (Bruneau, 2017).

The work of many NGOs and partnerships have been supporting wetland CEPA for decades. The *Water for Life* partnerships (i.e., AWC, WPACs, and WSGs) add a level of coherence to these efforts that could be improved by knowing what resources they lack, but it is not clear to what extent they need support or resources. What we do know is that private landowners and rural municipalities could be better supported in wetland management. Organizations like AUMA, DUC, and ALUS can help identify specific issues related to landowners, but it is not clear if their reach is as effective as it could be. Most respondents support action toward innovative programs to manage wetlands on private lands. These programs could include education and public outreach, compensation schemes, tax incentives, and restoration plans that could be beneficial for wetland management in the province. KI-8 supports education and outreach but does not support “[...] reward[ing] landowners for not breaking the law” (Appendix 4, pg.13). Issues with illegal wetland drainage on private lands continue to be a source of concern. One respondent recommended that clarity on crown boundaries when it comes to wetlands and water in the wetlands could be helpful because there is confusion around water licenses and crown ownership of beds and shores. This points to issues related to the boundary and delineation of wetlands. Improving access to best management practices for landowners could be beneficial.

Most respondents agreed that access to wetland management training and wetland restoration education across Alberta could be improved. One respondent was unclear as to who the training would be for, and another respondent said that “[t]here is good training available to those who are interested, particularly regarding wetland assessment and valuation” (KI-1, Appendix 4, pg.15). Many programs exist across various non-governmental agencies, and the respondent recommended looking at the programs holistically to identify opportunities for collaboration and identify gaps. In the research for this thesis, I came across several

opportunities for training related to wetlands; however, many opportunities are located in Edmonton. In addition to professional training, stewardship training and education should be made available to people who are not professionally trained in wetland sciences. Wetland education and training should become accessible to a larger audience to become more involved in the care of wetland habitat. In addition to education, tools such as the www.wetlandsalberta.ca website need to be updated and should be more interactive.

A record of financial resources for agencies like Alberta NAWMP and DUCs are provided in their annual reports. They give some information about where their resources come from and what activities they go toward to support waterfowl habitat and wetland conservation. Now that AEP has taken over collecting wetland compensation funds, there should be a public resource that provides transparency and accountability about how these funds are distributed at the very least, and possibly who they come from and potentially how the amount was calculated. Transparency about how much money comes into the AEP, where it goes, who gets it and why because would be beneficial for improving accountability in wetland management and maintaining accurate records and consistency for data collection. As of today, no such document or tool is publicly available.

AEP writes that Alberta's *Wetland Replacement Program* is an in-lieu compensation program that replaces wetlands in Alberta in an effort to reverse lost wetland value. Historical land use and change over time, hydrology (including water quality and potential pollutants), invasive species and species at risk, biodiversity, human use and values (including socio-economic drivers and cultural values) and regional context are all considered in wetland replacement project proposals and review" (KI-9, Appendix 6, pg.2) which means the information exists and should be made public.

The capacity for delivering the *wise use of wetlands* in the province was not shown to be an issue in the document review. But the capacity of AEP to act as the regulatory authority responsible for the technical and non-technical wetland-related issues across agencies, responsible ministries and wetland management bodies was not clear from the documents or KI responses. KIs identified issues of capacity for municipalities—which substantiates the claim that landowners with wetlands on their lands may not be getting sufficient support for wetland management.

7.2.4.1 Enhancing Implementation Recommendations

Based on the literature review, KI responses, document analysis and document assessment, the following recommendations for enhancing the implementation of the *Alberta*

Wetland Policy (2013) are provided to improve the GoA's ability to deliver the *wise use of wetlands* in the province:

7.2.4.1a More support for rural municipalities to manage wetlands and to decrease wetland losses on agricultural lands.

7.2.4.1b More support and leadership regarding capacity and coordination among landowners and Wetland Restoration Agents.

7.2.4.1c Develop a layperson's version of ABWRET-A and any highly technical documents that could improve wetland management on private lands. Alternatively, make expert advice about ABWRET-A or other technical documents available to rural municipal development officers.

7.2.4.1d Ensure distribution of available materials in areas where wetland loss is high.

7.2.4.1e Determine the extent of support needed by the many NGOs and partnerships supporting wetland CEPA for decades.

7.2.4.1f Develop/continue support for new/existing programs to manage wetlands on private lands, including education and public outreach, compensation schemes, tax incentives, and restoration plans.

7.2.4.1g Improve access to wetland management training and wetland restoration education across Alberta.

7.2.4.1h Transparency about how much money comes into AEP for wetland compensation and restoration, where it goes, who gets it and why would be beneficial for improving accountability and transparency in wetland management.

7.2.4.1i Expand incentives program to pay landowners and farmers to conserve or restore wetlands and riparian areas on their lands in the White Area (as per discussion in Section 4.4).

7.2.4.1j Integrate the recommendations of the Chief Scientist.

Issue	Importance	Recommendation	Responsible Agency	Barriers
Wetland restoration and compensation funds should be more transparent.	High	Transparency about how much money comes into AEP for wetland compensation and restoration, where it goes, who gets it and why would be beneficial for improving accountability and transparency in wetland management.	1. GoA 2. AEP	-Political will -Priorities
Capacity needs should be better identified and supported. (See Section 6.4 and Appendices 2, 4, 6, 9, 10 and 11)	High	More support for rural municipalities to manage wetlands and to decrease wetland losses on agricultural lands.	1. GoA 2. AEP 3. AG 4. AUMA	-Financial -Siloes
	High	Support and leadership for capacity and coordination among landowners and WRAs.	1. Federal 2. GoA 3. AEP	-Financial
	High	Expand incentives program for landowners.	1. GoA 2. AEP	-Financial
	Medium	Develop a layperson's version of ABWRET-A and technical documents that could improve wetland management on private lands or make expert advice readily available to rural municipal development officers.	1. GoA 2. AWC 3. ABMI	-Priorities -Financial
	Medium	Ensure distribution of available materials and follow-up in areas where wetland loss is high.	1. AEP	-Logistics -Resources
	Medium	Determine the extent of support needed by the many NGOs and partnerships supporting wetland CEPA for decades.	1. AEP 2. NGOs	-Planning -Resources
	Medium	Develop/continue support for new/existing programs to manage wetlands on private lands, including education and public outreach, compensation schemes, tax incentives, and restoration plans.	1. GoA 2. AEP 3. AWC 4. WPACs 5. WSGs	-Financial -Planning -Priorities
	Medium	Improve access to wetland management training and wetland restoration education across Alberta.	1. GoA 2. AEP 3. NGOs	-Resource allocation -Logistics

Table 7.4 Recommendations for Enhancing Implementation of the Alberta wetland management program to support the *wise use of wetlands* in Alberta

7.3 Directions for Future Research

Many opportunities exist for implementing the wise use of wetlands to deal with wetland loss, preserve remaining wetlands, and restore Alberta's degraded wetlands. The tool presented in this thesis could serve as a way to improve the adaptive management of wetlands in the province. For example, it could be designed to include specific, measurable outcomes which would ultimately support regional planning in the province. The tool could also be developed into a live database or a software program that enables users to see the current status of wetland management elements, view and assess gaps in the wetland management program, and allocate resources to where they are most needed. This tool could also be applied in and adapted to other provinces where they may not have a wetland management program but are looking to begin one or further develop an existing program. The technical skills and resources required for this task would be formidable, but they would fully support the wise and sustainable use of wetlands. As we have learned, keeping these complex aquatic resources intact is both a short-term necessity and a long-term investment for the future.

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Sector	Organization	Participant	Refusal or No Response	Total Contacted
Education	Research	1	5	6
Government	Provincial	1	3	4
Government	Municipal	1	1	2
Government	Regulator	1	0	1
Private	Diverse	2	6	6
NGO	Environmental	2	1	3
NGO	Regional	3	14	17
Law	Law	1	1	2
Total		12	31	41

Appendix 1A. Composition of participants

1 A Cost Assessment of Ecosystem Services Procurement Using Three Mechanisms	51 Guidelines for Wetland Establishment on Reclaimed Oil Sands Leases
2 A Guide for Developing State of the Watershed Reports in Alberta	52 How Can We Restore Your Wetland? (Alberta Living Laboratory Wetlands Project)
3 A Guide to Municipal Wetland Conservation	53 Incorporating Wetland Carbon Values into Spatially Explicit Tools to Inform Land Use Decisions
4 AB NAWMP 2018-19 Progress Review	54 Indicators for Assessing Environmental Performance of Watersheds in Southern Alberta
5 Advancing Citizen Science in Alberta	55 Indigenous Wisdom Advisory Panel (IWAP)
6 Alberta Amphibian Monitoring Program	56 Institute for Wetland and Waterfowl Research
7 Alberta Aquatic Invasive Species Early Detection Rapid Response Plan	57 Invasive Weed & Disturbance-caused Undesirable Plant List For Use in Riparian Health Assessment and Inventory in Alberta
8 Alberta Aquatic Invasive Species Program Annual Reports	58 Knowledge for a Changing Environment: 2019-2024 Science Strategy
9 Alberta Biodiversity Monitoring Institute Strategic Plan: 2020-2023	59 Land-Use Framework
10 Alberta Conservation Association Annual Report 2019/20	60 Ministry of Environment and Parks Annual Report
11 Alberta Conservation Association Habitat Program Agreement	61 Municipal Government Act
12 Alberta Conservation Information Management System (ACIMS)	62 Policy on Consultation with First Nations on Land and Natural Resource Management (2013)
13 Alberta Energy Regulator website	63 Prairie Habitat Joint Venture/Western Boreal Joint Venture
14 Alberta Environment and Parks Business Plan	64 Prairie Habitat Monitoring Program
15 Alberta Invasive Alien Species Management Framework Draft	65 Professional responsibilities in completion and assurance of wetland science, design and engineering work in Alberta
16 Alberta Land Stewardship Act	66 Provincial Ecological Criteria for Healthy Aquatic Ecosystems (could this be referred to in recommendations?)
17 Alberta NAWMP 2018 Forum	67 Reclamation and Restoration of Land and Water
18 Alberta NAWMP Education Network	68 Recommendations for Water for Life
19 Alberta River Basins Online Tool	69 Recommendations to Improve Aquatic Invasive Species Management in Alberta (2016)
20 Alberta Surface Water Allocation Directive	70 Standard monitoring protocols for evaluating wetland performance for constructed 'habitat' wetlands
21 Alberta Water Council Business Plan	71 Stepping Back from the Water
22 Alberta Water Tool (AWT)	72 Strategy for the Protection of the Aquatic Environment
23 Alberta Wetland Assessment Impact Report Directive (2017)	73 Strengthening Invasive Plant Management in Alberta
24 Alberta Wetland Classification System Field Guide	74 University of Alberta Land Institute Living Laboratory Wetlands Project
25 Alberta Wetland Policy document and Implementation website	75 University of Alberta Land Institute website
26 Alberta Wetland Policy Implementation Review	76 Water Act
27 Alberta Wetland Rapid Evaluation ToolActual (ABWRET-A) Guide	77 Water for Life Implementation Review
28 ALUS website	78 Water for Life program webpage
29 Biodiversity Conservation Guide for Farmers	79 Water for Life: A Renewal
30 Biodiversity Management Framework and Regional Plans	80 Water for Life: Action Plan
31 Brokering science for environmental management: progress report from the Chief Scientist: a term in review	81 Water Innovation Program
32 Compliance Assurance Management Framework	82 Water Quest website
33 Consensus Decision-Making Toolkit	83 Water Research and Innovation Strategy
34 Cow's and Fish (Alberta Riparian Habitat Management Society) website	84 Water Use Reporting (WUR) Tool
35 Culturally Important Wetland Plants Project	85 Watershed Planning and Advisory Council webpage
36 Desktop Method for Establishing Environmental Flows in Alberta Rivers and Streams	86 Watershed Resiliency and Restoration Program Prioritization
37 Ducks Unlimited Canada Annual Report	87 Watershed Stewardship Group webpages
38 Ecosystems Services Assessment Project (ABMI)	88 Wetland BMP Knowledge Exchange
39 EDDMaps	89 Wetland Mapping Standards and Guidelines: Mapping Wetlands at an Inventory Scale
40 Electronic Disposition System (EDS)	90 Wetland Mitigation
41 Enabling Partnerships: A Framework in Support of Water for Life	91 Wetland Policy Implementation Plan
42 Environmental Protection and Enhancement Act	92 Wetland Regulatory Requirements Guide
43 Fish Conservation and Management Strategy for Alberta	93 Wetland Replacement Program
44 Fort McKay Sustainability Department website	94 Wetland Restoration Agents
45 Framework for Water Management Planning	95 Wetland Restoration Directive
46 GeoDiscover	96 Wetland Restoration Program website
47 Government of Alberta Communications Policy	97 Wetland Stewardship website
48 Guide to Watershed Management Planning	98 Wetlands AB website
49 Guide to Watershed Management Plans	99 Wetlands and their Benefits: Review and Synthesis of Tools and Models [...]
50 Guidelines for the approval and design of natural and constructed treatment wetlands for water quality improvement	100 Your Guide to Making Wetlands Work in Your Municipality

Appendix 1B. Documents and sites accessed and applied to criteria

What is your position?	# Yrs Exp	Q5A	
		Will the new wetland policy....	
1 Landscape Ecologist	13	Protect AB wetlands	
		Agree	Comments: It is not clear to what extent avoidance through alteration of site locations will be supported by the regulators. Implementation included commitments to reclamation.
2 Executive Director	20	Disagree	
3 Skipped	Skipped	Skipped	
4 Research, GIS, and Stewardship Coordinator	2	Partially Agree	Comment: It really depends on how strongly they (Alberta Environment and Parks) adhere to wetland avoidance as the primary response to applications.
5 Watershed Coordinator	5	Agree	Comment: The policy lacks a no net loss approach but otherwise provides good protection granted that implementation.
6 National Policy Analyst	3	Partially Agree	Comment: Unlike the interim policy, the new policy applies to the whole province. It can protect Alberta's wetlands, but only if it is effectively implemented.
7 Coordinator - Alberta	20	Agree	Comment: Directly, it will reduce but not eliminate unregulated wetland loss. Indirectly, it provides clear priority and direction on wetlands to all other Government of Alberta Ministries
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree	Comment: The policy will protect some wetlands, but others will not be protected. It is not overall a no net loss (NNL) policy, though the policy allows for NNL on a regional level.
9 Professor Emerita, Adjunct	20		
10 Agricultural Conservation Coordinator	2	Disagree	Comment: I believe that the new wetland policy allows wetlands to be drained. In return for the drainage, developers (industry, agriculture, urban development, etc.) need to either restore a wetland of specific size and value according to a relative value table, OR, pay a compensation fee. The policy does not value the existence of a wetland to its direct surrounding environment, it will allow it to be drained, and the direct value will be lost. The restoration may occur in an entirely different area. Compensation paid to a Wetland Restoration Authority is great, however, WRAs must seek out potential restoration opportunities. In order to perform many restorations, a private landowner must AGREE that restoring a wetland will provide the landscape (and most importantly, the owner) with a benefit. Finding landowners willing to restore wetlands is the hard part, and is restrictive to the ability of the wetland policy to fulfill its purpose. I foresee the loss of many wetlands on the landscape in a rural municipality such as my own, with little possibility for equivalent restoration within its boundaries.
11 President, AND President 12 Landowner	22	Agree	
	Skipped	Disagree	

Q5B		
Will the new wetland policy....		
Value all stakeholder input equally		
What is your position?	# Yrs Exp	
1 Landscape Ecologist	13	Agree Comments: Input was during the policy development stage that included publicly available workbooks.
2 Executive Director	20	Disagree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Agree Comment: Challenges with wetlands on the agricultural landscape was not addressed, and to my knowledge, has not been dealt with.
5 Watershed Coordinator	5	Agree Comment: There is always a challenge accounting for Aboriginal values in our present system.
6 National Policy Analyst	3	Agree Comment: I believe that most major stakeholders were consulted during policy design. The policy tries to create a level playing field in terms of regulations and ensure that there is consistency & compliance across all industries.
7 Coordinator - Alberta	20	Strongly Agree Comment: It's origin was from 25 stakeholders under leadership of the Alberta Water Council
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Disagree Comment: I understand this question to mean that the policy reflects all stakeholder input equally. I do not know what it means to say that the policy values input. Since stakeholder views are at times opposed, it is not possible for the policy to reflect or incorporate all stakeholder views equally.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comment: Agricultural producers are consistently awarded additional privileges when it comes to Alberta-wide reduction of environmental impact. Cumulatively, the impact of farms is substantial; certainly the case when it comes to wetland loss. Developers and other industry will no doubt be forced to comply with the new policy, while agricultural producers seem to experience a much lower risk of enforcement. I don't believe that the Government of Alberta has the ability to enforce the Wetland Policy as it pertains to rural Alberta. Many farms will continue to drain wetlands for agricultural profit, and it will go unnoticed. I feel that the responsibility is left too heavily on the municipality to enforce such legislation, a responsibility that is not valued to the same degree across different municipalities. If some stakeholders in wetland loss and protection are asked to comply with the new policy, there must be some mechanism in place to ensure that ALL stakeholders are held to the same standard.
11 President, AND President Landowner	22	Strongly disagree
	Skipped	Disagree

Q5C Will the new wetland policy.... balance economy, enviro, society		
What is your position?	# Yrs Exp	
1 Landscape Ecologist	13	Agree Comments: Allows development within wetlands while considering alternatives and providing compensation.
2 Executive Director	20	Strongly disagree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Agree Comment: I think that societal concerns and values have been taken into account.
5 Watershed Coordinator	5	Strongly agree
6 National Policy Analyst	3	Partially Agree Comment: The wetland policy and the wetland impact mitigation directives still seem to favour economic development over environmental protection. The policy is enabled by the Water Act which was not intended to "protect water bodies" - instead, it is a legislation that governs activity in water bodies and therefore doesn't offer sufficient legislative authority that would enable full wetland protection.
7 Coordinator - Alberta	20	Strongly Agree Comment: Yes, it does provide balance. It discourages wetland loss by a regulated requirement to replace what is impacted.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comment: The environmental value of wetlands, and the fate of their existence, will still be subject to economic preference. The wetland policy simply adds an additional fee for development, and decision-making will still occur based on profitability. I believe that in order to decrease wetland loss in the province, protection of wetlands will need to be made into an enforceable law to be effective. In my experience, when it comes to the profitability of the agricultural sector, economic incentive is not enough to ensure that societal and environmental values are upheld.
11 President, AND President Landowner	22	Partially agree
	Skipped	Strongly Disagree

Q6

What is your position?	# Yrs Exp	I am familiar with interim policy
1 Landscape Ecologist	13	Partially Agree Comments: Not familiar with all aspects but have read the policy.
2 Executive Director	20	Partially agree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Partially Agree Comments: My research has focused primarily on the new policy, though I am aware of it.
5 Watershed Coordinator	5	Partially Agree
6 National Policy Analyst	3	Agree
7 Coordinator - Alberta	20	Strongly Agree Comments: Yes, I am. I attended public consultations on it at that time
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Strongly Agree
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: I studied the interim policy in my Bachelor's degree, but did not experience it in practice.
11 President, AND President	22	Strongly Agree
12 Landowner	Skipped	Agree

Q7

What is your position?	# Yrs Exp	I am familiar with draft policy for peatlands
1 Landscape Ecologist	13	Disagree
2 Executive Director	20	Disagree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Partially Agree Comments: My research has focused primarily on the new policy, though I am aware of it.
5 Watershed Coordinator	5	Partially Agree
6 National Policy Analyst	3	Disagree
7 Coordinator - Alberta	20	Strongly Agree Comments: Yes, I am
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Strongly Agree
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: I studied the policy in my Bachelor's degree, but did not experience it in practice.
11 President, AND President	22	Partially Agree
12 Landowner	Skipped	Agree

Q8

What is your position?	# Yrs Exp	There are existing laws and regulations in Alberta that hinder wetland protection.
1 Landscape Ecologist	13	Partially Agree Comments: Main concern is agricultural development, both via cultivation and herbicide use.
2 Executive Director	20	Partially agree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Partially Agree
5 Watershed Coordinator	5	Agree
6 National Policy Analyst	3	Agree Comments: As mentioned earlier, the Water Act wasn't designed or intended to protect wetlands or other water bodies. Other Acts may do a better job at protecting wetlands like Alberta Land Stewardship Act (ALSA). The Municipal Government Act was just recently modernized and it changes the definition of water bodies that may actually hinder wetland protection at the local level.
7 Coordinator - Alberta	20	Partially Agree Comments: Hinder may be too strong. Best framing is that there is a need to better align intent and terminology with other Acts (e.g. MGA)
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Strongly Agree
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Agree
11 President, AND President	22	Partially Agree
12 Landowner	Skipped	Agree

Q9

What is your position?	# Yrs Exp	The approval process is significantly improved by the new policy.
1 Landscape Ecologist	13	Strongly Agree Comments: To be correct, implementation mechanisms and tools to support the policy are a significant improvement.
2 Executive Director	20	Disagree
3 Skipped	Skipped	
4 Research, GIS, and Stewardship Coordinator	2	Not applicable I am not directly involved with wetland approvals or the process, so I'm not sure.
5 Watershed Coordinator	5	Agree
6 National Policy Analyst	3	Partially Agree Comments: The approval process is more standardized but some of the new policy directives have created some implementation challenges for industry in terms of increased costs, time requirements and expertise
7 Coordinator - Alberta	20	Agree Comments: The new approval process is more complex and comprehensive, but slower as a result. Yes it's improved, if your criteria includes 'does it honour the core concept that wetlands provide important ecological services and therefore should be protected?'.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: The policy has not been incorporated into law so as to require compliance with it when a proponent seeks a Water Act approval or licence that could impact a wetland. However, the policy apparently is being incorporated into those processes - e.g. as a condition of an approval.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comments: The approval process appears to be the same. I have been told, by Government of Alberta Environment and Parks staff, that unless a wetland has been put under protection by a municipal land-use bylaw, there is a very low chance that an application for approval of alteration of the wetland will be denied. The new policy seems to have only made the compensation process for alteration of a wetland more robust yet complicated.
11 President, AND President	22	Strongly Disagree Comments: The policy is theoretical while the directives and guides are practical. This being said the policy has nothing to do with the approval process. This process is severely understaffed and with the new application requirements and flood recovery the process is worse than ever.
12 Landowner	Skipped	Disagree

Q10

What is your position?	# Yrs Exp	The policy provides the tools and knowledge to support wetland management needs into the future.
1 Landscape Ecologist	13	Strongly Agree Comments: The key is that the policy and implementation support awareness and force consideration in planning. Integration across enactments is fundamental..
2 Executive Director	20	Partially agree
3 Skipped	Skipped	
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Agree
6 National Policy Analyst	3	Partially Agree Comments: This is still ongoing. Many tools that would help with wetland management are still being developed. For example, the wetland inventory is still incomplete. More capacity is needed at the municipal level to ensure better wetland management. Capacity is also an issue for the agricultural sector.
7 Coordinator - Alberta	20	Agree Comments: Yes, it has made good progress on tools and knowledge. The reality is that all the tools and knowledge required to do this well are major undertakings (e.g. wetland inventory), so only so much is possible in the short term.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: The GOA has developed some useful implementation tools and information in conjunction with the policy.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comments: If wetland management needs means allowing people to simply remove and place wetlands as they choose and as it benefits development, then yes, the policy certainly has provided more tools. It leaves little wetland management responsibility to the natural environment. Wetlands will be managed for maximum economic benefit rather than for maximum ecological service.
11 President, AND President	22	Agree
12 Landowner	Skipped	Strongly Disagree

Q11

What is your position?	# Yrs Exp	A cumulative effects-based management approach is made possible with the new policy.
1 Landscape Ecologist	13	Disagree Comments: The policy does not inhibit an CE approach, but CEA is something different. CE is supported to some extent by considering abundance in wetland valuation.
2 Executive Director	20	Partially agree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Agree Comments: There is the interdepartmental challenge for GoA but there is also the challenge of coordinating and backing municipal wetland management efforts.
6 National Policy Analyst	3	Partially Agree Comments: The policy is supposed to be in alignment with the Land-Use Framework. Because many of the wrinkles are still being ironed out (in terms of tools, databases, knowledge sharing etc.) cumulative effects management with respect to wetlands is still a significant challenge. But, yes it is possible once these tools are in place and the government has enabled its municipal and industry partners to think about wetlands from a cumulative effects management perspective.
7 Coordinator - Alberta	20	Agree Comments: Conceptually, yes. Cumulative effects is a complex concept that will take time to connect in a practical way with the many streams that feed it (i.e. wetlands are only one of many streams).
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: Policy implementation will engender greater knowledge about Alberta's wetlands, generate inventories, and in other ways will support cumulative effects management. However the policy does not direct that a cumulative effects management approach be adopted.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comments: I have seen nothing in the Wetland Policy that alludes to applications for wetland drainage being denied based on a high rate of historic wetland loss in the area. It seems to me that cumulative-effects management will be the responsibility of the municipality.
11 President, AND President	22	Partially Agree Comments: This may be the case, but it is not well described how this will be achieved. Additionally, at this early stage glitches in the process are still being worked out
12 Landowner	Skipped	Disagree

Q12

What is your position?	# Yrs Exp	Experts were consulted and their knowledge incorporated successfully into the new policy.
1 Landscape Ecologist	13	Strongly Agree Comments: Core team included a large cross section of interests and expertise, and consultation included leading academic experts and watershed groups.
2 Executive Director	20	Agree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Strongly Agree
6 National Policy Analyst	3	Partially Agree Comments: A lot of resources, expertise, science and research went into the design and implementation of the new policy. However, there are political factors that make implementation an ongoing challenge. For example, the agricultural sector needs to be better engaged to ensure that they are aware of the policy and have the right tools to meet its requirements.
7 Coordinator - Alberta	20	Agree Comments: This is my understanding. The Alberta Water Council that helped shape the policy in a significant way certainly included experts. Its actual development occurred in 'fits and starts' over a 20+ year time period.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: The process leading to the new policy was long and complex. Experts were consulted, there was a Water Council Wetlands Committee struck to help develop a new policy, but despite their long and hard work, their report was not consensus-based. The GOA then began a new process to develop the policy that was not, in any obvious sense, multi-stakeholder-based. It must be assumed that experts were consulted during this process, however it is not clear, at least to me, how their knowledge was incorporated into the new policy.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: I am not 100% familiar with how the Wetland Policy was created. More information-gathering needed on my part to properly answer this question.
11 President, AND President	22	Disagree Comments: This is likely the biggest drawback in the policy. A LOT of new guidance and processes were introduced and some experts were hired to help create the documents.
12 Landowner	Skipped	Disagree

Q13

What is your position?	# Yrs Exp	The goal of the Alberta Wetland Policy is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy. The overall policy goal is achievable.
1 Landscape Ecologist	13	Partially Agree Comments: Require monitoring of outcomes to determine if this is being achieved through land use decisions.
2 Executive Director	20	Agree
3 Skipped	Skipped	Skipped
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Strongly Agree
6 National Policy Analyst	3	Partially Agree Comments: The policy goal is achievable if the appropriate tools, resources and partnerships are in place to help its implementation. In Alberta, to achieve this goal a broader societal change is needed. A policy in itself is not enough. Members of the public, industry stakeholders and various levels of government need to recognize the value of wetlands and the importance of conserving them. THis will take quite some time...but it's not impossible.
7 Coordinator - Alberta	20	Strongly Agree Comments: Yes: it's a strong policy signal on government prioirty and direction. Without it, wetlands would be ignored.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: The goal is achievable if the GOA aggressively seeks to realize it. However the policy is not no-net loss, and is not law. If the government does not aggresively seek to realize the goal the goal will not be achieved.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comments: I fail to see how the wetland policy will protect Alberta's wetlands and sustain the benefits they provide to the environment, when the policy has allowed the drainage of wetlands for a fee or replacement in a different location. I would hope that the financial burden of correctly following the application process and compensation schedule would be enough to mitigate loss of wetlands, but I fear it will only result in non-compliance with regulation. In rural Alberta, the risk of enforcement for private landowners is too low.
11 President, AND President	22	Strongly Agree
12 Landowner	Skipped	Partiaiy Agree

Q14

What is your position?	# Yrs Exp	The policy will focus on the following outcomes:a. Wetlands of the highest value are protected for the long-term benefit of all Albertans. b. Wetlands and their benefits are conserved and restored in areas where losses have been high. c. Wetlands are managed by avoiding, minimizing, and if necessary, replacing lost wetland value. d. Wetland management considers regional context.The policy outcomes are aligned with the overall goal mentioned in the previous question.
1 Landscape Ecologist	13	Strongly Agree Comments: There is a recognition that there will be disturbances to wetlands as part of land use, and attempts to leverage that into replacement in areas where historical losses have been high.
2 Executive Director	20	Agree
3 Skipped	Skippe	Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Agree Comments: These policy outcomes are trying to balance the economic, social and environmental factors of human development activities and land-use management. While these outcomes are aligned with the overall goal, achieving these outcomes is quite challenging in practice.
7 Coordinator - Alberta	20	Stongly agree
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree
11 President, AND President	22	Strongly Agree
12 Landowner	Skipped	Strongly Agree

Q15

What is your position?	# Yrs Exp	There are issues that the policy does not adequately address.
1 Landscape Ecologist	13	Agree Comments: The policy does not identify protected wetlands in spite of that being imbedded in its goals.
2 Executive Director	20	Agree
3 Skipped	Skipped	Strongly Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Partially Agree Comments: The policy itself is quite vague so it is difficult to pinpoint which issues that it does not adequately address. You could argue that the policy's focus on "permanent" wetland loss allows for temporary loss of important ecological goods and services, which in turn may undermine the overall policy objectives and goals of the policy.
7 Coordinator - Alberta	20	Partially Agree Comments: The policy captures the important high-level principles that a policy should. There will be issues that emerge and the policy will need to address as it evolves.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Agree Comments: E.g., the role of municipalities in wetland management (it should be an important, and provincially recognized role); how to protect wetlands that do not score high in the relative wetland value (e.g. not significant biodiversity because of the nature of the landscape) but should be protected in any event; how to incorporate the policy in law; others
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Strongly Agree Comments: Such as agricultural private land enforcement, and allowance of wetlands to be taken from the landscape. The policy does not align with the idea that all wetlands play an important role to their immediate surrounding ecosystem.
11 President, AND President	22	Strongly Agree Comments: Particularly in the White Management Area of Alberta and specifically private landowners
12 Landowner	Skipped	Strongly Agree

Q16

What is your position?	# Yrs Exp	Q16 The new wetland policy was designed based on sound best management practices.
1 Landscape Ecologist	13	Strongly Agree Comments: The policy is based on a hierarchy starting with avoidance. BMPs are more applicable to individual development proposals. The policy is based on wetland values, which goes beyond BMP, but rather is world leading.
2 Executive Director	20	Partially Agree
3 Skipped	Skipped	Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Agree Comments: Not sure what you mean by this question, but yes the policy hopes to (at the very least) incentivize and promote sound management practices when it comes to wetlands.
7 Coordinator - Alberta	20	Yes
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Disagree Comments: Depends on what "sound best management practices" applies to. The policy is largely back end - it applies when a wetland is slotted for some kind of development, accordingly the policy does not focus on the preservation and management of wetland values prior to the approval stage. The policy mentions best management practices with respect to minimization. It is expected and hoped that GOA implementation materials will incorporate sound best management practices.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree
11 President, AND President	22	Agree Comments: Again, there should be some clarity in the question that separates the policy from the directives.
12 Landowner	Skipped	Strongly Disagree

Q22

What is your position?	# Yrs Exp	Relative Wetland Value is an important aspect of the new policy
1 Landscape Ecologist	13	Strongly agree Comments: It is one of the foundational concepts.
2 Executive Director	20	Strongly agree Comments: Part of the relative value might be a sliding scale. As wetlands become increasingly scarce their value goes up.
3 Skipped	Skipped	No
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Agree Comments: Unlike the interim policy which used an "acre-based" approach when trying to mitigate wetland loss, the new policy adopted a "value-based" or a "functions-based" approach. So yes, relative wetland value is an important new development.
7 Coordinator - Alberta	20	Strongly Agree Comments: Yes: if a principle is to protect those wetlands of highest quality (i.e. relative value), then you need a means to assess that.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Agree Comments: It is very important, though I do not necessarily agree with the approach and it can be difficult and expensive for those who wish to preserve wetlands in the public interest to establish evidence for RWV.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: I believe there were good intentions in defining relative values, however, it made the whole process significantly more confusing. Putting such an emphasis on wetlands with high relative value gives the impression that low relative value wetlands can be eliminated. The whole policy rides on the idea of relative wetland value for the lengths we will go to for conservation. Will development now show a preference for removal of many low relative value wetlands? Does that mean we will get hit harder with wetland loss in the pothole region? If someone comes up with an effective way to restore a peatland, they will be able to rake up WRA funds. Will we see increased wetland loss in the South and restoration in the North?
11 President, AND President	22	Partially Agree Comments: ONLY if there will be an impact to the wetland. The policy spends a lot of time on avoidance, so if avoided relative wetland value is of no consequence.
12 Landowner	Skipped	Disagree

Q23

What is your position?	# Yrs Exp	The Alberta Wetland Policy is a go-forward policy and will be effective from the date of implementation. The policy does not apply retroactively to Water Act approvals issued prior to the policy implementation date; therefore, all projects that are operating, approved and approval in-waiting prior to the implementation date are exempt. The go-forward approach is aligned with policy goal to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy.
1 Landscape Ecologist	13	Not Applicable Comments: This is a necessary approach in terms of fairness. Alignment with the policy is not relevant. In spite of this existing projects will achieve some alignment through regional monitoring initiatives and prior and evolving reclamation obligations.
2 Executive Director	20	Partially Agree
3 Skipped	Skipped	Strongly Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Agree Comments: Projects within the white zone of Alberta that received a Water Act approval before the implementation of the new policy still have to mitigate for any wetland loss or impacts that they will cause. So the go-forward approach is fine because wetland loss is still mitigated in one way or another.
7 Coordinator - Alberta	20	Agree Comments: A go forward approach was the only terms under which it would be politically acceptable.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Disagree Comments: Obviously it does not align with the goal with respect to the Green Area. The Interim policy applied to the White Area before the new policy and its goal was similar.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree
11 President, AND President	22	Partially Agree
12 Landowner	Skipped	Partially Agree

Q24

What is your position?	# Yrs Exp	The decision-making framework benefits approval writers.
1 Landscape Ecologist	13	Agree Comments: Implementation brings more consistency between regions and clarity of expectations on the part of developers. It is not clear how this is applied to agricultural development on private lands. In those case approval may not be sought.
2 Executive Director	20	Agree
3 Skipped	Skipped	Not Applicable
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Not Applicable Not sure what you mean by this question
7 Coordinator - Alberta	20	Agree Comments: Acknowledging greater complexity and related hassles, teh process is much clearer and consistent than in past.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: Although the framework on its face appears quite straightforward there is still considerable discretion and unknowns for decision makers. E.g. although avoidance is the first preference, when can a decision maker simply deny an application? When is replacement permissible in contrast to restoration? Where should restoration take place? How can restoration take place in the South Saskatchewan River Basin where there is a moratorium on new surface water licences?
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: I'm not 100% sure on this one. The approval writer should simply need to assign compensation, as a QWSP would give them a report indicating relative wetland value. The approval writer will determine if there are any local bylaws affecting the decision to approve an impact activity. The decision-making framework certainly doesn't seem to benefit municipal decision-makers, as they will need to decide if wetlands are valuable as they already exist on the landscape.
11 President, AND President	22	Not Applicable Comments: What decision making framework are you referring to? The delineation guide? The mitigation directive? Eventually approval writer may benefit, but right now it is a hot mess with up to a year to get an approval
12 Landowner	Skipped	Strongly Agree

Q25

What is your position?	# Yrs Exp	The Alberta Environmental Monitoring, Evaluation and Reporting Agency (AEMERA) plays an important role in wetland policy implementation. *This agency no longer exists, but please feel free to comment on your knowledge of policy implementation related to wetlands in Alberta.
1 Landscape Ecologist	13	Partially Agree Comments: They are focused on the NE part of Alberta only. Their role is reporting on things like change in abundance and condition at a regional scale. It is not clear how their programs support or are aligned with regional monitoring frameworks (indicators and thresholds).
2 Executive Director	20	Disagree
3 Skipped	Skipped	Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	AEMERA has been dismantled. The organization was originally established to monitor landscape changes that result from big projects - like the oil sands. It was never fully developed or established to know what role it could play in wetland policy implementation. Currently, wetland policy implementation is primarily the responsibility of Alberta Environment & Parks.
7 Coordinator - Alberta	20	n/a
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Strongly Disagree Comments: It no longer exists. I appreciate that it did exist when the survey was developed.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree Comments: To this point, I have not heard anything of AEMERA's involvement with the wetland policy. I will look into their involvement further.
11 President, AND President Landowner	22	Strongly Disagree
	Skipped	Partially Agree

Q26

What is your position?	# Yrs Exp	The policy considers short-term and long-term effects adequately.
1 Landscape Ecologist	13	Disagree Comments: The policy provides a framework to support decisions. Consideration of effects is aside from the policy but can be implemented into the tools. An example would be changing wetland valuation based on evaluation of changing abundance.
2 Executive Director	20	Partially agree
3 Skipped	Skipped	Disagree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Disagree Comments: The policy document is too vague to consider short and long term effects of the current wetland management system. Policy implementation is still in its early stages and again, it's hard to know whether it would adequately consider the long-term effects
7 Coordinator - Alberta	20	Agree Comments: Yes, as best as any policy is able to do that. Long term effects will be best addressed through periodic policy updates.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Disagree Comments: Although the policy mentions that it is designed to "Consider both short-term and long-term effects on society and the environment" it is not apparent how it does that. The RWV concept does not clearly connect to this, and decision makers are not directed to consider such effects.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree
11 President, AND President	22	Disagree
12 Landowner	Skipped	Strongly Disagree

Q27

What is your position?	# Yrs Exp	The policy has adequate monitoring and contingency response plans.
1 Landscape Ecologist	13	Not applicable Comments: This is not the role of the policy. These are project or regional management framework considerations. The policy provides a framework to implement the outcomes of land use policy, and informs development of those omnibus policies.
2 Executive Director	20	Disagree
3 Skipped	Skipped	Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Not Applicable Not sure what you mean by this
7 Coordinator - Alberta	20	Agree Comments: The policy is adequate (and improving) for its regulated wetland replacement aspect. The broader need for wetland monitoring (i.e. all wetlands) remains unaddressed.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Partially Agree Comments: In a number of places the policy mentions monitoring and paves the way for monitoring conditions in approvals, but it does not require monitoring. Although the policy mentions contingency response and adaptive management, nothing requires these.
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Disagree
11 President, AND President	22	Partially Agree Comments: The directives for these are currently being developed. The concept is OK although we will see how long monitoring is. What are contingency response plans?
12 Landowner	Skipped	Strongly Disagree

Q28

What is your position?	# Yrs Exp	The policy will improve wetland protection in the Green Area.
1 Landscape Ecologist	13	Strongly Agree Comments: Prior to this there was no policy for the green area beyond general Water Act and Public Lands Act requirements. The policy integrates management across those enactments and sets goals based on wetland values. Inclusion of peatlands as waterbodies is a major change.
2 Executive Director	20	Disagree
3 Skipped	Skipped	Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Agree Comments: Theoretically, yes because the interim policy did not protect any northern or boreal wetlands. If implemented well, then the policy should help conserve some of the wetlands.
7 Coordinator - Alberta	20	Agree Comments: Yes, by stating priority (i.e. importance) and direction (approach to avoid, minimize or replace). Again, without the policy, wetlands can be ignored
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Agree Comments: Since prior to July 4th, 2016 there was no policy protection in the Green Area, there has to be an improvement after July 4th, when the policy kicked in (at least for non-grandparented development applications).
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Partially Agree Comments: The wetlands in the green area will likely be of higher value, and therefore would cost more to impact.
11 President, AND President	22	Partially Agree Comments: Most of the activities that occur in the Green Area are not covered by the Water Act, but rather by Public Lands Act or EPEA
12 Landowner	Skipped	Strongly Disagree

Q29**What is your position?**

1 Landscape Ecologist

Yrs Exp

13

Land-use activities and wetland values are equally respected in the Green Area.

Agree

Comments: I must admit I do not fully understand the statement. Wetland values are part of land use considerations and approval conditions.

2 Executive Director

20

Disagree

3 Skipped

Skipped

Partially Agree

4 Research, GIS, and
Stewardship Coordinator

2

Skipped

5 Watershed Coordinator

5

Skipped

6 National Policy Analyst

3

Not Applicable

Comments: I can't comment on this because I don't have a lot of experience with policy implementaiton in the Green Area. I assume the same rules apply as in the White Zone.

7 Coordinator - Alberta

20

Not Applicable

Comments: Unfair question. The policy is designed ina way to enable those deciosn at teh local level that take into account the wetland's importance.

8 Emerita Professor of Law,
Adjunct Prof,
Senior Research Fellow

23

Disagree

Comments: The fact of approval of destruction of huge areas and numbers of peatlands indicates that these values are not equally respected.

9 Professor Emerita, Adjunct

20

10 Agricultural Conservation
Coordinator

2

Not Applicable

Comments: I am unfamiliar with the specifics of land-use in the Green Area and how wetlands will be impacted in those regions.

11 President, AND President

22

Disagree

12 Landowner

Skipped

Disagree

Q30

What is your position?	# Yrs Exp	The policy will adequately address the unique needs of peatland management.
1 Landscape Ecologist	13	Partially Agree Comments: There will be peatland losses as a recognized trade off for oil sands development. This should provide funding for restoration in grassland and parkland areas. Peatland restoration is advancing also as is our understanding of peatland functions.
2 Executive Director	20	Partially Agree
3 Skipped	Skipped	Partially Agree
4 Research, GIS, and Stewardship Coordinator	2	Skipped
5 Watershed Coordinator	5	Skipped
6 National Policy Analyst	3	Not Applicable Comments: Sorry, cannot comment on this one as I do not have sufficient knowledge about the policy directives for the north.
7 Coordinator - Alberta	20	Partially Agree Comments: Uncertain, based on my inexperience with peatland wetlands.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	Disagree Comments: The policy does provide for regional targets, which can facilitate greater development and destruction of wetlands in the Green Area than in areas where wetland loss is greater, but I do not see how the policy addresses other "needs of peatland management."
9 Professor Emerita, Adjunct	20	
10 Agricultural Conservation Coordinator	2	Not Applicable Comments: In my limited understanding, there have been few research achievements in peatland restoration. Hopefully the wetland policy addresses this with either prohibition of peatland impact, or VERY high compensation requirements.
11 President, AND President	22	Disagree
12 Landowner	Skipped	Disagree

Dear [...],

Please answer and/or comment to the best of your knowledge. If you are not able to agree (i.e. 1, 2, or 3), please tell us if there is any wording with which you could agree (i.e. 4 or 5). You may fill this form out electronically or manually. Thank you so much for your time.

Questions Generated from Expert Consultation

1) The process for development permit approval of activities that may impact wetlands, particularly in rural areas, is potentially ineffective because requirements may be too onerous.

Strongly Disagree 1 2 3 4 5 Strongly Agree

2) The *Alberta Wetland Mitigation Directive* guides applicants to prioritize “*avoid*” and “*minimize*” decisions over “*replace*” decisions. Where avoidance and minimization efforts are not feasible, wetland replacement is required through *permittee-responsible replacement* or *wetland replacement fees*. There are growing concerns that *wetland replacement fees* are favoured more often than are impacts to wetlands avoided or minimized.

Strongly Disagree 1 2 3 4 5 Strongly Agree

3) The functional role of wetlands is not valued when *wetland replacement fees* are expended on restoration projects (in priority areas) that are not located in the watershed where the original wetland impact occurs.

Strongly Disagree 1 2 3 4 5 Strongly Agree

4) The Wetland Policy is very difficult to implement on private land, particularly agricultural lands, without an extensive and frequently updated monitoring program which currently does not exist.

Strongly Disagree 1 2 3 4 5 Strongly Agree

5) Implementing the wetland policy in the Green Area will require an extensive and frequently updated monitoring program which currently does not exist.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Recommended Best Management Practices Based on the Literature Review

1) Develop standardized monitoring and assessment programs using a systems approach.¹

Strongly Disagree 1 2 3 4 5 Strongly Agree

2) Develop programs that monitor and sanction illegally drained wetlands.

Strongly Disagree 1 2 3 4 5 Strongly Agree

3) Complete (higher resolution) wetland inventories and make them publicly available.

Strongly Disagree 1 2 3 4 5 Strongly Agree

4) Develop wetland restoration plans.

Strongly Disagree 1 2 3 4 5 Strongly Agree

5) Reverse auctions are a viable option for wetland restoration on private lands.

Strongly Disagree 1 2 3 4 5 Strongly Agree

6) Identify wetland targets and thresholds for each watershed.

Strongly Disagree 1 2 3 4 5 Strongly Agree

7) If wetland destruction cannot be avoided, replacement should occur in the same basin, near the original site.

Strongly Disagree 1 2 3 4 5 Strongly Agree

8) Develop/continue support for new/existing programs to manage wetlands on private lands including education and public outreach, compensation for unaltered wetlands, tax incentives, and restoration plans.

Strongly Disagree 1 2 3 4 5 Strongly Agree

9) Develop working groups from each WPAC to report on wetlands and best management practices.

Strongly Disagree 1 2 3 4 5 Strongly Agree

10) Improve access to wetland management training and wetland restoration education across Alberta.

Strongly Disagree 1 2 3 4 5 Strongly Agree

¹ Gordon K.C. Chen (1965) defines the Systems Approach as “a way of perceiving and thinking through a problem by identifying and focusing on the critical elements pertaining thereto,” where a problem is defined as “the deviation of the actual from the desired state of affairs at a given point of time.”

1) The process for development permit approval of activities that may impact wetlands, particularly in rural areas, is potentially ineffective because requirements may be too onerous.

Position	Years	Agree?	
1 Landscape Ecologist	13		<p>The focus of the statement on development approvals is not clear. It can be interpreted as approvals specifically under the Municipal Government Act, or applied more generally to resource development approvals. My recent experience with municipal development approvals is limited to the City of Calgary. During the time that the City was allowed to collect wetland compensation funds the amount of funds collected was very large, and was a much larger impediment to development than process. This has since changed so that all funds are collected by Alberta at a lower rate. The development approval process needs to be well managed by applicants to allow consideration of alternatives for wetland management within the development proposal process, including delineation, valuation, and decisions regarding infilling, compensation, conservation, or alteration of ecosystem goods and services. These decisions must be made within the context of long-term water management within a development. E.g. a wetland may remain undisturbed yet the surrounding activity causes significant hydrological changes, or human activity may discourage use by wildlife. The viability of wetlands and potential to retain their key values must be considered and current process allows that. Purely protectionist policies can deter development without achieving wetland conservation objectives.</p>
	3		<p>In relation to non-urban developments (resource extraction) there is still confusion as to how this is applied. Typically, for in situ developments in NE Alberta wetlands are interpreted as only open water wetlands so fens and bogs with no open water are excluded from approval conditions. This is often dealt with through reclamation plans. Current reclamation practice does not allow for restoration of peatland types, so alternatively many disturbed areas are converted to marshes and shallow open water. Some research is ongoing to improve peatland reclamation.</p> <p>There is a lack of clarity on the part of consulting wetland specialists as to how information collected during a wetland assessment is used to place a value on wetlands. The forms to be completed by the consultant involve subjective decisions and the implications of those decisions to wetland value determination is not transparent.</p>
2 Executive Director	20	3	I don't actually know if, or how, complicated the process may be. I think that because the Government has rarely, if ever, asserted the Crown's ownership over some of these natural assets.
4 Research, GIS, and Stewardship Coordinator	2		Though some county/municipal district governments complain about this, I think the real challenges lie at the landowner level. Most don't have the money to hire consultants to even determine if they need to get the permits. Nor do they work on the same timeframe as the approvals processes. With crop production, there is a limited time frame. And they can't afford to wait 2 years to find out if they need a permit, etc. Development of a guide or workshop to help landowners start on their own, and contacts within Alberta Ag that they can help.
5 Watershed Coordinator	5	2	only when private landowners need a wetland assessment then the cost increases. Farmers/businesses should be able to afford these costs as part of operations.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23		I would like to see some evidence on this "potential". I do not think the requirements are too onerous.
10 Agricultural Conservation Coordinator	2		Whose requirements? The municipality's requirements? This should perhaps be clarified. I don't find that the municipality's requirements are too onerous, but rather, municipalities like ours do not know how to handle wetlands during development permit processes unless we strengthen our policies. Here, it results in files being treated inconsistently with some development permits requiring more than others. The provincial requirements are often-times far too onerous for a rural landowner wanting to simply build a house, for example. Part of the problem is that we can't definitively tell them if something is a wetland or not, without it costing them a lot for a qualified professional to do a study.
11 President	22	2	Why would this question focus on rural? It is difficult in urban areas too. That being said, despite the massive increase in prescription of the wetland policy, it seems to be effective. I would need a definition of 'potentially ineffective'

2. The Alberta Wetland Mitigation Directive guides applicants to prioritize “avoid” and “minimize” decisions over “replace” decisions. Where avoidance and minimization efforts are not feasible, wetland replacement is required through permittee-responsible replacement or wetland replacement fees. There are growing concerns that wetland replacement fees are favoured more often than are impacts to wetlands avoided or minimized.

Position	Years	Agree?	
1 Landscape Ecologist	13	2	I have no direct experience with reviewing or completing wetland mitigation plans or issuing Water Act approvals. However from review of recent EIAs with a focus on wildlife impacts it is clear that wetlands are still given low priority during siting decisions and are seen as an impediment to development. e.g. see EIA for Pembina Two Lakes sour gas plant. There seems to be an unwritten policy on the part of Alberta that economic development trumps environmental/biodiversity protection. (e.g. McClelland Fen mining). In some cases this may be an appropriate trade-off decision because wetland avoidance will have resource recovery or other environmental implications.
2 Executive Director	20	2	I think that if avoidance was truly the preferred priority, avoidance would occur in the majority of cases. Mitigation and replacement are more often employed, perhaps because it is easier and more economical.
4 Research, GIS, and Stewardship Coordinator	2	3	I'm not sure where the current actual <i>modus operandi</i> sits. In decades past, fees were definitely the default method. I would hope that this is shifting, but it will take a lot of political and policy will to do so. Also, for this understanding and value to be a part of society and potential proponents thinking will take time.
5 Watershed Coordinator	5	4	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	Avoidance can be accomplished by turning down an application to impact a wetland. This fact is not well enough understood or appreciated. So avoidance always is feasible. Also minimization always is feasible as the government decision maker has to power to require minimization. The Policy should be amended to clarify how avoidance is primary and minimization next and to emphasize that avoidance and minimization decisions, in the last analysis, are in the hands of the government.
10 Agricultural Conservation Coordinator	2	4	I went to a workshop where a developer very clearly described the reasoning why it is much cheaper for a developer to choose replacement fees over avoidance or minimization. She flat-out said they wherever possible they will choose replacement fees, so I agree that they are favored more often. However, I have also seen landowner and municipal cases where projects have not been pursued because the costs associated with wetland replacement are too high. There may be a silent group out there just choosing to avoid and not go through the process at all, so it's difficult to say if one is being favored more often.
11 President	22	3	I think that the perception is that replacement is the primary option, but that is because avoidance and minimization are not measured, whereas replacement is measured.

During the analysis of options, the total wetland area may or may not be measured, but I feel that many proponents opt for the route or location with the least number of wetlands.

3. The functional role of wetlands is not valued when wetland replacement fees are expended on restoration projects (in priority areas) that are not located in the watershed where the original wetland impact occurs.

Position	Years	Agree?	
1 Landscape Ecologist	13	NA	Don't know
2 Executive Director	20	5	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	I fully agree. There is also onus on the part of counties, knowledge holders (i.e. hydrologists, wetland specialists), and watershed groups to do some strategic planning and retention of key wetland areas. There of course are nuances that need to be considered in the sense that restoring some wetlands may be more important than keeping a type of wetland that may be plentiful in a certain area.
5 Watershed Coordinator	5	5	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment
10 Agricultural Conservation Coordinator	2	5	I agree, it doesn't recognize the values and services that were required right there on the landscape and have now been lost. The cumulative impact of a lot of cases like this may be great.
11 President	22	1	What is meant by function role of wetlands? Wetlands function locally and regionally. Wetlands higher up in the watershed have a greater import for holding more water during high precipitation events. So...if my wetland is lost in Calgary, I feel that having a wetland replaced in another RWVAU up higher in the watershed fulfills an important functional role for flood abatement. Perhaps not so with wildlife habitat. This question is a bit too vague to answer for me.

4. The Wetland Policy is very difficult to implement on private land, particularly agricultural lands, without an extensive and frequently updated monitoring program which currently does not exist.

Position	Years	Agree?	
1 Landscape Ecologist	13	3	The statement well may be true, but I suggest that on private land awareness and voluntary action may be a better approach. This can include awareness of the legal context around wetlands, and can be backed up with enforcement when needed. It will also be necessary for regulatory agencies to be clear on what the expectations of landowners are. Actions at the community level can be very successful when local influencers are identified and undertake projects on their land.
2 Executive Director	20	4	In priority areas monitoring can now be done relatively easily and cost effectively using earth observation and remote sensing technologies.
4 Research, GIS, and Stewardship Coordinator	2	4	I should hedge this answer with the statement that I think there needs to be less of the top-down type of monitoring of ag lands, and more working with landowners. Alberta Agriculture does a much better job of this type of education and working with landowners than Alberta Environment. Alberta Environment is a very regulatory type ministry, and often does not work well with sharing responsibility and power. As such, I would like to see the wetland policy with shared oversight with Alberta Agriculture.
5 Watershed Coordinator	5	5	No Comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	2	I would like to see some evidence supporting this statement. The Government can always require monitoring etc. I do not know why a program would need frequent updating if it is well thought out in the first place.
10 Agricultural Conservation Coordinator	2	4	I agree, there are many out there “getting away” with continued wetland drainage because they are in more remote locations and have not had a neighbor complain yet. There are also cases where neighbors do not want to report neighbors even though wetland drainage is impacting their land. Right now, producers are still draining wetlands as they feel like they can get away with it. I feel that many know they aren’t supposed to but do anyways. Perhaps there is a way of digitally inspecting through air imagery from different years?
11 President	22	1	I don't understand this question. What is meant by monitoring program? Do you mean the Wetland restoration or construction directives?

5. Implementing the wetland policy in the Green Area will require an extensive and frequently updated monitoring program which currently does not exist.

Position	Years	Agree	
1 Landscape Ecologist	13	5	Neither the Government of Alberta or industrial operators have a strong regional understandings of cumulative wetland losses or change. Some monitoring exists through the Environmental Monitoring and Science Division of AEP (EMSD) and through project approval requirements. Linkages to the Biodiversity Management Frameworks are unclear. Current monitoring is focused on stressors such as air emissions or hydrologic changes relating to specific activities. Monitoring should be expanded to include simple metrics of wetland area affected by CWCS type and functional values. Furthermore monitoring needs to be viewed at a regional or Natural Sub-region scale and needs to reflect the values in the Wetland Policy.
2 Executive Director	20	4	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	I'm not as knowledgeable about the Green Area and the other regs in place in that area. Again, top-down regs and monitoring should be accompanied with good engagement and education to help with compliance.
5 Watershed Coordinator	5	4	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	2	Again, why, what is the evidence. And anyway, even if an extensive program is required, then there should be one.
10 Agricultural Conservation Coordinator	2	4	I am not as familiar with green area policy implementation but do agree that monitoring will be needed and will be much more difficult than in the white area where things can more easily be seen from the sky or road.
11 President	22	1	I don't understand this question.

1. Develop standardized monitoring and assessment programs using a systems approach.

Position	Years	Agree	
1 Landscape Ecologist	13	5	In order to understand cumulative effects this is fundamental. Standardized monitoring will be most effective if it is co-ordinated between EMSD, regional Biodiversity Management Frameworks, ABMI, and industrial operators whether through industry associations, new institutions, or permit approval conditions. This must occur within regional monitoring frameworks. The regional focus of Alberta's land use plans, and the proposed federal amendments to the Environmental Assessment Act with a cumulative effects/regional focus are key drivers.
2 Executive Director	20	4	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	No comment
5 Watershed Coordinator	5	4	However, a lot of this is already in place. LiDAR, wetted area mapping. ABWRET, Forestry mapping, etc., has identified a lot of the wetland. Maybe not functionality but location and often type of wetland.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	NA	NA
10 Agricultural Conservation Coordinator	2	5	No comment
11 President	22	4	What is this question getting at? Does this mean assessing the potential of a wetland, not the existing condition or use?

2. Develop programs that monitor and sanction illegally drained wetlands.

Position	Years	Agree	
1 Landscape Ecologist	13	3	Focus on high risk areas, and start with education and awareness. Prosecution of landowners, for an activity that has historically been seen as a natural and necessary part of land management for the purpose of cultivation, is unpalatable in Alberta. Sanctions can be in the form of wetland restoration and replacement.
2 Executive Director	20	5	No comment
4 Research, GIS, and Stewardship Coordinator	2	4	No comment
5 Watershed Coordinator	5	4	I think the challenge will be with private landowners as industry (with the potential exception of agricultural) is largely compliant
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment
10 Agricultural Conservation Coordinator	2	5	No comment
11 President	22	NA	I don't understand this question. I may be getting hung up on the term monitor. What do you mean by monitor, because it has a specific meaning in the wetland policy directives (restoration and construction directives)

Complete (higher resolution) wetland inventories and make them publicly available.

Position	Years	Agree	
1 Landscape Ecologist	13	4	While this is desirable there is a lot of detail that needs to be sorted through to determine what this needs to deliver. Key questions are: what information is needed, by who, for what, and at what scale. There is a tradeoff between better data and the cost of acquisition, storage, and distribution. I support this statement because Alberta's inventory and valuation system are immature and the inventory is composed of a Frankenstein of several disparate pre-existing inventories that were completed prior to the Wetland Policy development.
2 Executive Director	20	5	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	On a watershed and county/municipal district level.
5 Watershed Coordinator	5	3	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment
10 Agricultural Conservation Coordinator	2	4	Would also be neat to see a drainage inventory like DUC has
11 President	22	5	AEP has done this. The inventory is available through GeoDiscover

4. Develop wetland restoration plans.

Position	Years	Agree
1 Landscape Ecologist	13	5 Where restoration is contemplated a plan is inevitable. A Plan must identify goals and targets, how those are to be achieved, and how success will be measured and demonstrated. There must also be information sufficient to guide contractors who undertake on the ground restoration activities.
2 Executive Director	20	4 No comment.
4 Research, GIS, and Stewardship Coordinator	2	5 No comment.
5 Watershed Coordinator	5	3 Wetland restoration is challenging and money is better spent maintaining existing wetlands, particularly in the north. Restoration is probably more important in the south where greater loss has already occurred.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5 No comment.
10 Agricultural Conservation Coordinator	2	3 The wetland restoration plans would need to consider that wetland restoration opportunities Are limited by the willingness of the landowner to participate in the project.
11 President	22	NA Do you mean directives on how to conduct restoration activities? Each wetland being restored or constructed must have a specific suite of plans and objectives for design. These are detailed in the construction and restoration directives/guides.

5. Reverse auctions are a viable option for wetland restoration on private lands.

Position	Years	Agree	
1 Landscape Ecologist	13	NA	I am not familiar with these so have no opinion.
2 Executive Director	20	3	I don't have a good understanding of how this method works.
4 Research, GIS, and Stewardship Coordinator	2	5	No comment
5 Watershed Coordinator	5	3	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	4	However there must be controls within a reverse auction program to avoid rewarding owners who unlawfully drained wetlands.
10 Agricultural Conservation Coordinator	2	4	There was some success with the reverse auction in our municipality. Nice to let the landowners set their Willingness to pay.
11 President	22	NA	I don't know what this is.

6. Identify wetland targets and thresholds for each watershed.

Position	Years	Agree	
1 Landscape Ecologist	13	5	This should be part of Alberta's Land Use Plans under LUF and Biodiversity Management Frameworks, and must be the responsibility of government. In many areas ecologically meaningful targets will have been exceeded so these become priority areas for restoration. (this relates to BMP 7 also) Note: 'watershed' has several operational scales in Alberta from the 7 major ALSA planning regions to fine scale HUC8 units. In addition to watersheds other ecologically meaningful units can also be used such as Natural sub-regions or Ecodistricts.
2 Executive Director	20	5	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	No comment
5 Watershed Coordinator	5	4	This is work that the Watershed Planning and Advisory Councils could undertake.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment
10 Agricultural Conservation Coordinator	2	4	More emphasis on keeping wetlands in the ground than trying to restore them after they are lost. Accounting for the unique situation in the watershed may help.
11 President	22	4	When you say targets, do you mean number or cover of wetlands? Anyways, I assume so. Note that this is covered in the Land Use Framework Regional Plans and Biodiversity Frameworks that are being created.

7. If wetland destruction cannot be avoided, replacement should occur in the same basin, near the original site.

Position	Years	Agree
1 Landscape Ecologist	13	2 This is a good principle for maintaining wetland values on the semi-local landscape. However it does not recognize that wetland values can be at much higher risk in areas that may be distant from the disturbance being compensated. I have no issue with wetland compensation being applied based on priority (established in planning and policy) rather than on geography. It is a matter of identifying priority management issues at a provincial scale and using compensation funds accordingly. This also allows more flexibility in making trade-off decisions between wetland, economic, and social values.
2 Executive Director	20	5 No comment
4 Research, GIS, and Stewardship Coordinator	2	4 On watershed and county/municipal district level.
5 Watershed Coordinator	5	5 No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	4 Again, wetland destruction can always be avoided by the government decision maker saying "no". As a general rule statement 7 is good, but there may be exceptions.
10 Agricultural Conservation Coordinator	2	4 I agree, but also understand that this is not always possible. Landowners may not be willing or there May not be drained wetlands in the area to restore.
11 President	22	3 Theoretically I agree that this has the most confidence in maintaining basinal wetland functionality, but practically it is simply not feasible, given that the green area is still mostly wetlands already, and the white area is mostly private lands.

8. Develop/continue support for new/existing programs to manage wetlands on private lands including education and public outreach, compensation for unaltered wetlands, tax incentives, and restoration plans.

Position	Years	Agree	
1 Landscape Ecologist	13	5	Landowners are the key 'boots on the ground' implementers on private lands. They can be strong influencers within the community. Wetland values are societal and the types of programs mentioned ensure that a few landowners do not shoulder an unfair proportion of burden.
2 Executive Director	20	3	Some wetlands on private lands should legitimately be considered Crown owned. Therefore, there shouldn't be compensation for leaving them unaltered.
4 Research, GIS, and Stewardship Coordinator	2	5	no comment
5 Watershed Coordinator	5	5	no comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	3	Education and outreach yes, but do not reward landowners for not breaking the law!
10 Agricultural Conservation Coordinator	2	4	I would prefer to see enforcement to compensation for unaltered wetlands. Tax incentives might be a good idea as many producers feel that "if it isn't my land, why am I paying for it?" Much more effort is needed to get information to landowners about the wetland policy. Until it negatively affects them they don't seem to realize that it's important when advertising and communication attempts are made
11 President	22	5	no comment

9. Develop working groups from each WPAC to report on wetlands and best management practices.

Position	Years	Agree	
1 Landscape Ecologist	13	3	I agree that this type of monitoring and reporting is valuable and would lead to better outcomes. I am not clear on the role of WPACS within this and what the options are. Monitoring can require expertise, especially when it comes to values such as carbon sequestration. WPACs may be better suited to provide an oversight/audit role rather than direct monitoring.
2 Executive Director	20	4	No comment
4 Research, GIS, and Stewardship Coordinator	2	5	No comment
5 Watershed Coordinator	5	5	No comment
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment
10 Agricultural Conservation Coordinator	2	4	I would be interested in being involved in something like this.
11 President	22	4	This is a good way to go, I think, but note that they would need to hire a wetland practitioner to complete this work, so the WPACs would need a large infusion of funds.

10. Improve access to wetland management training and wetland restoration education across Alberta.

Position	Years	Agree	
1 Landscape Ecologist	13	2	There is good training available to those who are interested, particularly regarding wetland assessment and valuation. There are existing programs that are long-standing and could be leveraged (Cows and Fish, now Riparian Habitat Management Society), the Range Management Society, the Alberta Prairie Conservation Forum/NAWMP, Ducks Unlimited, and the Alberta Conservation Association for example. There may be value in looking at these programs holistically to identify opportunities for collaboration and to identify gaps.
2 Executive Director	20	4	No comment.
4 Research, GIS, and Stewardship Coordinator	2	5	No comment.
5 Watershed Coordinator	5	5	No comment.
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	5	No comment.
10 Agricultural Conservation Coordinator	2	3	I'm unclear as to what this means. Who would the training be for? Landowners? Those wanting to restore wetlands?
11 President	22	4	No comment.

Wetlands in Alberta's White zone are mostly gone from the landscape, and while wetlands in the Green zone are plenty, they are at risk of unsustainable development: Peatlands are ancient ecosystems whose functions and benefits would not recover in our lifetime, let alone the next generation.

What I seek to answer in my research is if the wetland policy and management program in Alberta manages provincial wetland ecosystems in the context of wise use of wetlands. The wise use of wetlands refers to the maintenance of wetland ecological character that is achieved through the implementation of ecosystem approaches within the context of sustainable development. Ecological character is the combination of the ecosystem components, processes, benefits and/or services that characterise the wetland at a given point in time.

To find answers to this question, I identified and defined the elements that should be included in wetland management planning and assessment to align with the wise use of wetlands in a regional context. The elements were then assessed for their existence and level of implementation into Alberta's current wetland management planning and assessment regime. The goal was to determine a baseline for alignment with international and global wetland management precedents under wise use principles albeit attuned to the regional context. This means that elements that required federal input or participation were not included in my evaluation e.g. Avian Flu is managed at the federal level and even though it is a requirement to address under the wise use principle, it was not included in this assessment. As I concluded my evaluation based on the criteria I set out, I found it necessary to reach out to subject experts for their input.

On the next page is a series of five questions. Please feel free to provide input on any of the questions, you are not required to answer all of the questions, or any for that matter.

Thank you again for your participation in the project.

1. Does Alberta's wetland policy and management program have sufficient support from its laws and institutions and regulatory frameworks to support the wise use of wetlands in the province?
2. How are the drivers of wetland loss acknowledged and managed in Alberta's wetland policy and management program? (e.g. water allocation for wetland ecosystem need; invasive alien species; groundwater management)
3. How are wetland ecosystem functions and benefits integrated into publicly available documents (including policies, plans, and strategies)?
4. Can you comment on the state of inventory, assessment, and monitoring of wetlands in Alberta?
5. What are your thoughts on stakeholder engagement and public participation wetland management in Alberta?

1. Does Alberta's wetland policy and management program have sufficient support from its laws and institutions and regulatory frameworks to support the wise use of wetlands in the province?

Position	Years	Response
1 Landscape Ecologist	13	<p>The question itself contains some bias, but I also recognize the wise use of water is embedded in our regulations. Overall, regarding institutions and regulatory frameworks, the answer is yes. My experience is limited primarily to reviews of Environmental Impact Assessments (EIAs). In those wetlands are typically identified as a constraint to be avoided to the extent possible when planning a project layout. However, if there is conflict between wetland avoidance and resource recovery (coal, bitumen) then wetlands are given the lower priority. The effect will be a long-term or permanent loss of peatland wetland types (primarily treed fen).</p> <p>As part of permitting I have seen a failure to recognize the difference between open water wetlands and vegetated wetlands such as bogs and fens. Only open water wetlands are included in wetland monitoring and reclamation approval conditions under the Water Act.</p> <p>One area of systemic failure is that Alberta Environment has defined disturbances to wetlands requiring Water Act approval as activities that directly affect the bed or shore. This does not consider effects to the aquatic environment that result from activities outside of the wetland boundary that can affect water supply or quality, or habitat values. This is particularly acute in urban developments, where the minimum development setback of 6 metres (Municipal Government Act) is typically applied as a matter of policy.</p>
4 Research, GIS, and Stewardship Coordinator	2	<p>For the most part, yes. However there are some issues, and noted in the following questions. There is still skepticism whether the wetland approvals emphasize avoidance and minimization over mitigate/replace. I am not sure how the government will provide reassurance regarding this.</p>
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	<p>The heart of wise use as defined is the "implementation of ecosystem approaches" "to maintain ecological character". The addition of "within the context of sustainable development" does not detract from the requirement of taking an ecosystem approach; it simply adds that wetland maintenance and management may permit some development, provided that the subject of the development – wetlands -- "ecological character" is maintained. "Ecological character" in turn has nothing to do with development, sustainable or otherwise. It is "the combination of the ecosystem components, processes, benefits and/or services that characterise the wetland at a given point in time." I understand "wise use" to mean or imply that development of or near a wetland may be permissible if the development will not adversely impact (or perhaps some other standard like 'significantly impact') the wetland's ecological character. Starting with the WP, to a degree the WP supports wise use as defined, but it could be improved. First note that the WP has two major wetland assessment approaches. The first approach is aimed at determining whether a wetland is to be protected for the long term. This determination is made based on the "relative value" of the wetland. "Relative value" includes many elements other than ecological character, such as value to humans and abundance of like wetlands. Value to humans may not, and abundance, in the sense intended, does not contribute to or support ecological character. The second major assessment approach is incorporated into the WP wetland mitigation section. This section uses the notion of "wetland function" (most often accompanied by "and benefits"). The WP states that "the primary focus of the wetland mitigation system is to sustain the full range of wetland functions and benefits" (p 15). These notions – wetland function and benefits -- particularly play out in the discussion of wetland replacement ratios. Although they are not defined, on their face they seem comparable to the notion of "ecological character". Accordingly, in the mitigation section the WP supports wise use. Given the differences in the "relative value" and "wetland function" approaches, one cannot help but ask why should which wetlands we protect are based on relative value, but mitigation be based on wetland function? The former invites subjectivism, (which human values? what does abundant mean and why is it relevant to value? – some wetlands wetland function is improved by abundance) whereas the latter calls for a more objective scientific and observational assessments. In contrast to the WP, I note that a goal of the Interim Policy, which governed Alberta White Area wetlands prior to the WP, was to "conserve slough/marsh wetlands in a natural state" (p 3). This applied to all slough/marsh wetlands no matter their relative value or abundance.</p>

I express some of my concerns about the function/value dichotomy in my 2013 ABLawg "The New Alberta Wetland Policy: White Area Wetlands, Just a Pawn in the Game?" online: << https://ablwg.ca/wp-content/uploads/2013/09/Blog_AK_Alberta_Wetland_Policy_September-2013.pdf>> and will not repeat them here. Here I will just say that the Wetland Policy would be improved by getting rid of the notion of "relative value" and zeroing in on wetland function for both determining which wetlands should be protected, and mitigation for wetland disturbance. If it did so the WP would better support wise use. What about laws, meaning statutes and regulations? Do laws, in relation to the WP, support the wise use of wetlands in the province?

There are a myriad of laws relevant to wetlands, as is evident in my Alberta Wetlands, A Law and Policy Guide (2nd ed), (2016, CIRL and NAWMP). Some of these laws allow the decisionmaker who decides whether to permit a wetland impact to consider matters that could be relevant to ecological character. For example, wetland drainage requires a Water Act approval, and section 38 of the Water Act states that: (2) In making a decision under this section, the Director (a) must consider, with respect to the applicable area of the Province, the matters and factors that must be considered in issuing an approval, as specified in an applicable approved water management plan, (b) may consider any existing, potential or cumulative (i) effects on the aquatic environment, (ii) hydraulic, hydrological and hydrogeological effects, and ... Obviously (b)(i) and (ii) are, and (a) could be relevant to ecological character and wise use, the latter depending on whether there is an applicable approved water management plan, and what is in it. However, the daunting lacuna and implementation problem is that the Water Act is not tied in any explicit way to the WP. There is nothing in the approval section, or any other section of the Water Act (e.g. allocations) that requires or even specifically permits the decisionmaker to comply with the WP. One exception would be where compliance with the WP is part of an approved water management plan, but to my knowledge no approved water management plan requires such compliance. Another would be where compliance with the WP is required by an applicable regional plan under the Alberta Land Stewardship Act, (s 4.1 Water Act) but again, to my knowledge, no regional plan requires such compliance. One way to address the gap would be if approved water management plans and regional plans stated something like "When a Water Act Director is considering application for an activity or development that could impact a wetland, the Director shall ensure that the Wetland Policy is complied with." Comparable provisions should be in all statutes and regulations where what is regulated could impact wetlands.

1. Does Alberta's wetland policy and management program have sufficient support from its laws and institutions and regulatory frameworks to support the wise use of wetlands in the province?

Position	Years	Response
9 AEP-Wetlands Branch	-	<p>Alberta has a provincial Wetland Policy (Alberta Wetland Policy, 2013) that provides the strategic direction and tools required to make informed management decisions in the long-term interest of Albertans. The policy minimizes the loss and degradation of wetlands, while allowing for continued growth and economic development in the province.</p> <p>The goal of the Alberta Wetland Policy is to conserve, restore, protect, and manage Alberta's wetlands to sustain the benefits they provide to the environment, society, and economy. The Alberta Wetland Policy also provides the management framework for wetland mitigation and management in Alberta by avoiding, minimizing, and if necessary, replacing lost wetland value.</p> <p>The Alberta Wetland Policy is supported by various pieces of environmental legislation (e.g. the Water Act, the Public Lands Act, the Environmental Protection and Enhancement Act). Regulatory requirements require that all applicants impacting water and wetlands must obtain an authorization before commencing any activity that disturbs a wetland. Alberta Environment and Parks makes informed-decisions based on a review of an application.</p>
10 Agricultural Conservation Coordinator	2	<p>The Alberta Wetland Policy is written with ecological value as its core concept, and decisions within its framework are thus supposed to consider greater protection for wetlands more highly valued from both an ecological and human value standpoint. This framework supports the wise use of wetlands; however, while the intent is written within the policy, I would argue that it is not applied in practice for two reasons. The first is enforcement, when wetlands are drained on the landscape illegally, in my experience they are not always followed up on by AEP and certainly not in a timely manner. AEP oftentimes allows the impacts to remain so long as the offender pays into the compensation fund. The compensation fund is supposed to go towards returning wetlands to the landscape, but this is a very challenging and slow activity with debatable return of wetland value. I would argue that the enforcement institution is therefore failing the wise use of wetlands. Second, I note the approval process. Proponents may apply to impact wetlands and provide an argument as to why said impacts cannot be avoided or mitigated as per Alberta Wetland Policy direction. In my experience, if an argument is provided, approval is granted. I know of one case where there was a substantial show of public dissent to the draining of two wetlands, and despite the public's efforts to comment accordingly and some of them being granted "directly affected" status under the legislation, the wetland impact was still approved by the Province. I would therefore argue that the approval institution is failing the wise use of wetlands in the province. The Alberta Wetland Policy regulatory framework does not seem to be sufficient for deterring impacts to and loss of wetlands so long as the person wishing to do so has sufficient financial freedom to pay the compensation fund. The wetland replacement function intended to make use of compensation fund dollars is thus far not sufficient for returning value to the landscape in my opinion and I question whether it will achieve its purpose.</p>
11 President	22	<p>The laws are in place, but the application isn't consistent across the province. There was not enough support for training regulators and practitioners, so although the law and framework was well thought out, its implementation was flacid.</p>

**2. How are the drivers of wetland loss acknowledged and managed in Alberta's wetland policy and management program?
(e.g. water allocation for wetland ecosystem need; invasive alien species; groundwater management)**

Position	Years	Response
1 Landscape Ecologist	13	<p>Historically the primary driver of wetland loss has been removal through draining and infilling during agricultural development. More recently, industrial and urban developments are increasingly important drivers. The Wetland Policy inherently recognizes this. By design it accepts that there will be wetland losses in areas of intensive resource development (northern Alberta). Through compensation payments resources are made available for wetland restoration in agricultural areas (habitat restoration programs such as Ducks Unlimited, Alberta Conservation Association).</p> <p>Many urban municipalities have wetland conservation policies that are aligned with the provincial Wetland Policy (e.g. Calgary).</p> <p>Activities that will disturb wetlands require evaluation of wetland extent and functions. The assessments are used when considering applications under the Water Act. There are a number of tools available through Alberta Environment or municipalities to assist in wetland mapping and classification, and wetlands of high management priority.</p>
4 Research, GIS, and Stewardship Coordinator	2	<p>Agricultural-related loss is not managed well (at least the last time I heard). I think there is a big disconnect from the agricultural sector, specifically crop producers (as they are more likely to drain wetlands to increase acreage for production). To gain approval to remove or alter a wetland, for a crop producer (large or small scale) is difficult. To hire consultants they can't afford to analyze the wetlands, and wait the 2 producing seasons for the application to be processed is unreasonable. They didn't think that part of the policy and management program through. It is overly burdensome, and will not improve compliance.</p> <p>As the province has done very little in regards to groundwater, there is no way to incorporate that into a policy at this time. It is an essential element that needs to be addressed, but the lack of groundwater data for most of the province is severely limited or non-existent. Climate change has also not been explicitly addressed in many of the available documents (to my knowledge).</p>
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	<p>-The question does not mention the main drivers of wetland loss – land and resource development. Land and resource use legislation is plentiful and diverse and may be at municipal, provincial, or federal level. Some acknowledge wetland loss, and some do not. I would recommend a comprehensive review with the goal of ensuring that land and resource development laws acknowledge and address wetland loss.</p> <p>-Re water allocation for ecosystem needs, I have written a lot about this and will just say here that the government has some tools to protect water in situ but has done poorly at implementing them. (See A. Kwasniak, "Quenching Instream Thirst: A Role for Water Trusts in the Prairie Provinces" (2006) 16(3) JELP 211). The government rejected our water trust's proposal for private instream licenses, which could apply to wetlands to put a priority on wetland water over subsequent licensed allocations. The matter ended in court, see Water Conservation Trust of Canada v. Alberta, 2015 ABQB 686, online: <<http://www.eab.gov.ab.ca/judicial/WCTC-QB-Decision.pdf>>. Although I will not go into it here, I am confident that notwithstanding the decision against the Trust, privately held instream licenses are possible under the Water Act, and a Director could grant one. The Court only held that the Director in question was reasonable in denying our application, The Court did not hold that any such licence is not authorized by the Act.</p> <p>-The WP itself is silent on how government will deal with allocations, unfortunately. It does not, for example, require that the WP's goals be even considered in allocation applications under the Water Act. As mentioned earlier, the Water Act itself does not even mention the WP, and the WP has no formal standing under the Act. It is not, for example, an Approved Water Management Plan, which, at least must be considered in water allocation applications (s 11, and 51(4)). Although the WP makes it clear that the WP is intended to apply to the Water Act approval process, as mentioned earlier, nothing in the Water Act itself requires that the WP be considered in approval applications.</p> <p>-Similar points could be made about groundwater management as were made on allocation.</p>

**2. How are the drivers of wetland loss acknowledged and managed in Alberta's wetland policy and management program?
(e.g. water allocation for wetland ecosystem need; invasive alien species; groundwater management)**

Position	Years	Response
9 AEP-Wetlands Branch	-	<p>Drivers of wetland impacts and loss are managed through an integrated resource management context. There are multiple Government of Alberta divisions and programs dedicated to assessing, inventorying and monitoring various drivers of change across the landscape, including assessment of local land use and change (Land-use Framework and regional plans, the Alberta Land Stewardship Act), invasive species (e.g. Alberta Aquatic Invasive Species Program), water quality and quantity (e.g., Alberta Wetland Policy, transboundary water agreements, water management plans, etc.), and climate change (e.g. The Alberta Climate Change Office).</p> <p>The Alberta Wetland Policy also recognizes drivers of wetland loss and manages them through regulatory requirements and informed decision-making processes. Whenever there is an impact or loss to wetlands, a wetland assessment is required and wetlands must be avoided, minimized, or, as a last resort, replaced.</p> <p>Alberta's Wetland Replacement Program is an in-lieu compensation program that replaces wetlands in Alberta in an effort to reverse lost wetland value. Historical land use and change over time, hydrology (including water quality and potential pollutants), invasive species and species at risk, biodiversity, human use and values (including socio-economic drivers and cultural values) and regional context are all considered in wetland replacement project proposals and review.</p>
10 Agricultural Conservation Coordinator	2	I would consider agriculture to be a major driver of wetland loss in our province. I would argue that agricultural impacts to wetlands are not being acknowledged or managed well under the policy at all – unapproved impacts still occur daily. The policy does not appear to apply to farmers as it does developers and municipalities. Residential/Commercial/Industrial Development does not appear to be being deterred by the policy as long as they have the money to pay compensation, though perhaps there is an effect happening whereby developers are choosing to work around wetlands instead. I've heard that industry can get around the regulations in some cases by writing wetland restoration into their reclamation plans.
11 President	22	Direct loss due to conversion is well managed; but, indirect losses, such as invasive species and changes in hydrology are not well understood, nor managed.

3. How are wetland ecosystem functions and benefits integrated into publicly available documents (including policies, plans, and strategies)?

Position	Years	Response
1 Landscape Ecologist	13	<p>Considering this question requires addressing it at the policy and planning levels. At the broad Policy level, wetland conservation is considered during regional land use planning such as the South Saskatchewan or Lower Athabasca Plans, as well as any sub-plans or biodiversity management frameworks that arise under these high-level plans. High level plans provide direction that must then be considered during project planning in documents such as Environmental Impact Assessments, and urban subdivision plans. Large-scale projects such as coal mines will often have a stakeholder and public involvement aspect to reclamation planning.</p> <p>I am aware of only one publicly facing, landscape scale monitoring program that includes wetland values. That is the Alberta Biodiversity Monitoring Institute, which samples Alberta at a broad scale on a regular basis. This organization has also undertaken some regional monitoring for indicators such as wildlife on behalf of industrial operators in the Oil Sands region of Alberta. I do not know to what extent wetland monitoring is explicitly included, but there will certainly be some overlap with wildlife monitoring. ABMI has provided some efficiency to industrial operators and allowed co-ordinated monitoring between projects and at a more appropriate scale (landscape vs project fence-line).</p>
4 Research, GIS, and Stewardship Coordinator	2	<p>Ideally, I think they mean to incorporate the wetland policy outcomes and management into the various regional plans the associated biodiversity frameworks. However, thus far, this has been lacking. Further delay in developing the land use plans is delaying any knowledge of how regions are to proceed on landscape wetland management.</p>
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	I touched on this earlier.

3. How are wetland ecosystem functions and benefits integrated into publicly available documents (including policies, plans, and strategies)?

Position	Years	Response
9 AEP-Wetlands Branch	-	<p>The Alberta Wetland Policy includes a suite of tools and directives that are publicly available on the Alberta Wetland Policy Implementation web page.</p> <p>The Alberta Wetland Policy is centered on the concept of relative value, and uses the Alberta Wetland Rapid Evaluation Tool (ABWRET) to assess ecosystem functions of wetlands and to inform decisions to avoid, minimize and replace wetland impacts. The ABWRET model has assessed over 25,000 wetlands since 2015.</p> <p>Additionally, ecosystem functions and benefits are directly incorporated into a variety of publicly available documents produced by the Government of Alberta. Key examples include the Land Use Framework, the Alberta Wetland Policy, the Water For Life Strategy, and regional plans.</p>
10 Agricultural Conservation Coordinator	2	<p>Wetland assessments required for the application process consider ecosystem function and benefits in their valuation determination (ABRWET tool). The value class that comes out of that assessment is used to set the price of compensation and number of required replacement wetland hectares based on the number of hectares of wetland that are impacted. For now, replaced wetlands are automatically considered to be low value from an ecological standpoint.</p>
11 President	22	<p>They are included conceptually in the policy, but only really described in the ABWRET-A manuals/workbooks. These ABWRET-A materials are very complex and not designed for the lay person to understand.</p>

4. Can you comment on the state of inventory, assessment, and monitoring of wetlands in Alberta?

Position	Years	Response
1 Landscape Ecologist	13	Not with any authority.
4 Research, GIS, and Stewardship Coordinator	2	No. I am not involved in this
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	No comment.
9 AEP-Wetlands Branch		<ul style="list-style-type: none"> - Alberta is one of the few provinces in Canada to provide a publicly available, comprehensive wetland inventory dataset. The current Alberta Merged Wetland Inventory (AMWI) was achieved by assembling and harmonizing the best available spatial wetland inventory data to provide unified provincial coverage. The Alberta Merged Wetland Inventory depicts wetlands within the province of Alberta, Canada for the period 1998 to 2017 classified to the five major classes in the Canadian Wetland Classification System (CWCS). These five major classes include bog, fen, marsh, swamp and shallow open water. For the purposes of this inventory, shallow open water includes all open water. The Alberta Merged Wetland Inventory is a generalized, merged product of 35 component wetland inventories that utilized different types of remote sensing source data from different years, different data capture specifications and different classifications. The spatial representation of wetlands and the quality of the AMWI is variable across the province. <p>Alberta Merged Wetland Inventory metadata https://geodiscover.alberta.ca/geoportal/rest/metadata/item/bfa8b3fdf0df4ec19f7f648689237969/html</p> <p>Alberta wetland mapping standards and guidelines: mapping wetlands at an inventory scale. Version 1.0 https://open.alberta.ca/dataset/0c78cbab-4076-4a2e-ab66-47e4c5c247ed/resource/fd3f065f-3615-4ef9-a61d-9cdac1f5b48f/download/aep-alberta-wetland-mapping-standards-guidelines-mapping-wetlands-inventory-scale-version-1-0.pdf</p> <p>Alberta monitors changes in wetland area over time across the province with periodic updates to the Alberta Merged Wetland inventory (AMWI), as well as monitoring changes in wetland loss and direct disturbances to wetlands by overlaying the AMWI with the human footprint inventory (updated every 2 years). https://geodiscover.alberta.ca/geoportal/rest/metadata/item/1d275eeb15f0449c81ff49ea2ef6a0be/html</p> <p>Alberta monitors wetland ecosystem condition through a partnership with the Alberta Biodiversity Monitoring Institute, which monitors wetlands across the province. https://www.abmi.ca/home/publications/501-550/510</p>
10 Agricultural Conservation Coordinator	2	<p>Alberta has a wetland inventory; it isn't perfect because field assessments must still be done to get actual data, but it's a start. As for more detailed, smaller spatial scale inventories, some municipalities and organizations have done them to improve upon the provincial data. There is a lot of great mapping work out there between Alberta Biodiversity Monitoring Institute, Ducks Unlimited Canada, etc. As wetland assessment goes, the ability to do that is confined to a select group of consultants who have been deemed able to perform such work by the Pro 10 professional associations. The skillset to perform such work being so specialized due to the complexity of information required for the assessments I believe is somewhat inefficient. We can't create qualified professionals very quickly to meet demand given the requirements. I do not know exactly what is happening in the field of monitoring.</p>
11 President	22	<p>The digital inventory is a good first start, but it is fraught with errors of omission and commission. It introduces a lot of bias if used as a standalone product. Most people, including wetland practitioners don't really understand the bias that it introduces. The types of assessment are Identification & Delineation; Wetland Classification; Wetland Relative Value Category assessment; and impact assessment. These each have their own Directive/documentation, but are quite complex and also not detailed enough at the same time. Except the classification system, I think all types of assessment Directives will be/should be updated. Wetland monitoring is just starting to emerge, so it is in a vestigial state.</p>

5. What are your thoughts on stakeholder engagement and public participation wetland management in Alberta?

Position	Years	Response
1 Landscape Ecologist	13	<p>Public participation must be part of the foundation for regional plans, including provincial land use plans and urban area structure plans. This is the most appropriate time to identify key values and address landscape scale management issues. Key management indicators should be identified early and with a landscape scale viewpoint to allow development projects to align in their impact assessments and follow-up monitoring.</p> <p>This may be a good time to plug the need for more imbedded and formalized adaptive management. AM is a formal process that can be used to identify and evaluate desired outcomes, knowledge gaps related to obtaining desired outcomes, and alternative management strategies or actions. It also allows identification of indicators to be monitored either as part of a regionals program or within industrial monitoring programs.</p> <p>Related to wetlands there are some examples of AM in action. Two I am familiar with are 1) the work of PTAC (Petroleum Technology Alliance of Canada). It is a consortium of in situ oil sands developers. They have been supporting research into various peatland reclamation methods and have made progress. ...and 2) COSIA which does the same thing with a focus on oil sands mining.</p>
4 Research, GIS, and Stewardship Coordinator	2	<p>I think stakeholder engagement was poorly done (if at all). Most of this responsibility has fallen to the environmental non-governmental and non-profit organizations, and solely as an informing about the rules, not as an inclusive part of the decision-making process. Some municipalities have worked on this as well. I would also suggest that many municipalities, especially perhaps more rural ones, have not been as actively engaged in the policy and wetland restoration process (paying for lost/degraded wetlands, and where and to whom the money goes, etc.).</p> <p>As an outsider, I also don't think that much collaboration with Alberta Agriculture and Forestry (specifically Agriculture) occurred either.</p> <p>I think the government did not involve as many stakeholders as they should have. I do not know if WPACs were consulted. As Water for Life partners, and as more regional/local organizations, they would have been good to work with on it.</p> <p>There may also be a disconnect regarding public participation in wetland management. Societally, we say we value wetlands on the landscape, but we have no means to compensate/reward people to keep them on their land, when wetlands are often seen as impediments to their livelihoods. There are incentive programs to restore a wetland, but not to keep it. This is a HUGE missing piece in the management framework. I don't have an answer to this, aside from allowing more groups who pay for restoration work via the fees paid during wetland loss (i.e. like through Ducks Unlimited Canada. ALUS Canada also compensates landowners for restoring wetlands), and through government programs like the Watershed Restoration and Resiliency Program (WRRP). A culture shift is needed, for sure.</p>
8 Emerita Professor of Law, Adjunct Prof, Senior Research Fellow	23	<p>I know of no provincial requirement for consultation just because the WP might be engaged. Requirements for consultation arise either from legislated processes such as for approvals under the Water Act where directly affected persons may be engaged, or from Constitutional obligations to consult. "Directly affected" is much narrower than "stakeholder" and "public". Constitutional duties to consult arise where likely impacts to a wetland from a proposed project could impact Indigenous title or rights. In my view there should be opportunities for broader meaningful stakeholder, public, and Indigenous consultation in WP development and implementation.</p>

5. What are your thoughts on stakeholder engagement and public participation wetland management in Alberta?

Position	Years	Response
9 AEP-Wetlands Branch		<ul style="list-style-type: none">- The Alberta Wetland Policy was developed in collaboration with a diverse group of stakeholders. Multiple years of engagement and policy development was completed before the Alberta Wetland Policy was approved by cabinet in 2013. The Alberta Wetland Policy promotes public participation in programs like the Wetland Replacement Program, which offers opportunities for landowners to participate in restoring and constructing wetlands in Alberta. A review of wetland policy implementation is currently being undertaken by the Alberta Water Council, which includes multi-stakeholder representation.
10 Agricultural Conservation Coordinator	2	<p>Stakeholders are engaged at AEP's whim but it feels at times like the departments responsible don't actually want to hear what those affected by the policy have to say. Advocacy efforts have fallen relatively unaddressed, AEP has made changes in response to some feedback but only to the extent they consider relevant. Individuals working within the department ignore many questions and comments and cannot or will not answer questions about the policy when directly asked.</p>
11 President	22	<p>What engagement/participation???? None. There have been some workshops geared towards professional organizations and some to specific groups (like CAPP), but not prior to creating the directives/tools.</p>

Baseline	<p><i>Represents an assessment of the wetland management and policy program in Alberta for how it delivers the wise and sustainable use of wetlands according to the criteria and indicators developed in this body of work.</i></p>
	Indicator is mentioned, defined and a clear implementation plan for the element is included.
	Indicator is mentioned and defined, but no direction or guidance for implementation is given.
	Indicator is mentioned but no definition and/or no further elaboration is given.
	Indicator is not mentioned, not defined, and no further elaboration is given.
✓	<i>Adequately mentions indicator, defines indicator, and/or addresses implementation of indicator.</i>
±	<i>Does not adequately mention indicator, and/or defines indicator, and/or addresses implementation of indicator.</i>
-	<i>Does not help to meet criteria or indicator by any means.</i>

6.1.1a Good Water Governance: Government Documents	
<i>The existence and level of implementation of statutory, policy or regulatory frameworks that foster good water governance in products, institutions, or governance processes.</i>	
<u>Alberta Land Stewardship Act SA 2000 cA-26.8</u>	<ul style="list-style-type: none"> ✓ Provides for coordination of decision-makers concerning land, species, human settlement, natural resources, and the environment. ✓ “environment” means the components of the earth and includes (i) air, land and water. ✓ Land-Use Framework enabled by this legislation which provides clear guidance for next steps. ✓ Multiple actors involved in the development and implementation of regional plans. ✓ Regional planning is best suited to management at the water-basin level.
<u>Land-Use Framework</u>	<ul style="list-style-type: none"> ✓ Seven land-use regions based on major watersheds w/ boundaries aligned to municipalities & natural regions ✓ Establishes Land-use Secretariat to support implementation of the framework. ✓ The Secretariat will develop regional plans in conjunction with government departments and Regional Advisory Councils. Final decision on regional plans rests with Cabinet. ✓ Aims to integrate participation from the Indigenous Peoples, the public and landowners. ✓ A clear implementation map/plan by the Land-Use process graphic on page 26.
<u>Water Act RSA 2000 Chapter W3</u>	<ul style="list-style-type: none"> ✓ To support and promote the conservation and management of water, including the wise allocation and use of water while attempting to achieve sustainable development. ✓ Identifies the need for an integrated approach to water management as well as the shared responsibility of all residents of Alberta for the conservation and wise use of water and their role in providing advice with respect to water management planning and decision-making. ✓ Water management frameworks must be established by minister and may include water management principles, and matters relating to integration of water management planning with land and other resources. ✓ Identifies importance of working cooperatively with governments of other jurisdictions with respect to transboundary water management. ± Assigns responsibility to the Minister for developing, implementing, and reviewing water management plans including aquatic environment protection strategy. ± Minister is responsible for development of WCOs, but Directors are charged with implementing them. ± Directors have discretionary power.
<u>Water for Life: A Renewal (2008)</u>	<ul style="list-style-type: none"> ✓ Builds on the work done in the 2003 strategy which identifies Alberta's water management. ✓ Recognizes shared responsibility of citizens, communities, industry, and government for water management ✓ AEP is lead agency accountable for water and watershed management activities in the province. ✓ Three partnerships aimed at the stewardship of water resources in the province: Provincial Water Advisory Council, Watershed Planning and Advisory Councils, and Watershed Stewardship Groups. ✓ Best available practices and market-based tools for flexible and adaptive water management. ✓ Integration of WFL into other policies and plans such as LUF. ✓ Implementation plan guided by Key Directions, A Roadmap to Action, and Measuring Success.
<u>Water Research and Innovation Strategy 2014 (AWRIS)</u>	<ul style="list-style-type: none"> ✓ A framework to guide research and innovation in responding to challenges faced by the water resource system. ✓ Identifies focused actions for government and publicly funded agencies to address key Alberta priorities. ✓ Systems and multidisciplinary approach have led to good water governance outcomes. ✓ Builds on the work that has taken place, reflects changes to the contextual environment and responds to today's knowledge needs as it relates to water priorities in Alberta. ✓ Pages 13 shows program and implementation map. ✓ Annual reports communicate progress toward AWRIS enabling outcomes and actions; identifies the areas for improvement; and provides clarity on required adjustments.

6.1.1b Good Water Governance: Planning Documents	
<i>The existence and functioning of institutions encouraging good water governance and responding to new needs for water governance practices.</i>	
<u>Government of Alberta Water for Life Action Plan</u>	<ul style="list-style-type: none">✓ This document represents the GoA because it is published by the Ministry of Environment and Parks✓ Water management context in the past and water management needs now and for the future.✓ Reflects current issues in the province and the recommendations made by the AWC.✓ Also reflects the need to continuously improve and strengthen water policy and planning to ensure water sustainability for the future.✓ Key themes, actions required, goals, key actions by organized by short-, medium-, long-terms dates, and key directions point to a clear implementation plan which is referred to as "a comprehensive road map" on pg. 23
<u>Alberta Water Council Business Plan 2019-2022</u>	<ul style="list-style-type: none">✓ The Alberta Water Council (AWC) is a collaborative partnership that provides leadership, expertise, and sector knowledge and perspectives to help governments, Indigenous Peoples, industry, and non-governmental organizations to advance the outcomes of <i>Water for Life</i>.✓ The AWC advises the GoA on matters pertaining to the successful achievement of the outcomes of the Water for Life strategy and on effective water resources management policies, practices, and tools.✓ A valued partner in the province's water management system✓ Provides a forum for discussion of provincial-scale water management issues and advises the GoA, stakeholders, and the public on effective water management practices and solutions to water issues.✓ Submits reports and recommendations directly to its members and the public.✓ GoA remains accountable for the implementation of the Water for Life strategy and continues to administer water and watershed management activities throughout the province.✓ Core businesses outlines goals, strategies, performance measures and targets.

6.1.1c Good Water Governance: Monitoring Documents	
<i>The existence and level of implementation of mechanisms that enable knowledge and experience-sharing to foster good water governance.</i>	
<u>Framework for Water Management Planning (FWMP)</u>	<ul style="list-style-type: none"> ✓ The Water Act provides legislative authority for the implementation of this policy. ✓ Reflects successes from past water management experience while introducing innovative requirements based on an increased understanding of the complexity of the environment and the challenges of the future, as well as input from Albertans, to formalize the process of water management in Alberta. ✓ Outlines process for water management planning and components required for water management plans. ✓ Applies to all waterbodies, including streams, rivers, lakes, aquifers, and wetlands. ✓ Provides general guidance for the planning process so that it can suit the local context. ✓ Any person developing a water management plan must follow this framework. ✓ Reviewed every (5) years to ensure it is up-to-date and supports sustainable water management. ✓ Consistent with principles of Integrated Resource Management (IRM), the interdisciplinary and comprehensive approach to decision-making and the method by which this commitment will be achieved. ✓ Recognizes critical links between water management planning and planning for other resources. ✓ Where appropriate, water management plans will support existing Regional Strategies.
<u>Water for Life Implementation Review</u>	<ul style="list-style-type: none"> ✓ A core task of the AWC is to review the implementation progress toward achieving the three goals of the <i>Water for Life</i> strategy. ✓ Since 2003, the AWC has completed four reviews of implementation progress. ✓ Fifth review provides insight into 2012–2015 and informs the GoA, <i>Water for Life</i> partners and Albertans about the strategy implementation ✓ Review Committee followed the approved "How-To" Guide for conducting the assessment and applied other techniques to fill gaps. ✓ Provides recommendations based on past reviews as well as current findings from current review and includes timelines to indicate urgency.
<u>Water Innovation Program</u>	<ul style="list-style-type: none"> ✓ Alberta Innovates Water Innovation Program (WIP) is a flagship program for the Government of Alberta focused on the advancement of knowledge and innovation in support of the Water for Life Strategy and Alberta's Water Research and Innovation Strategy ✓ Goal 1: Building projects to enhance scientific understanding and developing best practices in managing water security, risk and vulnerability ✓ Goal 2: Ensuring excellence in watershed stewardship and ecosystem management ✓ Goal 3: Developing energy efficient technologies for increased water conservation, efficiency and productivity ✓ The program will offer resource support for projects that fall under four key themes: future water supply and watershed management; healthy aquatic ecosystems; water use conservation, efficiency, and productivity, and water quality protection. WPACs were created under the <i>Water for Life</i> strategy as a stand-alone incorporated society with a mandate for effective watershed management ✓ WPACs are the main mechanism to foster collaboration at the watershed level, creating opportunities for stakeholders to come together, share resources, and explore innovative solutions to water management challenges. ✓ Their mandate is to support multi-stakeholder collaboration and community engagement within four main program areas: Education and Outreach; Environmental Stewardship; Watershed Evaluation and Reporting; Watershed Management Planning ✓ WPACs have two key deliverables for which they are responsible for: State of the Watershed (SOW) reports and Integrated Watershed Management Planning (IWMP) for their respective watershed ✓ SOW reports and IWMPs Both have structured guides with which to help them develop, design, write and deliver their reports.
<u>Watershed Planning and Advisory Councils (WPACs)</u>	<ul style="list-style-type: none"> ✓ Created under the <i>Water for Life</i> strategy as a stand-alone incorporated society to support effective watershed management ✓ WPACs are the main mechanism to foster collaboration at the watershed level, creating opportunities for stakeholders to come together, share resources, and explore innovative solutions to water management challenges. ✓ Mandate to support multi-stakeholder collaboration and community engagement within four main program areas: Education and Outreach; Environmental Stewardship; Watershed Evaluation and Reporting; Watershed Management Planning ✓ WPACs have two key deliverables for which they are responsible for: State of the Watershed (SOW) reports and Integrated Watershed Management Planning (IWMP) for their respective watershed ✓ SOW reports and IWMPs Both have structured guides with which to help them develop, design, write and deliver their reports.

6.1.2a Laws and Institutions: Government Documents	
<i>The existence and level of implementation of water law that clearly assigns or distinguishes water-related roles and responsibilities for policy making in the context of wetlands.</i>	
<u>Water Act RSA 2000 Chapter W3</u>	<ul style="list-style-type: none">✓ "Water" in the Act means all water on or under the surface of the ground, whether in liquid or solid state✓ "Water body" means any location where water flows or is present, whether or not the flow or the presence of water is continuous, intermittent or occurs only during a flood, and includes but is not limited to wetlands and aquifers (some exceptions)✓ "aquatic environment" means the components of the earth related to, living in or located in or on water or the beds or shores of a water body.✓ The property in and the right to divert and use all water in the Province is vested in the Crown except as provided for in the regulations.✓ The Act empowers the Director and Minister to Act on a number of issues✓ Local authorities are defined, and their context addressed throughout the Act✓ Requires the minister to establish a framework for water management planning for the province by Dec 31, 2001± Water management frameworks must include a strategy for the protection of the aquatic environment (may include matters relating to biological diversity) of which duties are relegated to the Minister± The Minister may, by order, designate employees of the GoA under the administration of the Minister as Directors for the purposes of this Act.± The Minister may, with respect to any Director, and a Director may, with respect to that Director, designate any employee of the GoA under the administration of the Minister as an acting Director to act in that Director's place in the event of the Director's absence or inability to act, and may specify any limitations on the scope of the designation.± The Minister or the Director may, by order, designate as an inspector or investigator for the purposes of this Act any person who in the opinion of the Minister or the Director is qualified to be so designated.✓ The Minister or the Director may not designate a person under subsection (2) or (3) without the approval of that person's principal or employer.✓ A designation under subsection (3) may direct that the authority of the inspector or investigator be exercised subject to any terms and conditions that the Minister or the Director prescribes in the designation, including limitations on the scope of the designation.± Requires development of a "<i>Strategy for the Protection of the Aquatic Environment</i>" as part of the FWMP for the province.✓ Water (Ministerial) Regulation AR 205/98 Defines all purposes a water license may be issued for: (a) municipal; (b) agricultural; (c) irrigation; (d) commercial; (e) industrial; (f) water power; (g) dewatering; (h) management of fish; (i) management of wildlife; (j) implementing a water conservation objective; (k) habitat enhancement; (l) recreation; (m) water management; (n) any other purpose specified by the Director.± Assigns and distinguishes roles and provides some definitions (i.e. water, water body), but discretion to act is within the Ministry and its Directors

6.1.2b Laws and Institutions: Planning Documents	
<i>The existence and functioning of institutions in charge of setting water and/or wetland-related policy goals and strategies and delivering them within the province of Alberta.</i>	
<u>Water for Life: A Renewal (2008)</u>	<ul style="list-style-type: none"> ✓ Government of Alberta set in motion public consultations that were vital to the development of the Water for Life Strategy ✓ Three partnerships under this strategy: Alberta Water Council, Watershed Planning and Advisory Councils and Watershed Stewardship Groups. ✓ The Alberta Water Council provides recommendations to the GoA about Water for Life strategies and key directions based on their own work ✓ Alberta Water Research Institute was created to help expand what we know about water in Alberta ✓ The Water for Life strategy will be integrated into other policies and plans including LUF planning ± Many commitments, key actions, and a roadmap for action ✓ GoA commits to report annually, and all partners are encouraged to report also. ✓ The goal of assuring that aquatic ecosystems are maintained and protected includes the key action to finalize and implement a new wetland policy for Alberta
<u>Government of Alberta Framework for Water Management Planning</u>	<ul style="list-style-type: none"> ± Built inside the framework is the <i>Strategy for the Protection of the Aquatic Environment</i> which affirms the GoA's commitment to maintaining and restoring the aquatic ecosystem in Alberta but does not provide definitions or specific guidance. ✓ The GoA has the responsibility for the approval and adoption of water management plans and decisions under the Water Act. ✓ Water management planners must work closely with other resource planners to ensure that resource management objectives are identified and understood, and potential conflicts are resolved. ✓ Alberta Environment and Parks is lead agency in creating, coordinating, authorizing, and approving water management plans. ✓ Other NGO or stakeholder groups may also develop water management plans in collaboration with government to ensure consistency. ± Does not have a clear implementation plan, but some direction for implementation is given
<u>Municipal Government Act RSA 2000 Chapter M26</u>	<ul style="list-style-type: none"> ✓ The Municipal Government Act (MGA) enables municipalities to conserve wetlands through tools such as land use bylaws and environmental reserves. However, there are limitations as to when these sections can be enacted and how they can be applied. ✓ The MGA is currently under review, which provides the opportunity to strengthen provisions for wetland protection which is something that Alberta Urban Municipalities Association (AUMA) and Alberta Association Municipal Districts and Counties (AAMDC) are advocating for.

6.1.2c Laws and Institutions: Monitoring Documents	
<p><i>The existence and level of implementation of mechanisms that can help identify areas of water or wetland management where there is a lack of clarity on who does what; areas within coherent and/or contradictory objectives; areas with deficient implementation and/or limited enforcement; and/or areas with overlaps/ duplication of responsibilities</i></p>	
<u>Recommendations for Renewal of Water for Life Alberta's Strategy for Sustainability</u>	<ul style="list-style-type: none">✓ In 2007, the Minister of Environment asked the AWC to review and provide renewal recommendations for the Water for Life strategy✓ The AWC recommended the strategy be renewed around two key themes: safeguarding our water resources and accelerating our actions.✓ Analysis and recommendations were organized around five issues on including insufficient emphasis on healthy aquatic ecosystems, the need for source water protection, water governance, integration of land use and water use, and the need to transition from supply-side to demand side management (pg. 8)✓ A key recommendation is "establishing responsibility, accountability, and authority to roles of stakeholders"✓ The issues are mentioned, defined, contextualized, and a recommendation provided for each issue that is brought up.
<u>Guide to Watershed Management Planning in Alberta</u>	<ul style="list-style-type: none">✓ Fulfils a key action identified in the Water for Life Action Plan (2009)✓ Guided by the 2008 AWC report "Recommendations for a Watershed Management Planning Framework for Alberta"✓ This guide (framework) is intended for local communities and Water for Life partnerships as a step-by-step mechanism for developing and implementing a watershed management plan for their respective watershed.✓ The guide is a 16-step process that can be used to successfully develop and implement a watershed management plan.✓ The process is based on integrated land management principles and cumulative effects management but acknowledges that other steps and tools could be incorporated where an alternate approach is required and that not all steps will work for every situation.✓ A watershed management plan is non-regulatory and has no statutory authority. It provides management advice to governments and agencies that have policy and approvals decision-making authority for land and resource management.✓ Documents the agreed-upon decisions of key stakeholders and encourages them to consider best practices and education and outreach programs in their activities that support their watershed.✓ Objectives of watershed management plans are consistent with relevant policies, legislation, approved plans, and agreements.✓ The objectives align with the management intent of the larger, higher order watershed and benefit its sub-watersheds.

<h3>6.1.3a Policy Coherence: Government Documents</h3> <p><i>The existence and the level of implementation of integrated policies or strategies for sustainable wetland management that fosters coherence across sectors (and minimizing contradictory objectives and negative impacts).</i></p>	
<u>Land-Use Framework (2008)</u>	<ul style="list-style-type: none"> ✓ New approach to managing the province's land and natural resources to achieve long term economic, environmental and social goals (sustainably?) ✓ Establishes (7) land-use regions based on water catchment area(s) and calls for the development of a regional plan for each. ✓ Alberta Land Stewardship Act is implemented through Land Use Framework Regional Plans ✓ ALSA is integrated into Public Lands Act, Water Act, Responsible Energy Development Act, Environmental Protection and Enhancement Act ✓ Identifies GoA province-wide policy responsibilities across the following departments and boards that set rules for land-use: Aboriginal Relations; Agriculture and Rural Development; Culture and Community Spirit; Energy; Environment; Municipal Affairs; Sustainable Resource Development; Tourism, Parks and Recreation; ERCB; AUC; NRCB; Surface Rights Board. ✓ Increases certainty for industry through integration and coordination of provincial policy and aligned planning and decision-making. ✓ Encourages stewardship and conservation on public and private lands (wetland conservation and restoration are a major component of this). ✓ Vision: "Albertans work together to respect and care for the land as the foundation of our economic, environmental and social well-being" (pg.15). ✓ Desired outcomes: Healthy economy supported by natural resources; Healthy ecosystems and environment; and Healthy people (pg. 15) are aligned to Ministry of Environment's 2020 outcomes. ✓ Guiding principles include sustainability, integration, accountability, responsibility, collaboration, transparency, knowledge-based, responsive, and others. Includes a short description of each. ✓ Under the provincial leadership section, the document summarizes a set of seven strategies to improve land-use decision-making under the LUF. ✓ Strategy most applicable to wetlands: "Develop a strategy for conservation and stewardship on private and public lands" (pg. 20) Wetlands are mentioned in the description with some detail. ✓ The GoA commits to developing new policy instruments to encourage stewardship and conservation on private and public lands. ✓ Proposes policy tools including: "environmental goods and services; support for conservation easements and land trusts; 'cluster development' through the transfer of development credits; and allowing land-trust tax credits to be sold to third parties" (pg. 20). ✓ Priority actions starting on page 42 to 46; Timeframe for implementation 48-50
<u>Alberta Wetland Policy (2013)</u>	<ul style="list-style-type: none"> ✓ Provides a strategic framework for conserving, restoring, and protecting wetlands in Alberta. ✓ Wetlands are recognized as being integral to watershed health and to the achievement of all three goals of <i>Water for Life</i>; The policy also supports the goals of the LUF. ± The policy "will provide a comprehensive suite of tools and guidelines to support and effective, efficient, and predictable wetland management system" (pg. 6) ± Also seeks to incorporate a broad range of knowledge and science around wetland functions and benefits into the establishment of an informed and considered approach to wetland management. ± A wetland value-based system necessitates fundamental changes to the province's existing wetland management program. ± Phased approach to implementation, in conjunction with an adaptive management plan, for the introduction of various policy components over time. ± Evolving knowledge of AB wetlands, their geographical extent, and the various functions they perform will be incorporated into the policy, as this information becomes available. ✓ The policy will be based on continuous improvement, incorporating new knowledge, science, and technology on an ongoing basis. ✓ Regular and timely updates of underlying data systems (e.g., inventory information) to support up-to-date and informed decision-making. ± A broad range of integrated products will be required to support and enable the AWP. ✓ <i>Agriculture Alberta Wetland Policy Implementation Fact Sheet</i> gives landowners important information about what wetlands are, why they matter, what the new policy means to them, and their rights and responsibilities associated with the new policy. Landowners can develop their privately held land provided they comply with local, provincial, and federal legislation and policies. ✓ <i>Forestry Alberta Wetland Policy Implementation Fact Sheet</i>: Strategic level Forest Management Plans, operational level plans, and annual operating plans are aligned with the Alberta Wetland Policy, Directives and Guides. There are no changes required to the forest management planning and operational processes to achieve the outcomes of the Alberta Wetland Policy. ± Key concepts and mechanisms are discussed, and wetland relative value is introduced (pg. 11-12), but no further elaboration is given. ± Identifies system information needs for wetland management to be fully aligned with policy intent
<u>Water for Life: Action Plan (2009)</u>	<ul style="list-style-type: none"> ✓ Water for Life goals and key directions will be achieved through the action plan, "which is designed to ensure achievable and timely outcomes that reflect growing pressures" on water supplies (pg. 3). ✓ Standards to conserve wetlands will be implemented through a wetland policy (pg.9). Points to need for groundwater mapping and modelling to support wetland policy implementation. ✓ "New water allocation policies, principles, and tools must be developed to address growth pressures, promote conservation, ensure fair access and wise water use, and protect aquatic environments" (pg. 9). ✓ A goal of the plan related to wetlands is: "Albertans are assured that aquatic ecosystems are maintained and protected" (pg. 12). ✓ The action plan remains a living document and will be reviewed and updated to make certain it is as effective as possible for the short-, medium-, and long-term. ± Key actions offer some guidance toward implementation. They include short- medium- long-term actions to integrate actions to regional systems, Provincial Energy Strategy, the Land-Use Framework regional planning and cumulative effects management system. For example, develop major watershed management plans for major river basins and integrate priority water management frameworks into watershed management plans; and develop tools to integrate environmental, economic, and social values into water management decision-making.

6.1.3b Policy Coherence: Planning Documents	
<i>The existence and functioning of bodies of institutions to facilitate coherent policies across ministries, discussing synergies and managing trade-offs across water, environment, health, energy, agriculture, industry, spatial planning and land use and other relevant areas.</i>	
<u>Alberta Water Council Wetland Policy Implementation Plan (2008)</u>	<ul style="list-style-type: none"> ✓ This seems to be a living document that initiated in 2008 and has a column for 2019 status. Most of the items were last updated in 2018. ✓ Captures the importance of the AWC as an important institution that facilitates the implementation of the wetland policy through important actions like maintaining this planning document. ✓ The recommendations in this document were thoroughly considered in preparation of the Alberta Wetland Policy (pg.1). ✓ This document and the recommendations therein have been a key resource throughout the policy implementation process (pg.1). ✓ Forms “the basis for a multitude of operational tools and mechanisms that have been developed under the AWC, and represent a significant driver in recent conversations between AEP and the North American Waterfowl Management Plan, the Alberta Urban Municipalities Association, the Alberta Association for Municipal Districts and Counties, Watershed Stewardship Groups, and Watershed Planning and Advisory Councils toward a) enhanced wetland education and b) more broadly integrated wetland management and decision making” (pg.1).
<u>Alberta North American Waterfowl Management Plan (NAWMP) Partnership: 2018-2019 Progress Review</u>	<ul style="list-style-type: none"> ✓ The North American Waterfowl Management Plan (NAWMP) is a partnership between Canada, the United States and Mexico for habitat conservation to sustain continental waterfowl populations. ✓ The vision to “Provide leadership to achieve healthy and diverse waterfowl and other bird populations through conservation partnerships” (pg.2) where these “partnerships strive for sustainable and responsible management of the landscape taking into account social, economic and environmental factors” (pg.2) is drawn directly from the parent partnership, the Prairie Habitat Joint Venture (PHJV). ✓ Alberta NAWMP coordinates joint projects, communications, planning and policy support, and facilitates funding options among Partners. ✓ “Advancing conservation together: that sums up what Alberta NAWMP is all about. Its successes in wetland and waterfowl conservation spring from the synergy of working together” (pg.3). ✓ It is a regional partnership composed of three government and two non-government organizations that coordinate essential conservation activities to help Alberta achieve the continental NAWMP goal of restoring waterfowl populations to average levels of the 1970s. ✓ Achieves restoration and habitat retention goals through a broad mix of directed, science-based conservation activities, focused extension and communications endeavours, and proactive efforts to support conservation policy and legislation. ✓ Provides maps of prairie/parkland and western boreal forest target landscapes (pg.2). ✓ Works with policy makers and various stakeholder groups to understand and support new and existing laws, policies and programs related to environmental conservation. ✓ Website for Alberta NAWMP claims to have raised the profile of wetland issues in Alberta, advanced scientific knowledge to support wetland protection and restoration, developed synergies by coordinating wetland-related programs, secured approximately (2) million acres in habitat projects acres, and supported development of mutually beneficial provincial water/land resource strategies. ✓ Document reviews past projects discussing things such as context, people involved, technology used, policies applied, and/or lessons learned. ✓ Committee reports, financial contributions, activity expenditures and habitat accomplishments, and cooperators are a summary of their implementation efforts (pgs.9-17).
<u>Prairie Habitat Joint Venture Implementation Plan 2013-2020: Summary The Prairie Parklands and Western Boreal Forest</u>	<ul style="list-style-type: none"> ✓ Habitat Joint Ventures integrate planning, science, governance, partnerships, and management to achieve NAWMP goals in Canada through a programmatic approach. ✓ A science-based implementation plan is created to address local, regional, and continental goals. Joint Venture partners actively research, monitor and evaluate waterfowl populations, and deliver habitat conservation programs at a regional level. ✓ This plan is based on past accomplishments and reinforces an enduring legacy of strong partnerships and science-based information to guide innovative actions for achieving conservation goals. ✓ The PHJV has played an active role in the wetland-policy arena, supporting the development and adoption of Alberta’s wetland policy in 2016. ✓ The mission for the PHJV is to provide leadership to achieve healthy and diverse waterfowl and other bird populations through conservation partnerships. ✓ The PHJV has developed individual plans for the Prairie Parklands and Western Boreal Forest regions because of their distinct land-tenure systems, differing land-uses and environmental threats and distinct conservation partners. ✓ The plans are modified regularly to reflect current and anticipated landscape conditions, socioeconomic trends, emerging priorities for bird conservation, and new knowledge about bird populations and their habitats (pg.1). ✓ The report provides status of waterfowl, shorebirds, waterbirds, and landbirds, and habitat for Prairie Parklands region and sets habitat objectives for each type of bird. Habitat objectives are summarized, and expenditure forecast provided to 2030 (pg.4). More detailed tables for habitat retention by prairie province are also provided (pg. 5). ✓ The report provides status of waterfowl, shorebirds, waterbirds, and landbirds, and habitat for Western Boreal Forest region and sets habitat objectives for each type of bird. (pg. 7-8). Habitat objectives are summarized, expenditure forecast by activity is provided, and a table for total habitat objective per jurisdiction is provided (pg. 8). ✓ The PHJV’s program in the Prairie Parklands and Western Boreal Forest has advanced significantly in the last decade, enabling partners to set aggressive, yet achievable, habitat and evaluation objectives for 2013-2020 (pg.9).

6.1.3c Policy Coherence	
<i>The existence and level of implementation of mechanisms to identify barriers that hinder the coherent management of wetland ecosystems in the province.</i>	
<u>Alberta Water Council Water for Life Implementation Review 2012-2015</u>	<ul style="list-style-type: none">✓ Presents Water for Life strategy for Healthy Aquatic Ecosystems goal, description, and outcomes as well as the status of actions taken to achieve the goal.✓ Assessed progress of AWP and found that overall, the use of tools to sustain healthy ecosystems, restore degraded ones and mitigate impacts has been limited or behind schedule.✓ Another finding was the need to better articulate how the regional planning system works to achieve Healthy Aquatic Ecosystem goals.✓ The review lists ten challenges to achieving the goal of Healthy Aquatic Ecosystems and provides two recommendations for meeting the challenges presented (pg.28).✓ Presents Water for Life strategy for Knowledge and Research key direction goal, description, and outcomes as well as the status of actions taken to achieve the key direction.✓ The assessment found that "substantial gains were made and are expected to continue with the implementation of the Alberta Water Research and Innovation Strategy (2014), the groundwater inventory program, and the collection and dissemination of information by <i>Water for Life</i> partnerships" (pg.42).✓ The review lists five challenges toward the Knowledge and Research key direction and offered four recommendations for meeting the challenges presented (pg. 42).✓ Key themes are provided in the overall assessment beginning (pg. 56) and includes "Address Gaps and Weaknesses" found in the <i>Water for Life</i> strategy at the time of review.
<u>Wetland Policy Implementation Review TOR (Draft 2020)</u>	<ul style="list-style-type: none">✓ Began as an ad hoc discussion group to explore a potential high priority review of the implementation of the Alberta Wetland Policy (AWP).✓ The ad hoc group transitioned to a standard AWC working group and proposed this Terms of Reference✓ The project team will operate in a manner that is consistent with the rules, policies and procedures adopted by the AWC✓ The purpose of the review is twofold: identify potential performance measures for the goal, outcomes, and strategic directions of the AWP; and describe the challenges, opportunities, or unintended consequences experienced by sectors in the implementation of the AWP.✓ The review will support continuous improvement & public reporting on the efficiency and effectiveness of wetland policy implementation.✓ The TOR outlines (3) objectives and (3) key tasks and includes a timeline of deliverables with the final report submission goal of March 2021

6.1.4a Regulatory Frameworks: Government Documents	
<i>The existence and level of implementation of wetland management regulatory frameworks to foster enforcement and compliance, and to protect the public interest.</i>	
<u>Wetland Regulatory Requirement Guide</u>	<ul style="list-style-type: none"> ✓ The purpose of this document is to improve public knowledge of the regulatory instruments and processes applicable to the Alberta Wetland Policy Implementation. ✓ The guide identifies the primary legislation, and requirements applicable to wetland administration, and aims to provide clear, consistent, and transparent information about requirements. ✓ Definitions and links to other pertinent documents are included. ✓ The 2013 policy has requirements and specific pieces of the legislation that must be complied with to carry out an activity in a wetland. ✓ "Wetlands are administered under both the Water Act and the Public Lands Act. Activities or water diversions that may impact wetlands may require approval, authorization, a licence and/or a disposition under both Acts. In addition, compliance with other legislation, both provincial and federal (e.g., Species at Risk Act), may be required before proceeding" (pg.1). ± These requirements may be affected by the UCP Red Tape Reduction Strategy (2019-2023) which may improve cost-effectiveness. ✓ AEP is the lead agency for key regulatory wetland management functions. The AER provides regulatory functions related to oil and gas, but always under AEP leadership. ✓ <u>AEP</u> and <u>AER</u> both run compliance and enforcement programs under the authority of the Water Act, Public Lands Act, and EPEA.

6.1.4b Regulatory Frameworks	
<i>The extent to which key wetland regulatory functions are entrusted to and carried out by responsible authorities.</i>	
<u>Alberta Environment and Parks Business Plan 2019-2023</u>	<ul style="list-style-type: none"> ± The Ministry of Environment and Parks outcomes are as follows: environment and ecosystem health and integrity; sustainable economic development; public well-being; public health and safety from environmental conditions and events. This is the umbrella that wetland regulations fall under. ✓ <u>AEP</u> runs compliance and enforcement program under the authority of the Water Act, Public Lands Act, and EPEA ± Alberta Environment will issue an information bulletin to media on all Water Management Orders, Enforcement Orders and Environmental Protection Orders issued to companies, organizations or municipalities under the EPEA, the Climate Change and Emissions Management Act and the Water Act if it is deemed to be in the public interest and does not interfere with the file or issue. ✓ When individuals, companies, or municipalities fail to comply with our legislation, the department has several options depending on the offence to ensure compliance including warning letters, tickets and administrative penalties, enforcement, environmental protection, and water management orders, and prosecution. ✓ AEP has the right to enter or gain access to any place, except a private dwelling, for the purposes of the Water Act. ✓ The investigator's powers including requiring that equipment be set into operation, taking photographs or copies of documents, and making reasonable inquiries of people. ✓ It is against the law to interfere with the work of an inspector or investigator carrying out their duties.
Alberta Energy Regulator (AER)	<ul style="list-style-type: none"> ± Mandate and Roles Document developed collaboratively among AEP Minister and the Minister of Energy and the AER to reflect a common understanding of their respective roles and responsibilities. ± Under the Responsible Energy Development Act, the AER is responsible for reviewing Water Act applications and submissions related to Alberta's energy resource industry. ✓ AER aims to ensure that companies use and manage water safely by reviewing energy resource applications that relate to the Water Act; issuing water approvals for energy resource activities that occur in or near water bodies, including wetlands; issuing water licences and temporary diversion licences for energy resource operations that require water; requiring companies to have a licence before using surface water and groundwater; and allocating the amount of water companies can use. ✓ If the AER finds a company is not following regulations under the Water Act, they will enforce compliance using various tools. ✓ AER runs a compliance and enforcement program under the authority of the Water Act, Public Lands Act, and EPEA. ± The AER has gone through several reorganizations and their ability to carry out regulatory functions is compromised on some level as evidenced by Auditor General reports

6.1.4c Regulatory Frameworks	
<i>The existence and level of implementation of regulatory tools for the wise use of wetland management.</i>	
<u>Alberta Wetland Mitigation Directive</u>	<ul style="list-style-type: none"> ✓ Wetland mitigation is the main regulatory tool used to inform planning and decision-making to avoid and minimize negative impacts to wetlands and, where necessary, to replace lost wetland area and value. ✓ The document references the following documents: Alberta Wetland Policy • Alberta Wetland Regulatory Requirements Guide • Alberta Wetland Assessment and Impact Report Directive • Alberta Wetland Identification and Delineation Directive • Alberta Wetland Restoration Directive • Directive for Permittee-Responsible Wetland Construction in Alberta • Alberta Guide to Wetland Construction in Stormwater Management Facilities ✓ Wetland mitigation establishes a hierarchy approach to managing wetland impacts in Alberta: 1. Avoidance, 2. Minimization, 3. Replacement ✓ Mitigation is not new in Alberta, but the way it is being implemented has some new features. ± Wise use of wetlands is not discussed in the document. ± Although avoidance "is the highest priority for wetland mitigation" it is not clear that this is ever chosen according to the literature.
<u>Alberta Wetland Policy Implementation GoA Website</u>	<ul style="list-style-type: none"> ✓ The website provides an overview of the AWP strategic direction and tools required to: "allow for continued growth and economic development in the province; make informed management decisions in the long-term interest of Albertans; minimize the loss and degradation of wetlands." ✓ Policy goal is to "conserve, restore, protect and manage Alberta's wetlands to sustain the benefits they provide to the environment, society and economy" and include the four outcomes to achieve the goal. ✓ The page includes a link to the policy itself and then also lists all of the policy requirement and tools under the following categories: planning and legislative alignment; wetland assessment; wetland mitigation; wetland replacement; application submission; wetland professional practice standard; additional resources and planning tools; and fact sheets. ± Does not address cost in any way and protection of the public interest is assumed. ✓ Also included is a disclaimer about inconsistencies and contact information for questions related to activities regulated by the AEP and AER within a wetland.
<u>Compliance Assurance Management Framework</u>	<ul style="list-style-type: none"> ✓ This policy document describes the business of Compliance Assurance for the issuing department, setting out goals, core principles and supporting policies. ✓ The purpose of the document is to support consistent, coordinated and effective delivery of the Compliance Assurance Program, and to provide a guide for all Albertans, including stakeholders and industry, on environmental compliance and performance expectations and how they will be achieved. ✓ This framework sets out environmental, resource management/protection and conservation obligations and requirements for all Albertans. ✓ The regulatory framework, or set of "rules," is a fundamental component in achieving this goal. ✓ We develop and implement a <i>Compliance Assurance Program</i> to ensure there is compliance with the statutory framework and regulatory requirements. ✓ The compliance assurance approach is based on three main components: Education, Prevention and Enforcement ± This document is not specific to wetlands, but applies to the environmental legislation that protects wetlands
<u>Wetland policy regulatory overview diagram</u>	<ul style="list-style-type: none"> ✓ This is a visual representation of the wetland regulatory process in Alberta. ± It provides an overview and preassessment of the required steps to impact a wetland. ± It touches on avoiding the wetland impact altogether but does not necessarily encourage it.

6.2.1a Wetland Functions and Benefits Featured in Policies and Strategies: Government Documents	
<p>The existence and level of implementation of information that relates to the ecosystem services provided by wetland ecosystems in policies, management plans, strategies and/or other relevant documents that are disseminated to key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture, fisheries at the local level.</p>	
<u>Alberta Wetland Policy (2013)</u>	<ul style="list-style-type: none"> ✓ The overview on (pg.2) outlines the policy goal and its outcomes and key terms such as "sustain the benefits they provide," wetlands of the highest value are protected," and "wetlands and their benefits are conserved and restored," generally point to the ecosystem services provided by wetlands. ✓ The policy also addresses the diversity in wetland form, function, use and distribution, then introduces how wetland value will be assessed using measures associated with ecosystem service functions (abundance on the landscape, supported biodiversity, ability to improve water quality, flood reduction, and human uses). ✓ This policy guides the wetland management program in Alberta and all key sectors who want to disturb a wetland are subject to the policy requirements and regulations ✓ The policy is "built in" to the <i>Water for Life</i> strategy specifically under the "Healthy aquatic ecosystem" (HAE) goal. The <i>Water for Life</i> strategy could be included as government document for this indicator, but it would have received the same baseline, and so was simply included here. ✓ The completion and implementation of the wetland policy is a key action toward the HAE goal ✓ The GoA "has worked in ongoing partnership with stakeholders, First Nations and Métis, and technical experts from a wide range of sectors, including agriculture, forestry, environmental non-governmental organizations, oil and gas, land development, and other levels of government (municipal, federal)" (pg.9) to develop the wetland policy. ✓ Wetland value and functional groups are addressed (pg.12) and wetland value criteria and categories are discussed on (pg.13) ± The policy mentions (pg.2), defines (pg.4), and provides direction and guidance for assessing the ecosystem services provided by wetland for wetlands that may be impacted by development ± Education and outreach are identified as a policy "system need" so that "Albertans appreciate the value and importance of wetlands to the environment and human health" thus "[a] comprehensive education and outreach [sic] will help ensure a common understanding of these benefits" (pg.21).
<u>Biodiversity Management Frameworks and Regional Plans (2014)</u>	<ul style="list-style-type: none"> ± Both the LARP and SSRP <i>commit the government to complete</i> a biodiversity management framework for each region. BMFs are cumulative effects management approaches designed to address the need for biodiversity monitoring and management. The management frameworks will support the conservation and management of biodiversity affected by land-use activity in a region. It is not intended to address all aspects of biodiversity. It will be developed and implemented to add to and complement, not replace or duplicate, existing policies, legislation, regulations, and management tools. Its primary features are regional objectives, key indicators, a monitoring approach, and identification of management actions to support meeting those objectives. ± The BMF <i>will</i> identify key indicators of biodiversity. It will focus on indicators that represent the broad range of biodiversity in the region including key species, important habitats, and landscapes important to sustaining long-term ecosystem health. Indicators will be closely linked to the biodiversity outcomes and objectives identified in the regional plans. ± A snapshot of how the indicators will work shows how the indicators are organized into a three-dimensional pyramid of four layers with a total of 12 indicators specific outcomes for each layer (pg.2). The layers represent the health of terrestrial and aquatic species populations and terrestrial and aquatic habitat health. ± The criteria for selecting indicators is also shown in a bulleted list (pg.2). ± The document shows that the current target dates for engagement began in 2014 for both the LARP and SSRP. ± A <u>Draft Biodiversity Management Framework</u> exists for the LARP but remains incomplete and not ready for release ± <u>Surface Water Quality Management Framework for LARP</u> is distinct from BMFs but offers a section about the characterization of the aquatic ecosystem in the region, and that fish habitat and populations have been chosen as key indicators of ecosystem health. ± <u>Surface Water Quality Management Framework for SSRP</u> is distinct from BMFs but offers some insight into monitoring aquatic ecosystem elements in the area. "Fish indicators for the region are anticipated to be addressed through the development of a separate biodiversity management framework for the South Saskatchewan Region and would also be considered in management response investigations related to increases in water quality indicator levels" (pg.36). ± <u>Environmental Management Frameworks for the South Saskatchewan Region</u> defines what an EMF is, what it does, key steps, and discusses cumulative effects, but offers nothing more. ± <u>South Saskatchewan Region status of management response for environmental management frameworks as of October 2019</u> mentions that "Work is underway to assess whether the limit exceedances are resulting in unacceptable risk to aquatic life and other surface water quality uses at the affected location" (pg. i)

<u>Biodiversity Conservation Guide for Farmers and Ranchers in Alberta</u>	<ul style="list-style-type: none"> ✓ The guide begins by defining biodiversity and explaining its importance to agricultural producers and to our world. ± Defines "ecosystem" (pg.5) and mentions that "Wetlands are collecting runoff and replenishing groundwater that tops up water wells" (pg.5). ± "The most biologically diverse ecosystems are generally those least altered by human activities. Areas like native grasslands, native bush, uncultivated fencelines and riparian areas (e.g., sloughs, creeks, river bottoms) are biodiversity "storehouses" benefiting the entire landscape. Because of this, biodiversity conservation tends to focus on native areas and their management" (pg. 5). ± Biodiversity is mentioned and defined in the context of an essential benefit to farms and ranches, "Biodiversity is like money in the bank for your farm or ranch" (pg. 6). ✓ Discusses how farmers and ranchers across Canada are taking action to conserve biodiversity. ✓ Recommendations to maintain and restore wetlands (and other landtypes) on pg. 12. ✓ The guide explains six basic principles of biodiversity conservation and, for each principle, lists supporting actions. ✓ These general principles and actions can be adapted to suit the specific situation of the landowner. ✓ The guide concludes with information to help farmers and ranchers take action to conserve biodiversity. It outlines the steps in developing and implementing a biodiversity conservation plan. And it lists agencies that provide financial/technical assistance to Alberta farmers and ranchers for biodiversity conservation.
<u>Fish Conservation and Management Strategy for Alberta</u>	<ul style="list-style-type: none"> ✓ ESRD has a mandate to develop an integrated resource management system, other mandates are related to biodiversity management, public lands management, forest management, water management, enforcement and monitoring ✓ Specifically, it is designed to reflect and utilize the scientific understanding of the health of fish populations and fish habitat across all provincial watersheds and the conservation and protection measures needed to sustain them. ✓ Fisheries management objectives, species management plans, waterbody management plans will help to manage fish populations and habitats and will likely inform aspects of other mandates. ✓ Fisheries Management and Fisheries Conservation graphic (pg.20) ✓ The Fish Sustainability Index (FSI) is a new approach for assessing, summarizing, and communicating the status of fish populations in Alberta. The FSI process is not a new way to collect data, but a new way to organize, use, and present it. It uses information already gathered by standardized fisheries data collection and methods of analysis. ✓ The Index of Native Fish Integrity (INFI) is a technique to assess the health of fish communities. This index is used to support the development of regional plans. The INFI provides an overall score of the current health of a fish community, relative to an unaltered state. ✓ Since wetland ecosystems can also be fish habitats, this strategy will be useful for achieving the goals of the wetland policy and the <i>Water for Life</i> strategy

6.2.1b Wetland Functions and Benefits Featured in Policies and Strategies: Planning Documents	
<p>The existence and functioning of personnel, groups or institutions responsible for assessing, documenting, and disseminating information that relates to the ecosystem services provided by wetland ecosystems to Alberta's key sectors.</p>	
<u>Alberta Conservation Information Management System (ACIMS)</u>	<ul style="list-style-type: none"> ✓ Established in 1996 as the Alberta Natural Heritage Information Centre (ANHIC) was created as a partnership to address the need for credible data for protected areas planning and management. ✓ Now called the Alberta Conservation Information Management System, ACIMS is an integral part of Parks Division and is a member program of NatureServe and NatureServe Canada. ✓ ACIMS is a data centre that provides biodiversity information on Alberta's species, natural ecological communities, and sites. Information about the location, condition, status, and trends of selected elements is collected, updated, analyzed, and disseminated. ± ACIMS collects, analyzes, and disseminates information on elements of natural biological and physical diversity for species, ecological communities, and landform elements (not necessarily for assessing wetland ecosystem services but provides important physical data that could be applied toward ecosystem services research). ✓ Ecological communities can be separated into three major types: terrestrial; wetland; and aquatic. ✓ Alberta Conservation Information Center Ecological Community Sampling Guidelines is a guide for people engaged in fieldwork to characterise a study area for the purpose of documentation, study, research. ✓ Assessing Similarities Between Observed Ecological Communities supports people engaged in fieldwork that aims not to classify the vegetation the site but rather document the "vegetation and floristics." ✓ Alberta Conservation Information Management System Ecological Community Tracking List - Biological elements are ranked and those that current information suggests are rare or of conservation concern for other reasons are put onto tracking and watch lists. Additional information, such as location and condition, is collected for tracked and watched elements and locations for tracked elements are mapped in a Geographic Information System (GIS). ✓ All conservation data centres in the NatureServe network use a common vocabulary of terms and concepts: elements of biodiversity - plant and animal species, infraspecies, ecological communities and other non-taxonomic biological entities (e.g., migratory species aggregation areas), element occurrences - specific locations of those elements on the landscape, existing managed areas - like parks, protected areas sources of additional information. ✓ The site has a mapping tool that provides access to ACMIS data. It requires requester identification, reason for request, township, range, and meridian to access.
<u>A Cost Assessment of Ecosystem Services Procurement Using Three Mechanisms</u>	<ul style="list-style-type: none"> ✓ A Cost Assessment of Ecosystem Services Procurement Using Three Mechanisms: Outright Purchases, Conservation Easements, and ALUS. ✓ This project was commissioned by ALUS Canada to compare the costs of procuring ecosystem services from agricultural land using the ALUS program model of annual payments with the costs of alternative procurement through land securement via easements and purchases. ✓ Procurement costs were estimated using methods from the literature on agricultural economics and ALUS data on actual program delivery costs. ✓ The key message is that ALUS can enable ecosystem service procurement in areas that cannot be easily accessed using easements and purchases at a comparable or lower cost. Conversely, ALUS projects are likely not ideal to conserve large areas of land as economies of scale make easements more economical.
<u>Alberta Biodiversity Monitoring Institute Strategic Plan: 2020-2023</u>	<ul style="list-style-type: none"> ✓ The ABMI is a not-for-profit, non-regulatory, arm's-length Institute that is delivered jointly by the University of Alberta, the Royal Alberta Museum, and InnoTech Alberta. ✓ ABMI has been implementing and managing science-based programs to monitor and report on the changing state of biodiversity throughout the province of Alberta. ✓ Board of directors includes representatives from the GoA; environmental nongovernmental organizations; forestry, energy, and agriculture sectors; and the research community. ✓ The ABMI tracks "changes in Alberta's wildlife and their habitats from border to border, and provide ongoing, relevant, scientifically credible information on Alberta's living resources. For Alberta's land-use decision makers. For Albertans" (pg.2). ✓ Priority 1 is "Monitoring Alberta's Landscapes and Biodiversity" to meet the needs of decision-makers by acquiring high-quality scientific data, supports environmental assurance. ± Outcomes related to wetlands and this indicator are: "Collection of specimens and data, and release of resulting provincewide upland and wetland data layers, human footprint, field-based species data," "One new monitoring standard (protocol) developed that can be used across organizations," and "Ecosystem Health program design complete and updated" (11). ± Priority 3 is "Working Collaboratively" with other monitoring organization, delivery partners and research community. ± Wetland ecosystem services are not directly addressed in this document.
<u>Alberta NAWMP 2018 Forum</u>	<ul style="list-style-type: none"> ✓ 'Alberta NAWMP's 2018 Forum, The Dollars and Cents of Wetlands, brought together 50 wetland professionals ✓ other stakeholders to gain a broader understanding of wetland economics and consider new outlooks on an often-contentious topic. Nine speakers with diverse backgrounds talked about such issues as: determining monetary values for wetland ecosystem services; economic challenges for different stakeholders in retaining wetlands; and economic incentives for wetland conservation.

<u>DUC Annual Report 2020</u>	<ul style="list-style-type: none">✓ DUC estimates that the total economic value of the 6.5 million acres (2.6 million hectares) of habitat under DUC's care is \$5.4 billion.✓ The estimate is for all of Canada, not just Alberta. They break down the figure in 3 ways: \$244.3 million in nature-related recreation and tourism; 90.3 million in GDP; 5.1 billion in environmental benefits.
<u>Incorporating Wetland Carbon Values into Spatially Explicit Tools to Inform Land Use Decisions</u>	<ul style="list-style-type: none">✓ This document outlines the important of wetland ecosystem services provision particularly for carbon sequestration but also a number of other functions.✓ It presents the problem of wetland loss and recommends "decision-support tools to better inform future land-use decisions.✓ The project generated "spatially explicit decision support tools that represent the distribution of wetland-related soil organic carbon stores throughout the Prairie and Boreal Plain Ecozones.✓ The tools could effectively guide the conservation of wetland-related soil organic carbon stores (pg. 3)✓ The tools could also serve as the foundation for developing conservation offset programs that ensure sustainability of wetland functions (pg.3)✓ Other applications of the tools could facilitate avoidance and minimization (pg.4)

6.2.1c Wetland Functions and Benefits Featured in Policies and Strategies: Monitoring Documents	
The existence and level of implementation of mechanisms that determine or are capable of measuring the ecosystem services provided by wetland ecosystems.	
Alberta Wetland Rapid Evaluation Tool- Actual (ABWRET-A) Guide	<ul style="list-style-type: none"> ✓ As a result of the Alberta Wetland Policy (2013) a system to determine the relative value of a wetland was developed ✓ Relative wetland value is determined by examining 5 characteristics: the relative abundance of a wetland on a landscape, human uses of the landscape, the ability of the wetland to improve water quality, the hydrologic function of the wetland, and the ability of the wetland to support biodiversity. ✓ Once these values have been assessed the wetland is assigned a value category from A (highest value) to D (lowest value). ✓ Determining the relative value of a wetland will allow land use planners, developers, and decision makers to consider the wetland in the context of the landscape and adapt management decisions. ✓ ABWRET-A is a standardized method for rapidly assessing some of the important natural functions of all types of wetlands present in Alberta. The "A" stands for "actual", meaning it uses on-site observations and off-site spatial data to inform the regulatory relative value of a wetland. ✓ ABWRET-A tool may be used to assess any wetland located in the Boreal and Foothills Natural Regions of Alberta.
Wetlands and their Benefits: Review and Synthesis of Tools and Models Assessing Wetland Function and Ecosystem Services (2017)	<ul style="list-style-type: none"> ✓ This report was completed by Native Plant Solutions and Ducks Unlimited Canada and submitted to ABMI and Alberta NAWMP. The following points are taken directly from the Executive Summary (pgs.2-4). ✓ A literature review to synthesize the potential tools and models available for wetland ecosystem service assessment in Alberta ✓ Eight regulating, cultural, and supporting ecosystem services for wetlands were prioritized for review of potential tools and models for application. These included flood control, water purification, water supply and storage, climate regulation, recreation and tourism, science and education, aesthetic, and biodiversity ✓ Thirteen tools and models were selected for further review in terms of their potential for application in Alberta. ✓ Each tool had varying degrees of skill-level requirements, documentation, data input requirements, scale, applicability to wetlands, and applicability to Alberta. ✓ There were generally three types of tools and models reviewed: ecosystem function models, area-based ecosystem service models, and ecosystem service planning tools. ✓ Potential opportunities and limitations for application in Alberta were presented for the tools and models reviewed for each ecosystem service. ✓ Also investigated other jurisdictions where a wetland ecosystem service assessment has been developed as a tool or applied on the landscape in association with planning or policy. ✓ Key recommendation was to pair ecosystem service assessment with strong wetland policies that encourage wetland restoration and/or protection. ✓ 7 guiding principles for recommendations on assessment: 1. Identify the key wetland ecosystem services for assessment. 2. No one tool will be capable of assessing all wetland ecosystem services. 3. Favour tools/models that include wetlands. 4. Identify resolution required and data available. 6. Consider user and their skillsets. 6. Consider the output. 7. Weigh biophysical assessment versus economic valuation. ✓ 8 indicators were identified as priorities for data requirements, many of which were common across the tools and models evaluated: 1. A wetland inventory. 2. A land use map. 3. Topography/elevation/LiDAR/DEM. 4. Watershed/sub-watershed boundaries. 6. Soils data. 6. Climate data. 7. Population data. 8. Infrastructure data. ✓ The jurisdictional review provided insight into key considerations for successful ecosystem service application for land management: 1. Pair ecosystem service assessment with strong policy and regulatory requirements. 2. Proceed with both internal and external reviews. 3. Track usage. 4. Weigh the opportunities versus limitations of economic valuation. 6. Ensure that the tool can be used by the intended audience. 6. Create a well vetted process for establishing a list of prioritized ecosystem services. ✓ The tool models, analysis scale, analysis type, data input, supporting documentation needs, whether or not it has been previously applied in AB, and what services can be measured is summarized on (pg.5) ✓ The report mentions and defines ecosystems services provided by wetlands and delivers a summary of tools that are capable of measuring ecosystem services to the GoA
Ecosystem Services Assessment Project by the ABMI	<ul style="list-style-type: none"> ✓ Ecosystem Services Assessment Project Fact Sheet defines ecosystem services as the benefits that humans receive from nature that support our health and well-being ✓ Two main goals: To develop a system to assess and map ecosystem services across Alberta, and 2. To better understand how planning and management decisions affect the provision of ecosystem services. ✓ An example used in the fact sheet includes “estimates of water quality in a stream, wetland, or lake are based on an understanding of precipitation, topography and land use in a watershed. The value of water purification services provided in that watershed can then be determined by estimating what it would cost to build and operate infrastructure to provide clean drinking water or healthy fish habitat” (pg.2) ✓ The website and infographic describe a project that would be capable of meeting this indicator; however, the project is underway without any more information about when it will be completed or how.
How Can We Restore Your Wetland? (Alberta Living Laboratory Wetlands Project)	<ul style="list-style-type: none"> ✓ The Alberta's Living Laboratory wetlands project is a multi-year, interdisciplinary research project examining the science and economics of wetland restoration in Alberta. ✓ The project uses advanced techniques to create tools to predict the functions a wetland might provide if it is restored. ✓ Once wetlands are restored as part of the project, they will be studied on an ongoing basis, so that the accuracy of these tools' predictions can be assessed. ✓ Both the tools and the improved understanding that accompanies them will help inform policymakers and developers as they work with Alberta's new Wetland Policy.

6.2.2a Water Use Respects Wetland Ecosystem Needs: Government Documents	
The existence and level of implementation of water management plans, strategies, frameworks that consider the water needs of wetland ecosystems in Alberta.	
<u>Framework for Water Management Planning</u>	<ul style="list-style-type: none"> ✓ The goal of assuring that aquatic ecosystems are maintained and protected includes the outcome of management and allocation of water to sustain aquatic ecosystems and ensure their contribution to Alberta's natural capital and quality of life is maintained; a key action if to finalize and implement a new wetland policy for Alberta ✓ Water management plans are statutory plans developed under the Water Act. ✓ They provide guidance for regulatory decisions made under the Water Act, including the establishment of minimum in-stream flows, conditions on diversions, and strategies for the protection of the aquatic environment. ✓ When a water management plan is approved by the Lieutenant Governor in Council, it becomes an "Approved Water Management Plan" and must be considered when making water approval decisions. ± There are some water management plans approved in Alberta, but they are not specific to wetlands
<u>Strategy for the Protection of the Aquatic Environment</u>	<ul style="list-style-type: none"> ✓ This document is part of the Framework for Water Management Planning (1999). ✓ Recognizes that the environment is a complex natural system of interconnected parts. ✓ The strategy commits GoA to maintain, restore or enhance conditions of aquatic environments, and to maintain biological diversity. ✓ The strategy stipulates protection by taking action to sustain current conditions and to restore conditions to their natural state. ✓ Manages four inter-related aquatic ecosystem components: Water quantity – the amount of water available; Water quality – the chemical, biological, and physical characteristics of the water; Aquatic habitat – the physical and biological structure of the water body and the surrounding land; and Aquatic species – the plants and animals living in or associated with water bodies, wetlands, and riparian areas ± This strategy has the potential to consider the water needs of wetland ecosystems
<u>Alberta Surface Water Allocation Directive</u>	<ul style="list-style-type: none"> ✓ The Surface Water Allocation Directive provides guidance about lakes and wetlands and uses a cumulative watershed approach for water allocations. ✓ In a modification of the original Alberta desktop method recommendation, this directive provides water allocation rules where an objective of full ecosystem protection may not be met, allowing greater flexibility for human use but at a cost of increased risk to environmental values. ✓ The intent of this directive is to minimize the incremental risk by addressing cumulative allocation impacts for both rivers and lakes ✓ This directive incorporates the fundamental ecological principle of maintaining natural hydrologic variability. The natural flows and water levels in water bodies play a critical role in sustaining native biodiversity and ecosystem integrity. ✓ This directive is applicable where the following are absent and where the following do not already provide guidance on water allocation, principally: a Ministerial Order or decision of the Lieutenant Governor in Council; a water management plan or water conservation objective (Water Act); a Land-use Framework regional plan or environmental management framework (Alberta Land Stewardship Act). ✓ Water allocation guidance provided by transboundary agreements, codes of practice and fisheries management objectives take precedence over this directive.

6.2.2b Water Use Respects Wetland Ecosystem Needs: Planning Documents	
The existence and functioning of professionals working to identify, assess, calculate, evaluate, or advocate for the water needs of wetland ecosystems.	
<u>ANAWMP 2018-2019 Progress Review</u>	<ul style="list-style-type: none"> ✓ Identifies Alberta Environment and Parks (AEP) as the lead provincial agency responsible for the stewardship of Alberta's air, land, water and biodiversity. ✓ AEP administers the AWP, the objective of which is to conserve, restore, protect and manage Alberta's wetlands to sustain the benefits they provide to the environment, society and economy. ✓ Alberta NAWMP is dedicated and passionate about advancing wetland and waterfowl conservation through design, implement, fund projects that ultimately inform wetland and waterfowl conservation. ✓ NAWMP defines and prioritizes geographic regions across the continent based on their biological values for waterfowl and other wetland-associated birds. Its initiatives address regional and continental priorities, using a collaborative approach at local, regional, national and international levels. ✓ The NAWMP joint ventures in AB have developed a series of science-based habitat implementation guides. ✓ It is likely that the AWNAMP is engaged in work related to water needs of wetland ecosystems, but it is not an easily discernible topic within the document.
<u>Provincial Ecological Criteria for Healthy Aquatic Ecosystems</u>	<ul style="list-style-type: none"> ✓ AWC's development of ecological criteria to identify areas significant to maintaining aquatic ecosystem health. ✓ The report describes seven criteria as well as number of potential indicators, data sources and other guidance provided for each criterion. ✓ The fourth criterion would support this indicator because it would require knowing how much water is needed in an area which may include assessing wetland needs ✓ The development of these criteria is a useful first step if the recommendations are applied in the real world. ✓ This document was provided to the Government of Alberta who may or may not use it to inform the development of mapping and other tools for land use and watershed planners and decision-makers. ✓ Other governments, industry, conservation organizations and collaborative partnerships like Watershed Planning and Advisory Councils may also find this advice useful.
<u>Professional responsibilities in completion and assurance of wetland science, design and engineering work in Alberta</u>	<ul style="list-style-type: none"> ✓ As of May 1, 2017, Alberta Environment and Parks will require signoff of an authenticating professional on regulatory documents submitted under the Alberta Wetland Policy. ✓ These same individuals will provide professional oversight on wetland replacement projects. ✓ The mobilization of this highly qualified workforce will help provide assurance to Albertans that wetlands in the province are being managed to a high standard of professional excellence. ✓ AEP and ten Professional Regulatory Organizations in Alberta have collaboratively developed and agreed upon a common set of standards that define the responsibilities and requirements for authenticating professionals in the province. ± This seems like a nice program, but it is vague and not clear on the responsibilities of the professional to address water needs of wetland ecosystems in terms or restoration.

6.2.2c Water Use Respects Wetland Ecosystem Needs: Monitoring Documents	
The existence and level of implementation of mechanisms to determine ecological water requirements for wetlands in Alberta.	
<u>Desktop Method for Establishing Environmental Flows in Alberta Rivers and Streams</u>	<ul style="list-style-type: none"> ✓ A hydrology-based tool commonly referred to as the Alberta desktop method ✓ Identifies a method to estimate an ecologically based flow regime on the basis of reductions from natural flow or the per cent exceedance from natural flow. ✓ It also provides background information and a jurisdictional review of current environmental flows (commonly known as instream flow needs) knowledge in North American and international rivers. ✓ Mentions wetlands as an ecological service: "Aquatic ecosystems provide important ecological services, such as wetlands, helping to improve water quality, reducing flood peaks and recharging groundwater aquifers" (pg.6) ✓ It is designed to establish environmental flows but not necessarily designed to address wetland ecosystem needs. ✓ Can provide valuable information when considering environmental aspects in balancing natural river flows and water demand. ✓ The technical report provides a science-based water management tool that can support informed decisions regarding the environmental considerations of flowing rivers and streams of Alberta. ✓ Organizations with an advisory capacity are undertaking reviews of water availability and general planning, and this method provides an efficient way to assess environmental flow options.
6.2.3a Participatory Skills and Partnerships: Government Documents	
The existence and level of implementation of legal frameworks to engage stakeholders in wetland-related decision making.	
<u>Water Act RSA 2000 Chapter W3</u>	<ul style="list-style-type: none"> ✓ The Minister must, in a form and manner that the Minister considers appropriate, consult with the public during the development of the framework for water management planning. ✓ The Director or other person developing a water management plan must engage in public consultation that the Minister considers appropriate during the development of the water management plan. ✓ The Director must engage in public consultation that the Director considers appropriate during the establishment of a water conservation objective. ✓ The Minister must, in a form and manner that the Minister considers appropriate, consult with the public during the development of the aquatic environment protection strategy
<u>Alberta Land Stewardship Act SA 2009 Chapter A26.8</u>	<ul style="list-style-type: none"> ± Before a regional plan is made or amended, the Stewardship Minister must (a) ensure that appropriate public consultation with respect to the proposed regional plan or amendment has been carried out, and present a report of the findings of such consultation to the Executive Council, and (b) lay before the Legislative Assembly the proposed regional plan or amendment. ✓ In terms of the regional planning process, the Lieutenant Governor in Council MAY describe the public and stakeholder communication required ✓ Cabinet will: Provide provincial oversight of regional planning; Review and decide terms of reference for regional plans; Review and make final decisions on regional plans; Ensure integration of provincial land-use related policies; and Ensure regional plans are implemented to achieve provincial outcomes. ± The Stewardship Commissioner is responsible for overseeing the development, implementation, review and amendment of regional plans, and for reviewing complaints. The Stewardship Commissioner has the authority to investigate complaints about non-compliance and may issue Interpretation Bulletins if further explanation or clarification of the Act or regional plan is needed. ± The Land Use Secretariat (LUS) was established by the Alberta Land Stewardship Act as part of the public service of Alberta, but not as part of a government department. The LUS reports to a Stewardship Commissioner and works independently of a department. It is subject only to directives issued by the Stewardship Minister. ± The Secretariat: Supports development of the terms of reference for regional plans; Leads development of regional plans in conjunction with departments with an interest in land-use (regional planning teams) and in consultation with the Regional Advisory Councils; Communicates with local planning bodies to clarify and interpret plans; Supports policy reconciliation; Provides advice to regional bodies on provincial policy; Ensures effective management of cross-regional infrastructure and policy matters; Assists provincial departments, municipalities and other local authorities in reconciling their respective roles to the Land-use Framework; Provides administration infrastructure and support to Regional Advisory Councils; and Ensures application of cumulative effects assessments.
<u>Land-Use Framework</u>	<ul style="list-style-type: none"> ✓ Stakeholder engagement was part of the process in developing the LUF. From 2006 to 2008 there were several versions and iterations of engagement including gathering input and advice from a broad range of stakeholders, public consultations, questionnaires, working groups, and Indigenous People's consultations. ✓ The Regional Advisory Council will advise and participate in public and stakeholder consultation for the planning process. ✓ The process of developing the regional plans involves multi-stakeholder engagement ✓ The LUF formalizes regional planning whereas before land-use planning policies and strategies were uncoordinated and developed independently from each other and at different times

6.2.3b Participatory Skills and Partnerships: Planning Documents	
The existence and functioning of dedicated stakeholder engagement institutions or platforms, such as catchment-based authorities, decentralised assemblies, governing boards, subnational water councils or committees, as well as more informal forms of community-based engagement.	
<u>Regional Advisory Councils</u>	<ul style="list-style-type: none"> ✓ Regional Advisory Councils (RACs) are comprised of a cross-section of individuals who live, work, recreate/or have an interest in the region, and can strategically consider what is best for the entire region at a holistic level. ✓ Members are appointed by Cabinet through an open and transparent nomination process and will provide advice to the Government of Alberta based on a term of reference for developing each regional plan. ✓ Members are expected to provide their expertise and perspectives of the region and not represent their respective company or organization's position. ✓ Members are also expected to prepare for and attend all council meetings. Alternates are not allowed. ✓ RAC is asked to submit their advice to the Government of Alberta in the form of a Recommendation to Government report. Once RAC has delivered its report, government will engage Albertans through an online survey to obtain feedback on the recommendations.
<u>Alberta Water Council</u>	<ul style="list-style-type: none"> ✓ The AWC was established in 2004 and incorporated in 2007 as a not-for-profit society in 2007. ✓ IT is a collaborative partnership with 24 members from governments, industry, and non-government organizations. ✓ Its primary tasks are to advance the outcomes of Water for Life, provide advice that informs policy or actions, and provide a forum to discuss water perspectives. ✓ The AWC is one of three partnerships identified in the Water for Life strategy.
<u>Watershed Planning and Advisory Council (WPACs)</u>	<ul style="list-style-type: none"> ✓ Watershed Planning and Advisory Councils (WPACs) are independent, non-profit organizations that are designated by Alberta Environment and Parks to report on the health of our watersheds, lead collaborative planning, and facilitate education and stewardship activities. ✓ WPACs are one of three partnerships identified in the Water for Life strategy ✓ WPACs engage representatives of key stakeholders in the river basin area, including municipal, provincial and federal governments; industrial sectors; conservation groups; aboriginal communities; academia; the public ✓ WPACs seek consensus on land and water resource management strategies that support the achievement of shared environmental, social, and economic outcomes for the watershed. ✓ Within Alberta there are currently 11 WPACs representing the major river basins: Athabasca Watershed Council; Battle River Watershed Alliance; Bow River Basin Council; Lesser Slave Watershed Council; LICA – Beaver River Watershed; Mighty Peace Watershed Alliance; Milk River Watershed Council Canada; North Saskatchewan Watershed Alliance; Oldman Watershed Council; Red Deer River Watershed Alliance; South East Alberta Watershed Alliance ✓ <i>Water for Life</i> provided WPACs with a mandate to support multi-stakeholder collaboration and community engagement within four main program areas: Education and Outreach; Environmental Stewardship Watershed Evaluation and Reporting; Watershed Management Planning
<u>Watershed Stewardship Groups</u>	<ul style="list-style-type: none"> ✓ Watershed stewardship groups (WSGs) are community, volunteer-based partnerships actively engaged in environmental stewardship of their watershed. ✓ They include individuals, organizations, agriculture, industry, municipalities and other forms of local government and set common goals to achieve shared outcomes. ✓ WSGs are one of the three partnerships identified in the <i>Water for Life</i> strategy ✓ Currently there are over 140 stewardship groups in Alberta undertaking a wide variety of activities. ✓ Watershed Stewardship Grants are made possible with funding from AEP ✓ The Land stewardship Centre has an interactive online WSG StoryMap where the public can learn about grant recipients and their stewardship projects

6.2.3c Participatory Skills and Partnerships: Monitoring Documents	
The existence and level of implementation of mechanisms to diagnose challenges and risks in activities related to decision-making in water or wetland management.	
<u>Enabling Partnerships: A Framework in Support of Water for Life</u>	<ul style="list-style-type: none"> ✓ The purpose of this document is to describe how landowners, communities, organizations, industry, and governments can get involved in timely and effective actions for the sustainable management of Alberta's watersheds. ✓ Identifies WPAC as a mechanism to find solutions to challenges faced by a watershed because of their mandate (see WPACs in previous section) and access to resources. ± Not specific to wetlands, but rather decision-making related to water-management in general which may include wetlands, depending on the specific scenario. ✓ Describes in detail the mandates of all Water for Life Partnerships identified in the strategy: AWC, WPACs, and WSGs ✓ This guide could assist someone in determining who to go to for help in diagnosing or addressing challenges and risks related to decision-making related to water or wetlands ✓ It shows the Adaptive Management Approach to Watershed Management (pg. 9) where the cycle involves planning, implementing, monitoring and reporting, review and evaluate, and identifies "trigger" as the way to identify and assess watershed issues in a 'state of report' ✓ Implementation guidelines are offered for the different scenarios presented
<u>Consensus Decision-Making Toolkit</u>	<ul style="list-style-type: none"> ✓ This toolkit is designed for an organization that has an issue or conflict to address. The following points are taken directly from the document. ✓ The document consists of screening tool; necessary conditions for consensus; communication checklist; checklist for staying on course; reaching consensus and dealing with blocks to consensus; implementing and monitoring checklist; designing terms of reference; sample communication tools; and checklist for successful meetings. ✓ This screening tool will help determine whether the issue is suited to being resolved through a consensus decision-making (CDM) process. ✓ The tool contains a list of considerations to explore and provides insights on the conditions that should be in place before submitting an issue to a CDM process. ✓ After conducting the analysis, the user will be able to determine whether a CDM process is the right approach for the issue. ✓ Although not specific to water or wetland-decision-making, the CDM process can be applied to any context where multi-stakeholders are involved
<u>A Guide for Developing State of the Watershed Reports in Alberta</u>	<ul style="list-style-type: none"> ✓ Characterizing the current state of one's watershed, its problems, and the pressures upon it can provide the basis for developing effective management strategies to meet watershed goals. ✓ <i>Water for Life</i> outcome that "Albertans have the knowledge, tools, and motivation to implement actions that will maintain or improve the province's water resources was one impetus behind drafting this guide ✓ Introduces users to the concept of watershed-scale assessments via watershed health indicators and includes an extensive listing of data and information sources from across the province. ✓ It is intended to serve as an informative reference guide to "non-technical audiences" interested in assessing and reporting on the state of their local watershed. ✓ This level of reporting is expected of the province's Watershed Planning and Advisory Councils, but it is also recognized that a number of local community-based watershed stewardship groups are also pursuing development of state of the watershed reports to assist them in better directing their stewardship activities. ✓ A state of the watershed assessment has often been likened to a medical screening for human health; it identifies potential problems and issues that require further investigation
<u>Guide to Watershed Management Plans</u>	<ul style="list-style-type: none"> ✓ Integrated Watershed Management Plans (IWMPs) IWMPs are the second key deliverable produced by Watershed Planning and Advisory Councils (WPACs). ✓ These plans provide advice to governments and agencies that have policy and regulatory decision-making authority for land and resource management. ✓ Collaboration is central to the development of IWMPs, which are based on consensus agreement and inclusive participation of stakeholders and community representatives from within the watershed. ✓ Provides advice on the steps to develop and implement a watershed management plan based on the iterative process of adaptive management. ✓ Offers WPACs and WSGs a useful reference for their planning activities. ✓ Informs other collaborative community-led watershed management planning projects and programs about appropriate planning processes. ✓ Outlines Terms of Reference of a Watershed Management Plan. Recommends identifying "Outstanding Watershed Issues" to describe any high-profile issues that stakeholders have identified that may affect long-term decision-making and sustainable development in the watershed. It recommends that these issues be addressed through the watershed management plan process. ✓ Recommends establishing the structure under which participants will contribute which includes developing operating principles for all established committees. ✓ Operating principles define, for each committee, its role, the specific tasks it is responsible for, its decision-making powers, and its reporting requirements. The operating principles should be developed by the respective committee during the initial few meetings and be approved by the next higher level of authority (e.g., the technical committee's operating principles would be approved by the steering committee).

6.2.4a Invasive Alien Species: Government Documents	
The existence and level of implementation of policy that address invasive alien species with respect to wetlands.	
Alberta Aquatic Invasive Species Program Annual Reports	<ul style="list-style-type: none"> ✓ Within the Ministry of Environment and Parks, the Alberta Aquatic Invasive Species (AIS) Program is led by the Fish and Wildlife Policy Division. ✓ Program is supported by Operations Infrastructure (watercraft inspections), Alberta Support and Emergency Response Team (ASERT—response planning), the Environmental Monitoring and Science Division (EMSD—monitoring), Parks (education, monitoring, roving inspections), Community Engagement Branch (graphic design, education strategies and materials), and Communications (social media and advertising); and three dedicated full-time staff in the AIS program. ✓ The program benefits from a lot of “in kind” support, from both cross-ministry government staff, as well as essential non-government stakeholders. ✓ The Alberta AIS Program includes five elements: 1. Policy and Legislation, 2. Watercraft Inspections, 3. Education and Outreach, 4. Monitoring, and 6. Response. ✓ Alberta Invasive Species Council (AISC) is a not-for-profit society dedicated to informing and educating Albertans about the destructive impacts invasive species have on our environment, economy, and society. ✓ The program aims to foster partnerships with jurisdictions, agencies and groups to collaboratively develop integrated, long-term management programs, and to engage and empower people to take action against invasive species in Alberta. ± Wetlands are included in the program, but it is not clear if there is an aspect dedicated to invasive species in wetlands specifically ± Annual reports for the program are only available until 2017, and it is not clear if they were continued elsewhere or what happened to them.

6.2.4b Invasive Alien Species: Planning Documents	
The existence and level of functioning of plans and strategies that aim to identify, address, reduce or eradicate invasive alien species with regards to wetland ecosystems.	
Alberta Invasive Alien Species Management Framework Draft	<ul style="list-style-type: none"> ✓ The Invasive Alien Species Risk Management Framework (the Framework) is a systematic process intended for use by governments, private companies and individuals to efficiently and effectively manage invasive species in Alberta. The Framework (Figure 1) is a risk-based approach to identifying existing and potential invasive species, assigning a management authority, assessing the potential environmental, economic, and social effects, and outlining management options. ✓ This is a draft, and it is not clear how it is or will be implemented
Strengthening Invasive Plant Management in Alberta	<ul style="list-style-type: none"> ✓ Alberta has about one-half the total number of invasive plant species present in Canada (279/580 species). ✓ preventive strategies should be devised and effectively implemented, including an evidence-based approach to invasive plant management. This approach includes the use of risk assessments, economic analyses, species distribution models, field studies to quantify invasive species impacts and control efficacy in local ecosystems. ✓ This report identifies a lack of science and applied research in invasive plant programs in Alberta and recommends that scientists and practitioners should begin to work together on areas of mutual interest. ✓ Working together would likely be an increase in management effectiveness, and a stronger business case for both invasive plant management and science.

6.2.4c Invasive Alien Species: Monitoring Documents	
The existence and level of implementation of mechanisms for dealing with invasive alien species in Alberta.	
<u>Alberta Aquatic Invasive Species Early Detection Rapid Response Plan</u>	<ul style="list-style-type: none"> ✓ Contact information for AIS 24-hour line (reporting and inquiries), 24 Hour Environmental Emergency/Complaint (ASERT), Alberta Support & Emergency Response Team Office, Aquatic Invasive Species Program, Alberta Environmental Monitoring, Evaluation & Reporting Agency (No longer exists), Alberta Parks, Alberta Irrigation Projects Association, Alberta Irrigation and Agriculture, Emergency Management Services, Agriculture and Forestry ✓ -Aquatic Invasive Species Rapid Response Task Team Regular Members are made up of representatives from ministries, companies and organizations that regularly participate in the ongoing business of the team including: Ministry of Environment and Parks (AEP) – Fish and Wildlife Policy Branch, Alberta Support and Emergency Response Team, Operations, Infrastructure and Parks Division; Ministry of Agriculture and Forestry; Science and Monitoring; Eastern Irrigation District (EID); TransAlta; Alberta Irrigation Projects Association (AIPA); Ministry of Justice and Solicitor General
<u>EDDMapS Alberta</u>	<ul style="list-style-type: none"> ✓ Early Detection and Distribution Mapping System (EDDMapS) that offers real-time tracking of invasive species occurrences; local and national distribution maps, electronic early detection reporting tools; and a library of identification and management information ✓ EDDMapS Alberta is a state-of-the-art invasive species tracking and reporting program, currently tracking 62 aquatic and terrestrial species.
<u>Recommendations to Improve Aquatic Invasive Species Management in Alberta (2016)</u>	<ul style="list-style-type: none"> ✓ AIS pose significant threats that could adversely affect aquatic ecosystems, the economy, recreational opportunities, and human health. Many groups and individuals in Alberta are aware of the threat and have been taking action to prevent or manage AIS, although until recently, a formal provincial-scale plan to address these threats was lacking. ✓ The economic cost to control just one new highly invasive plant species was calculated at CAD \$100 million over 20 years ✓ Albertans want to be involved in preventing AIS from entering the province and in managing existing threats, but seek leadership, expertise and support from the government to do so. Some jurisdictions that deal with established AIS have developed AIS management plans or strategies that rely largely on the support of stakeholders to prevent the spread of AIS to unaffected areas. Building on the experience of local stakeholders and of other jurisdictions, the AWC believes the recommendations in this report, when implemented, will support the development of a holistic AIS management approach in Alberta. The recommendations address identified opportunities to improve general awareness of the issue, communication among stakeholders and coordination of activities in support of preventing AIS from becoming established in Alberta and effectively managing those that are already present.
<u>Invasive Weed & Disturbance-caused Undesirable Plant List For Use in Riparian Health Assessment and Inventory in Alberta</u>	<ul style="list-style-type: none"> ✓ Document developed by Cows and Fish (Alberta Riparian Habitat Management Society) ✓ This invasive weed and disturbance-caused undesirable herbaceous species list is used by the Cows and Fish staff and others to complete riparian health assessments and inventories. ✓ This list is a tool that landowners, resource managers, and communities can use in understanding riparian health assessments and examining their own riparian areas.

6.3.1a Traditional Knowledge, Innovations, and Practices: Government Documents	
The existence and level of implementation of law, policy, or strategies that facilitate indigenous people's direct involvement in sustainable use of wetlands.	
<u>Alberta Land Stewardship Act (ALSA) SA 2009 cA-26.8</u>	<ul style="list-style-type: none"> ✓ ALSA is to provide a means to plan for the future, recognizing the need to manage activity to meet the reasonably foreseeable needs of current and future generations including aboriginal peoples ✓ Section 52 of the Act enables the Lieutenant Governor in Council to establish a regional advisory council for a planning region as well as the ability to appoint members of a regional advisory council, including individuals who are members of aboriginal peoples
<u>Environmental Protection and Enhancement Act (EPEA) RSA 2000 cE-12</u>	<ul style="list-style-type: none"> ✓ The Act is the primary act in Alberta through which regulatory requirements for air, water, land, and biodiversity are managed. The Act supports and promotes the protection, enhancement, and wise use of the environment by designating proposed activities for which an approval or registration is required. ✓ The Chief Scientist also consults and supports the Science Advisory Panel and the Indigenous Wisdom Advisory Panel to ensure an improved understanding of Alberta's environmental issues and includes the Indigenous Wisdom Advisory Panel (IWAP), and the Science Advisory Panel (SAP) ✓ Advisory panel to Chief Scientist is the Indigenous Wisdom Advisory Panel (IWAP) ✓ The Minister is required to establish an advisory panel to provide advice to the Chief Scientist and the Minister about how to incorporate traditional ecological knowledge into the environmental science program. ✓ The Indigenous Wisdom Advisory Panel appointed under the Protecting Alberta's Environment Act, SA 2013 cP-26.8, is continued and is deemed to be an advisory panel established under 15.3(1), and the appointments of the members of that Panel are continued. ✓ The Minister shall determine the remuneration and expenses payable to the members of the advisory panel referred to in subsection (1). ✓ The environmental assessment process in the EPA supports the goals of environmental protection and sustainable development, and provides for the involvement of the public, proponents, the Government and Government agencies in the review of proposed activities.
<u>GoA Policy on Consultation with First Nations on Land and Natural Resource Management (2013)</u>	<ul style="list-style-type: none"> ✓ Alberta's management and development of provincial Crown lands and natural resources is subject to its legal and constitutional duty to consult First Nations and, where appropriate, accommodate their interests when Crown decisions may adversely impact their continued exercise of constitutionally protected Treaty rights. ✓ In this document, "decisions relating to land and natural resource management" refers to provincial Crown decisions that directly involve the management of land, water, air, forestry, or fish and wildlife. ✓ Alberta recognizes that impacting Treaty rights to hunt, fish, and trap for food may trigger a duty to consult. ✓ Traditional Uses: Duty to Consult; and Accommodation (like mitigation) are elements of the policy process. ✓ Through this policy, the GoA "will seek to reconcile First Nations' Treaty rights and First Nations' traditional uses with Alberta's mandate to manage provincial Crown lands and resources" (pg.2) ✓ GoA "will consult with First Nations when Crown land and natural resource management decisions may adversely impact Treaty rights protected under the Constitution Act, 1982, as well as traditional uses" (pg.2). ✓ The Integrated Resource Management System and Regulatory Enhancement Project will accompany the province's emphasis on strategic consultation.

6.3.1b Traditional Knowledge, Innovations, and Practices: Planning Documents	
The existence and functioning of Indigenous and local community groups that are enabled to contribute traditional knowledge, innovations, and practices.	
<u>Indigenous Wisdom Advisory Panel (IWAP)</u>	<ul style="list-style-type: none"> ✓ IWAP is dedicated to ensuring that Indigenous science knowledge systems, languages, oral traditions, understandings, natural laws and cultures are represented and respected equitably with the Alberta environmental science program under the EPEA. ✓ The Indigenous Wisdom Advisory Panel provides advice to the Chief Scientist and the Minister about how to incorporate traditional ecological knowledge into the environmental science program. ✓ For the purposes of this Mandate and Roles Document, Indigenous wisdom and knowledge is understood as a living body of knowledge, a cosmovision, worldview and way of knowing transmitted from generation to generation. ✓ Indigenous wisdom and knowledge are inextricably integrated with the Earth and Indigenous languages, cultures, spirituality and natural laws. ✓ IWAP intends to operate in accordance with the customs, protocols, and knowledge systems of Indigenous Peoples, insofar as possible, and to carry out such deliberations, responsibilities and communications through oral systems in parallel with written contemporary knowledge systems. ✓ As such, this Mandate and Roles Document is a collaboratively written agreement envisioning a relationship between the Indigenous Wisdom Advisory Panel, Alberta Environment and Parks' Chief Scientist and the Minister of Environment and Parks (the Minister) wherein principles of good faith, sharing, mutual respect and honour, kindness, generosity, trust and humility form a foundation. ✓ Key focus areas of the IWAP include: The respect and protection of Indigenous wisdom; Accepted methodology associated with the applications of Indigenous wisdom in an environmental context and the linkage of Indigenous and western science-based systems; Emerging and best practices for application of Indigenous wisdom in a science-based monitoring system; Effective and efficient methods for understanding and addressing community-based monitoring priorities for ambient environmental monitoring; Traditional Ecological Knowledge (TEK) ✓ Traditional Ecological Knowledge (TEK) refers to the knowledge held by Indigenous peoples and shared orally across generations over hundreds of years through direct contact with, and understanding of, the local environment and traditional territories. ✓ Originally named the Traditional Ecological Knowledge Advisory Panel, the Panel members, who are knowledge keepers and Elders, renamed the panel to focus on Indigenous wisdom. The term Indigenous wisdom reflects an accurate and culturally appropriate recognition of the scope of Indigenous knowledge and worldview. ✓ IWAP Mandate and Roles Document: The elements of this Document are intended to be implemented as a whole, maintained as a living document and revisited through ceremony or dialogue as conditions develop through the relationship. ✓ The original intent of the Panel, to provide advice for the respectful and appropriate inclusion of Indigenous wisdom and knowledge, will remain the core value of the relationship.
<u>Fort McKay Sustainability Department</u>	<ul style="list-style-type: none"> → The FMSD has a mandate to: <ul style="list-style-type: none"> ○ Review resource development applications, environmental impact assessments and other regulatory documents to ensure that the environmental issues important to Fort McKay are addressed and mitigated. ○ Facilitate on-going consultation within the Community so Fort McKay residents know how their traditional lands are being affected by industrial development and to obtain advice and input from residents. ○ Continuously interface with utility, timber harvest, and conventional oil and gas companies, with heavy oil and oil sands developers and government with respect to social, economic and environmental matters, and to provide industry with a reliable contact point ○ Develop in-community knowledge and capacity for addressing environmental, social, economic and technical matters relating to resource development → <u>Draft Biodiversity Management Framework</u> is a document on the FMSD knowledge keeper website → The document offers the direct perspective of First Nations, particularly Fort McKay First Nations, is addressing land use planning in the LARP → It is not clear if there is a newer document available or if any of the issues mentioned were addressed. → Deficiencies identified in the Draft BMF include: 1. BMF Does Not Adequately Address Constitutional rights 2. BMF is Incomplete and Not Ready for Release 3. BMF Does Not Align with UN Convention on Biodiversity 4. BMF Does Not Align with Canadian Biodiversity Strategy 5. BMF Lacks Clarity in Purpose 6. BMF Lacks Clarity in Linkages to Integrated Resource Management System 7. Indicator Selection Incomplete and Not Relevant to Fort McKay 8. Identification of Thresholds Incomplete and Not Relevant to Fort McKay 9. Monitoring Requirements Incomplete 10. Management Response Incomplete and Excludes Fort McKay → "Until Aboriginal goals and their relationship with the land are recognized, Aboriginal values will never truly be included in criteria and indicator frameworks. By assuming that Constitutional rights will be protected as a natural extension of protecting the environment, Alberta continues to misunderstand the nature of Constitutional rights and marginalize the needs of Aboriginal people in land use planning." → Considering the BMF document one can conclude that while there are elements in place for First Nations to contribute knowledge as a group, it is still up to the GoA to determine how their knowledge will be input

6.3.1c Traditional Knowledge, Innovations, and Practices: Monitoring Documents	
The existence and level of implementation of mechanisms that bring together Indigenous peoples local communities for the wise use of wetlands.	
<u>Electronic Disposition System (EDS)</u>	<ul style="list-style-type: none">✓ EDS is a web-based tool managed by Alberta Environment and Parks (AEP).✓ The Aboriginal Consultation Office (ACO) does not manage the system and all system inquiries regarding EDS should be directed to the AEP EDS team.✓ Proponents use EDS to electronically apply to the ACO for consultation direction on activities regulated by the Alberta Energy Regulator (AER) under these: • Public Lands Act • Water Act • EPEA.✓ Proponents are required to have a Client ID and a User ID to utilize EDS and will need to contact the AEP EDS team to apply for both.✓ Through EDS proponents can: Create and submit a Pre-consultation Assessment Request; Amend a Pre-consultation Assessment Request; Respond to a Request for More Information; View a submission status; Submit a request for an Adequacy Assessment; Cancel a File Number for Consultation (FNC)✓ Proponents can refer to the EDS First Nation Consultation User Guide for detailed instructions and information on EDS.✓ The ACO provides consultation advice and recommendation to these ministries upon their request.✓ As of August 20, 2019, the AER is moving from EDS to OneStop which will impact the way that proponents engage but it is not immediately to what extent.✓ AER's Bulletin 2019-11 and the GoA's Enhanced Approval Process Manual offer some insight, but no details about changes or guidance about implementation are provided.
<u>Culturally Important Wetland Plants Project</u>	<ul style="list-style-type: none">✓ The Culturally Important Wetland Plants Project funded under the Oil Sands Monitoring Program is working to co-produce knowledge about culturally important wetland plants through community-led, traditional environmental knowledge-based monitoring in the Athabasca and Peace oil sands regions.✓ The project is rooted in a collaborative approach to environmental monitoring and will continue to support Indigenous community involvement in wetland plant monitoring program design, implementation, evaluation, reporting, and communication to ensure the project is based on community-specific priorities.✓ Indigenous Knowledge, Community Monitoring, & Citizen Science Branch - Alberta Environment and Parks: There is not much information about this branch on the public forum other than the contact information on the info sheets for the "Oil Sands Monitoring Program" Community-Based Project Sheets✓ The term Indigenous Wisdom reflects an accurate and culturally appropriate recognition of the scope of Indigenous knowledge and worldview and does not necessarily adapt to the constraints of GoA protocol for keeping records

6.3.2a River Basin Management: Government Documents	
The existence and level of implementation of policy and regulatory incentives that foster river-basin management.	
Alberta Land Stewardship Act (ALSA) SA 2009 cA-26.8	<ul style="list-style-type: none"> ✓ This is the primary legislation that implements the Land-Use Framework. ✓ ALSA enables LUF which enables Regional Plans (RPs). Regulatory aspect of RPs is legally binding. ✓ Lieutenant Governor in Council may establish, make, or amend regional plans for planning regions ✓ Secretariat, Stewardship Minister, government departments, and other persons are also involved in the process ✓ Regional planning is best suited to management at the water basin-level which is made possible by this statute. ✓ At least once every 10 years, the secretariat must review each regional plan and report to the Stewardship Minister on its ongoing relevancy and effectiveness. ✓ The extent and nature of each review of a regional plan is in the discretion of the secretariat, subject to any terms of reference set by the Lieutenant Governor in Council ✓ A regional plan expires if a review of the regional plan is not started within 10 years of the date the regional plan is made.
Land-Use Framework	<ul style="list-style-type: none"> ✓ The LUF takes a new approach to manage public and private lands with the goal of achieving sustainable development. ✓ Identifies management at the river basin level made possible by ALSA and implementable by the LUF through the development of regional plans. ✓ The document Outlines strategies that aim to achieve regional planning in Alberta ✓ The first strategy is to "Develop seven regional land-use plans based on seven new land-use regions [...] The government will create seven new land-use regions and develop a regional plan for each" ✓ The regions for Alberta are based on the major watersheds, with boundaries aligned to best fit with existing municipal boundaries and the natural regions

6.3.2b River Basin Management: Planning Documents	
The existence and functioning of institutions encouraging water governance innovation and responding to new needs for water governance practices.	
Water for Life: A Renewal (2008)	<ul style="list-style-type: none"> ✓ GoA is responsible for implementing the <i>Water for Life</i> strategy and works closely with the <i>Water for Life</i> Partners (AWC, WPACs, and WSGs). ✓ AWC provides advice to the GoA that informs policy or actions, advances outcomes of <i>Water for Life</i>, and provides a forum to discuss water perspectives. ✓ WPACs are independent, non-profit organizations and stewards of Alberta's major watersheds designated by AEP to assess the condition of their watershed and prepare plans to address watershed issues. ✓ WSGs take community-level action to safeguard water resources in their local areas. ✓ Flexible and adaptive management is one of the principles guiding water management under this strategy. ✓ The GoA ensures that the partnerships are resourced and have the scientific information required to fulfil their mandates. ✓ The GoA acknowledges its responsibility to show leadership, provide assurance, and carry out compliance roles.
Alberta Water Council	<ul style="list-style-type: none"> ✓ At the provincial scale, the AWC can identify projects and initiatives that would benefit from input or collaboration from Watershed Planning and Advisory Councils and Watershed Stewardship Groups. ✓ At the same time, WPACs and WSGs can raise issues and concerns from either the watershed or local scale to the AWC for consideration. ✓ AWC provides advice to the GoA that informs policy or actions, advances outcomes of <i>Water for Life</i>, and provides a forum to discuss water perspectives
Watershed Planning and Advisory Councils	<ul style="list-style-type: none"> ✓ WPACs are stewards of Alberta's major watersheds and independent, non-profit organizations that are designated by AEP to assess the condition of and prepare plans to address watershed issues. ✓ WPACs also conduct education and stewardship activities throughout their watershed. ✓ WPACs include representatives of key stakeholders in the watershed, including provincial, municipal, and federal governments, important industrial sectors, conservation groups, and aboriginal communities. ✓ 11 WPACs in the province engage watershed residents in their work and seek consensus on solutions to watershed issues.
Watershed Stewardship Groups	<ul style="list-style-type: none"> ✓ Watershed stewardship groups (WSGs) take community-level action to safeguard our water sources. ✓ Community, volunteer-based partnerships actively engaged in environmental stewardship of their watershed. ✓ According to the Alberta Land Stewardship Centre, there are over 20 community stewardship groups focused on water in Alberta

6.3.2c River Basin Management: Monitoring Documents	
The existence and level of implementation of knowledge and experience sharing instruments to foster the science-policy interface in river-basin management.	
Alberta River Basins Online Tool	<ul style="list-style-type: none"> ✓ https://rivers.alberta.ca/ ✓ The Alberta River Basins app and online tool allows you to explore real-time river flow data, water shortage advisories, and water quality. ✓ This map-based tool allows you to explore data and water advisories from monitoring stations across the province. ✓ The tool portal is a visual database of: Water related advisories and forecasts; Snow pillow reports; Ice observation reports; Precipitation maps; Flood identification; Water flow summaries; Reservoir reports; Licensing and monitoring of water flows ✓ It is available on desktop and by mobile app
Alberta Water Tool (AWT)	<ul style="list-style-type: none"> ✓ The Alberta Water Tool (AWT) is a point-and-click tool helps scientists, communities, and government decision-makers to understand accurate, real-time information about water resources in Alberta. ✓ AWT provides a platform for industry, government, and the public to easily access water information in support of environmentally sustainable water management. ✓ A web-based decision support tool, providing accurate, scientifically defensible watershed reports at any location across more than 230,000 km² of Alberta. ✓ These reports combine information on water supply generated from hydrology models, with information regarding existing water allocations and environmental flow needs for any region of interest. ✓ Users have immediate access to actionable information which would otherwise take five to 10 days of effort for a professional to produce.
Water Use Reporting (WUR) Tool	<ul style="list-style-type: none"> ✓ This site enables Alberta water licence holders to report their water use in support of the <i>Water for Life</i> strategy. ✓ A number of manuals are listed on this site for how to report basic submissions, groundwater reports, two factor submitters, water measurement guidebooks, and more. ✓ Users enroll and log on with a MyAlberta Digital ID account.
Indicators for Assessing Environmental Performance of Watersheds in Southern Alberta	<ul style="list-style-type: none"> ✓ An introduction to generic condition and pressure indicators for land, water quantity, water quality, and aquatic and riparian ecosystems. This report explores the relationship between land and water and explains how select indicators are linked to environmental outcomes. ✓ To manage environmental performance of watersheds, a five-step adaptive system should be implemented involving (i) defining environmental outcomes, (ii) selecting condition and pressure indicators, (iii) monitoring indicators, (iv) evaluating outcomes using targets and thresholds, and (v) implementing management actions (pg.3) ✓ Using the environmental performance management system and indicators proposed in this report, the WPACs and WSGs can address the overall lack of coordination in managing from a watershed perspective by linking values or trends they observed in the water quantity, water quality, and aquatic and riparian ecosystem indicators they monitor to corresponding patterns observed in land use and land quality. Based on relationships they observe, they can then make specific recommendations to both municipal and provincial agencies to address priority issues.

6.3.3a Inventory, Assessment, and Monitoring: Government Documents	
The existence of frameworks that require inventory, assessment, and monitoring of wetlands to effectively guide decision-making.	
Water Act RSA 2000 Chapter W3	<ul style="list-style-type: none"> ✓ The Minister is required to develop a Framework for the Protection of the Aquatic Environment which exists within the Framework for Water Management ✓ There is a reporting requirement for Water Act license holders that has since been improved as a result of the Water for Life strategy ✓ The environmental assessment process is linked to EPEA in this document ± Directors may amend an approval on the Director's own initiative without the consent of the approval holder (ii) to amend a term or condition that relates to a monitoring, reporting or inspection requirement ± If an amendment of a licence does not increase the volume of the diversion of water specified in the licence or preliminary certificate, the Director may, amend a license to amend a term or condition that relates to a monitoring, reporting or inspection requirement ± An applicant shall provide notice of a water application in accordance with the regulations, but notwithstanding the aforementioned, an applicant is not required to provide notice with respect to (ii) to a monitoring, reporting or inspection requirement in an approval, preliminary certificate or licence ✓ A notice of appeal under this Act may be submitted to the Environmental Appeals Board by certain people and under certain circumstances, but notwithstanding the aforementioned, a notice of appeal may not be submitted with respect to an amendment of a monitoring, reporting or inspection requirement in an approval, preliminary certificate or licence. ± The Water Act serves as a legal statute for authorizations to disturb a wetland. Conditions for each approval can be customized by the director
Environmental Protection and Enhancement Act (EPEA) RSA 2000 cE-12	<ul style="list-style-type: none"> ✓ Environmental monitoring is conducted in Alberta under the EPEA. ✓ The Minister shall report on the condition of the environment in Alberta. ✓ The Minister shall appoint a person as Chief Scientist to develop and implement an environmental science program to monitor, evaluate and report on the condition of the environment in Alberta. ✓ The purpose of the environmental assessment process is (a) to support the goals of environmental protection and sustainable development, (b) to integrate environmental protection and economic decisions at the earliest stages of planning an activity, (c) to predict the environmental, social, economic and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity, and (d) to provide for the involvement of the public, proponents, the Government and Government agencies in the review of proposed activities. ✓ Directors have power to require environmental assessment if they are of the opinion that the potential environmental impacts warrant further consideration ✓ For the protection and wise use of the environment the Minister may develop ambient environmental quality objectives in qualitative or quantitative terms for all or part of Alberta. ✓ In addition to developing environmental quality objectives the Minister may develop standards, practices, codes of practice, guidelines, objectives or methods for monitoring, analysis and predictive assessment. ✓ These provisions are not specific to wetlands but apply to any application made under the EPEA which may include an application to disturb a wetland.
Knowledge for a Changing Environment: 2019-2024 Science Strategy	<ul style="list-style-type: none"> ✓ A Five-Year (2019-2024) Science Strategy for the Environmental Science Program to monitor, evaluate and report on the condition of the ambient environment in Alberta. ✓ Alberta's environmental science program and related provincial monitoring networks are evolving towards an adaptive design. Component areas such as surface and groundwater, air, wetlands, land and biodiversity monitoring networks are undergoing review to define and focus the monitoring objectives and science questions that need to be answered. ✓ An adaptive design used in conjunction with Cumulative Effects Assessments and Cumulative Effects Management systems can create optimal monitoring strategies that better understand and consider site selection, spatial and temporal sampling frequencies, and relevant physical, chemical and ecological processes to assess environmental impacts. ✓ This new design will allow available resources to be optimized to produce scientifically credible, timely and relevant information, addressing present and future stakeholder needs and concerns. Adaptive monitoring is a core activity that informs our understanding of the condition of Alberta's environment and the subsequent Cumulative Effects Assessments and ultimately Cumulative Effects Management Systems (Figure 2). ✓ Incomplete... why yellow?
Alberta Wetland Policy (2013)	<ul style="list-style-type: none"> ✓ Identifies need for a completed/finalized provincial wetland inventory, wetland value assessment system, wetland database and reporting tool ✓ Commitments and needs are laid out in this policy, but it does not go into specifics of implementation ✓ Alberta's wetland mitigation system is guided by ten principles that include inventory, assessment, and monitoring. The mitigation system is well developed and already implemented prior to this policy but has been fortified by regulations as a result of the new policy. ✓ Incomplete...why yellow?

6.3.3b Inventory, Assessment, and Monitoring: Planning Documents	
The existence of monitoring institutions that can produce evidence-based assessment on the performance of wetland management and support decision making accordingly.	
<u>Water for Life Implementation Review</u>	<ul style="list-style-type: none"> ✓ A core task of the AWC is to review the implementation progress toward achieving the three goals of the <i>Water for Life</i> strategy. ✓ Since 2003, the AWC has completed four reviews of implementation progress. ✓ Fifth review provides insight into 2012–2015 and informs the GoA, <i>Water for Life</i> partners and Albertans about the strategy implementation ✓ Review Committee followed the approved “How-To” Guide for conducting the assessment and applied other techniques to fill gaps. ✓ Provides recommendations based on past reviews as well as current findings from current review and includes timelines to indicate urgency. ✓ This project will provide evidence-based assessment on the performance of the wetland policy
<u>Prairie Habitat Monitoring Program</u>	<ul style="list-style-type: none"> ✓ Canadian Prairie Wetland and Upland Status and Trends ✓ 2001-2011PHMP examined habitat changes for both uplands and wetlands in the Prairie Habitat Joint-Venture PHJV) deliver area between 2001 and 2011. ✓ The purpose of the analysis was to provide wetlands and upland habitat status and trends for that period (pg.10) ✓ Change detection methods included the use of high-resolution aerial and satellite images in conjunction with #D heads-up stereo interpretation techniques and limited field verification. ✓ The net product of the analysis was the updating of the Prairie Habitat Monitoring Geodatabase
<u>Alberta Biodiversity Monitoring Institute</u>	<ul style="list-style-type: none"> ✓ Alberta Wetland Policy requires credible and transparent science to support its implementation. Since 2007, the ABMI has run a province-wide wetland monitoring program examining how human footprint influences wetland number and quality. This positions the ABMI to report on two of the criteria to be used to assess wetlands: biodiversity and water quality improvement. ✓ As of 2014, the ABMI has collected field data on 1,005 wetlands across the province. This represents the most significant investment in wetland monitoring in the province’s history. Every year we continue to monitor and re-assess these wetlands to determine the status and trends in water quality and biodiversity. ✓ As per the Alberta Wetland Classification System, the ABMI surveys the wetland class designated as permanent “shallow open water”. Wetlands are selected with a surface area ranging from 1 and 100 ha, a maximum depth between 0.5 and 2 m, and that contain stable water levels year-round even in drought. Each wetland survey includes a physical description, including characterizations of the wetland’s zones, the area of the open water zone, its bathymetry, and the percent area covered by human footprint, broken down by category [see citation online]. Various physiochemistry parameters are also measured: temperature, pH, dissolved oxygen, conductivity, salinity, total nitrogen and phosphorus, and dissolved organic carbon. ✓ The ABMI Southern Wetland Inventory is a polygon-based data set with spatially explicit information of wetland extents based on 2020 satellite imagery. This data set covers nearly all of the Grassland and Parkland Natural Regions of Alberta and is 90% accurate. This product represents the most up to date wetland data set created by the ABMI for Alberta/Canada and can provide users with high quality data to meet their needs. ✓ Boreal Wetland Probability data is a raster-based product which describes the probability of wetland habitat at a 10 m resolution across Alberta’s Boreal Forest Natural Region. ✓ Overall, the resulting product correctly identifies wetland and upland areas with an accuracy of 83%. This data set is based on fully open-source data and processing software.
<u>Alberta Conservation Association Habitat Program Agreement</u>	<ul style="list-style-type: none"> ✓ ACA leads development and delivery of specified habitat inventory, assessment and monitoring programs ✓ Identifies potential habitat for securement, enhancement, and/or management ✓ Ensures stakeholders are aware of habitat-related projects ✓ Although not wetland specific the ACA does work with the AEP on a number of fish and wildlife habitat related to inventory, assessment, monitoring, and conservation activities
<u>University of Alberta Land Institute</u>	<ul style="list-style-type: none"> ✓ The Living Laboratory Wetlands Project will contribute valuable scientific and economic knowledge to several fields and help inform policy for years to come.

6.3.3c Inventory, Assessment, and Monitoring: Monitoring Documents	
The existence of mechanisms to carry-out inventory, assessment, and monitoring activities.	
<u>Alberta Wetland Assessment Impact Report Directive (2017)</u>	<ul style="list-style-type: none"> ✓ As part of any application to impact wetlands, applicants must ensure that a qualified practitioner has assessed all of the wetlands that may be impacted and prepared a Wetland Assessment and Impact Report. This document is meant to provide clear instructions for preparation of this report. A Wetland Assessment and Impact Report (WAIR) must be prepared by an Authenticating Professional and submitted with Water Act applications where impacts to a wetland will occur. ✓ A WAIR includes the identification and classification of the wetlands, the delineation of the wetland boundary, and the results of the on and offsite Alberta Wetland Rapid Evaluation Tool (ABWRET). WAIR's were formally Wetland Impact Assessments (WIA) before the implementation of the new Alberta Wetland Policy. The requirements of a WIA are also required in the WAIR. ✓ The requirements of a WIA as outlined by the Provincial Wetland Restoration/Compensation Guide are as follows: Wetland area; Hydrologic assessment; Statement of wetland benefits: Hydrological; Ecological; Economical; Wetland classification based on either the Stewart and Kantrud or Cowardin Wetland Classification Systems; Flora and fauna at the site, including presence of rare or endangered species; Type of wetland margin and average width of wetland margin; Surrounding upland use; Drainage area contributing to the wetlands; Review of historical aerial photographs; Existing wetland conditions; Photographs detailing the delineated wetland area, margin, and immediate upland area.; Statement of avoidance, minimized impacts, or impacts. ✓ This is an assessment activity carried out to disturb a wetland.
<u>Standard monitoring protocols for evaluating wetland performance for constructed 'habitat' wetlands</u>	<ul style="list-style-type: none"> ✓ This guideline provides criteria that can be used to monitor the progress and evolution of a constructed habitat wetland towards an ecologically functioning wetland. ✓ The specific purpose of these Guidelines aims to assess: <ul style="list-style-type: none"> ○ The extent to which the constructed habitat wetland has evolved toward being a functioning wetland. ○ The success of measures to promote the evolution of the constructed habitat wetland and to signal where additional or strengthened measures are required ○ Unforeseen issues or problems that need to be addressed. An additional benefit of a monitoring program will be to add to the knowledge base of constructed habitat wetland design and management that will promote the successful creation of wetlands. ✓ The intended audience for this document is qualified wetland professionals as defined by Alberta Transportation; those individuals qualified to be conducting wetland monitoring. ✓ Outlines criteria that should be used in a monitoring program and includes rationale outlining why they are important indicators. ✓ Specific monitoring criteria are outlined in Appendix 1 ✓ This is a monitoring activity carried out when a wetland has been disturbed
<u>GeoDiscover Alberta</u>	<ul style="list-style-type: none"> ✓ GeoDiscover Alberta provides enhanced details regarding Alberta's geospatial data and the portal makes searching for mapping data easier. ✓ Alberta's geospatial data is brought together in one searchable portal and can be viewed and analyzed with our easy-to-use Map Viewer. ✓ The AMWI layer should be used for high level planning and not to plan an activity without doing a formal wetland assessment. To do a search, use the keywords "Alberta Merged Wetland". ✓ <u>The Merged Wetland Inventory Status Map</u> summarizes the data sources and resolutions for different portions of the province. ✓ Relative Wetland Value Map provides a preliminary (non-regulatory) estimate of relative wetland value (ABWRET-E) to assist with high level planning of wetland activities in the White Area of the province, such as a Community Area Structure Plan.
<u>Alberta Wetland Mapping Standards and Guidelines: Mapping Wetlands at an Inventory Scale</u>	<ul style="list-style-type: none"> ✓ These guidelines are intended to be used by those in Alberta that have a professional interest in/or are working on wetland conservation and management, including, wetland mapping and inventory development. These were developed based on minimum standards and guidelines to promote consistency and improve data quality in wetland mapping at a provincial scale within the Prairie/Parkland and Boreal/Foothills zones of Alberta.

6.3.4a Restoration: Government Documents	
The existence and level of implementation of wetlands restoration guidelines including inventory, planning, and strategies aimed at restoring designated sites.	
<u>Alberta Wetland Mitigation Directive (2018)</u>	<ul style="list-style-type: none">✓ The Wetland Policy changed the replacement requirements for wetlands lost to development.✓ To inform planning and decision-making to avoid and minimize negative impacts to wetlands and, where necessary, replace lost wetland area and value (pg.1).✓ Minimization refers to "reducing negative impacts on wetlands to the smallest practicable degree during the planning, design, construction, and operational stages of development, and when conducting "activities that may harm wetlands" (Alberta Wetland Policy, 2013).✓ For the purposes of this document, minimization also encompasses wetland reclamation.✓ An applicant must consider minimization of both direct and indirect impacts on the physical area of the wetland and the relative wetland value.✓ <u>Alberta Wetland Replacement Fact Sheet</u> provides a diagram of the mitigation process.✓ <i>Directive for Permittee-Responsible Wetland Construction and Guide to Wetland Construction in Stormwater Management Facilities</i> clarify obligations and expectations around permittee-responsible wetland replacement, including wetland construction and utilizing stormwater management facilities as replacement habitat.✓ Clear instructions on how to disturb a wetland.
<u>Alberta Wetland Restoration Directive</u>	<ul style="list-style-type: none">± To provide assurance to the Department that wetland restoration actions are meeting intended outcomes to restore wetland area and function, but it is not clear how it will do this from the document.± Provides direction to Wetland Replacement Agents (WRA) who undertake wetland restoration actions, but it is not clear how one becomes a wetland restoration agent✓ Applies only to restoration of mineral wetlands (i.e. marshes, shallow open waters, and swamps).✓ Supports the Alberta Wetland Policy and the Alberta Wetland Mitigation Directive.

6.3.4b Restoration: Planning Documents	
The existence and level of functioning of wetland restoration specialists.	
<u>Wetland Restoration Agents</u>	<ul style="list-style-type: none"> ✓ A Wetland Replacement Agent (WRA) is the party undertaking and responsible for the restoration action. ✓ The restoration plan, validation and monitoring steps may be conducted by and authenticated by employees of a WRA or may be authenticated by an independent third party. However, verification must be conducted by an independent third party to conclude whether or not the site is healthy and functional, based on the monitoring results and an ABWRET assessment. ✓ A wetland restoration plan, validation report, and verification report submitted by a WRA must be authenticated by a professional who is governed by a professional regulatory organization in accordance with practice standards set out in the Professional Responsibilities in Completion and Assurance of Wetland Science, Design and Engineering Work in Alberta. ✓ Some municipalities have become wetland restoration agents since DUCs moved on from being the only restoration agent in AB. See An Evaluation of Municipal-Provincial Wetland Management Partnerships in Alberta. ✓ Cows and Fish engage with wetland restoration because it is intricately tied to riparian habitat ✓ ALUS works with farmers and ranchers to restore wetlands on their land ✓ The Government of Alberta and its partners will continue to work with landowners to advance wetland restoration, construction, and enhancement efforts in the Province (Government of Alberta, 2013)
<u>DUC Annual Report 2020</u>	<ul style="list-style-type: none"> ✓ Until recently DUCs was the only restoration agent in Alberta (See Wetland Restoration Program Guide 2005) ✓ Restoration programs working directly with landowners ✓ Restoration through conservation easement (Enabling legislation for conservation easements was created under the Environmental Protection Enhancement Act (EPEA)). ✓ Restoration programs are focused on restoring naturally occurring water levels of drained and altered wetlands. Restoration projects are combined with other programs such as conservation easements and forage conversion on private lands ✓ Partnering with DUCs to restore your wetlands provide the landowner with expert technical assistance and also project funding and compensation through WRRP and conservation easements
<u>ALUS</u>	<ul style="list-style-type: none"> ✓ ALUS is a non-profit program that Aquality partners with for wetland restoration. ✓ ALUS works with farmers and ranchers at a community level to protect and restore wetlands, among other projects. ✓ ALUS pays producers annually for following wetland restoration and environmental management plans that ALUS specifically designs for their landscape.⁴ ALUS ✓ A 2018 update to the Alberta's Wetland Policy makes grants from the GoA available to finance private wetland restoration in addition to existing Alternative Land Use Services (ALUS) payments.

6.3.4c Restoration: Monitoring Documents	
The existence and level of implementation of wetland restoration programs to achieve the wise use of wetlands and the maintenance of their ecological integrity.	
<u>University of Alberta Land Institute Living Laboratory Wetlands Project</u>	<ul style="list-style-type: none"> ✓ The Alberta's Living Laboratory wetlands project is a multi-year, interdisciplinary research project examining the science and economics of wetland restoration in Alberta. ✓ The project uses advanced techniques to create tools to predict the functions a wetland might provide if it is restored. ✓ Once wetlands are restored as part of the project, they will be studied on an ongoing basis, so that the accuracy of these tools' predictions can be assessed. ✓ Both the tools and the improved understanding that accompanies them will help inform policymakers and developers as they work with Alberta's new Wetland Policy. ✓ At the same time, an economic study is being undertaken, examining the true cost of restoring wetlands on private land – including the cost of landowner compensation. Using a 'market-based instrument', the research team will engage with landowners to set the price for restoration. By partnering with landowners, the project will develop a deeper understanding of the factors that influence the cost of wetland restoration, while also testing a system that might allow for more efficient use of wetland restoration budgets. This knowledge will be useful both for policymakers, and for those seeking to meet their restoration obligations under the new policy.
Wetland Restoration Program	<ul style="list-style-type: none"> ✓ As of December 1, 2018, all restoration fees will be directed to a centralized, government-controlled fund. ✓ Fees will be expended on restoration projects in "priority areas", as per a call for proposals. ✓ Restoration work will be executed by vendors acting as delivery agents.
<u>Wetland Replacement Program</u>	<ul style="list-style-type: none"> ✓ The Wetland Replacement Program (WRP) aims to re-establish wetlands in partnership with Albertans by providing resources for collaborative restoration projects across the province. ✓ Under the Alberta Wetland Policy, WRP will offset wetland habitat lost due to development activities. ✓ A priority of the Alberta Wetland Policy and WRP is to replace wetlands within municipalities and watersheds that have had the highest amount of lost wetland area and value since 2015, as well as areas of high historical loss. ✓ WRP will focus on fostering partnerships with municipalities that have a vested interest in wetland replacement. ✓ Alberta Environment and Parks (AEP) and municipalities working together will help achieve shared outcomes for wetland replacement and conservation.
Prairie Habitat Joint Venture/Western Boreal Joint Venture	<ul style="list-style-type: none"> ✓ The PHJV's habitat implementation plans have been guided by quantitative models using the best available information to predict waterfowl responses to habitat program and policy initiatives. ✓ The success of restoration activities in achieving habitat objectives is predicted using the Waterfowl Productivity Model (WPM), a decision support tool that is continually refined. ✓ Habitat restoration is the priority means of improving the productive capacity of PHJV's PPR landscapes (1970s levels), while habitat retention prevents further loss of productive capacity. The PHJV will advance its restoration and retention objectives through a broad mix of conservation actions. Expenditure forecasts are also estimated for each program area.
<u>Watershed Resiliency and Restoration Program Prioritization</u>	<ul style="list-style-type: none"> ✓ This project identified riparian areas and wetland areas as the highest priority for projects that should get funding under the WRRP. ✓ The three priorities identified by WRRP are flood, drought, and water quality. ✓ To provide decision makers with information that can be used to inform program decisions, three priority maps were produced, one for each of flood, drought, and water quality. ✓ These maps were created using a criteria and indicators framework, where specific indicators representing each of the criteria (hazard, consequence, and resilience) were selected and quantified to represent overall priorities for flood, drought, and water quality at the watershed scale. ✓ Wetlands and riparian area are essential to fulfil the priority needs.

6.4.1a Scientific Guidance: Government Documents	
The extent to which scientific guidance about wetland ecosystems is integrated into legal, policy or regulatory frameworks.	
<u>Environmental Protection and Enhancement Act (EPEA) RSA 2000 cE-12</u>	<ul style="list-style-type: none"> ✓ The purpose of this Act is to support and promote the protection, enhancement and wise use of the environment while recognizing a number of sustainable development principles ✓ The Chief Scientist is appointed through Ministerial Order under section 15.1 (1) of the Environmental Protection and Enhancement Act. The role of the Chief Scientist is to: Communicate environmental science information to Albertans and government; provide scientific oversight on the provincial environmental science program. The responsibilities of the Chief Scientist is to: Act as a champion of science, research, and the role of evidence, as a recognized expert and active researcher in environmental sciences; Provides scientific advice to address complex environmental challenges and opportunities facing the province and the government; Promotes and builds scientific excellence through partnerships with Universities and other credible scientific and research based institutions and organizations; Ensures scientific information coming from Alberta Environment and Parks meets rigorous ethical and scientific standards; Establishes and upholds a public schedule for environmental science reporting to inform the Government of Alberta and Albertans. ✓ The Chief Scientist also consults and supports the Science Advisory Panel and the Indigenous Wisdom Advisory Panel to ensure an improved understanding of Alberta's environmental issues and includes the Indigenous Wisdom Advisory Panel (IWAP), and the Science Advisory Panel (SAP) ✓ The Minister shall establish a Science Advisory Panel (a) to periodically review the scientific quality and relevance of the environmental science program, including its components and any related research programs and plans; (b) to assess the scientific integrity of the environmental science program and comment publicly where the Science Advisory Panel considers it necessary, and (c) to provide independent advice to the Chief Scientist and the Minister on the environmental science program.
<u>Knowledge for a Changing Environment: 2019-2024 Science Strategy</u>	<ul style="list-style-type: none"> ✓ Sets the strategic direction for an integrated environmental science program to monitor, evaluate, and report on the condition of Alberta's ambient environment. ✓ The strategy "lays the foundation to address key environmental information needs of multiple users; deliver transparent, sound and trustworthy science on environmental conditions; braid Indigenous Knowledge with classical science through knowledge co-production; and provide scientifically sound information to decision makers so they can address provincial environmental challenges" (pg?) ✓ Alberta's environmental science program and related provincial monitoring networks are evolving towards an adaptive design. ✓ Component areas such as surface and groundwater, air, wetlands, land and biodiversity monitoring networks are undergoing review to define and focus the monitoring objectives and science questions. ✓ The goal is an adaptive management design used in conjunction with Cumulative Effects Assessments and Cumulative Effects Management systems to create monitoring strategies that better understand and consider site selection, spatial and temporal sampling frequencies, and relevant physical, chemical and ecological processes to assess environmental impacts. See graphic on (pg. 9). ✓ The strategy set out to meet five priority area: Biological and ecological change, Consequences of a changing and variable climate, Condition and sustainability of Alberta's water resources, Chemical contaminants and biological stressors in the environment, and Environmental responses to natural resource development. ✓ Pg. 5 has a graphics that shows the "Components for the successful design and delivery of Alberta's Environmental Monitoring and Science Program ✓ There is a growing effort to engage the public in science and environmental monitoring and the Alberta Environment and Parks (AEP) Knowledge for a Changing Environment, 2019-2024 Science Strategy recognizes the role of citizen science in addressing data and information needs about the environment.
<u>Alberta Wetland Policy (2013)</u>	<ul style="list-style-type: none"> ✓ The Policy is designed to incorporate the best available knowledge and science and note gaps or assumptions where improved information is needed. ✓ The wetland mitigation system will be adaptable, acknowledging and incorporating new information, as wetland science and public policy continue to evolve. ✓ Minimization procedures and techniques should be based on sound ecological principles and best available science and technology ✓ Non-restorative Replacement refers to a variety of alternatives that must support the maintenance of wetland value, by advancing the state of wetland science and wetland management. ✓ The policy lays the framework, but does not get into specifics about implementation

6.4.1b Scientific Guidance: Planning Documents	
The extent to which wetland scientific research and technical guidance is entrusted to and carried out by credible and responsible authorities.	
<u>Brokering science for environmental management: progress report from the Chief Scientist: a term in review</u>	<ul style="list-style-type: none"> ✓ Office of the Chief Scientist is responsible for developing and implementing an environmental science program to monitor, evaluate, and report on the condition of Alberta's environment. ✓ This mandate fulfills the Minister of Environment and Parks' obligation to report on the condition of the environment in Alberta ✓ Chief Scientist role is established through provincial legislation, and the role includes overseeing the environmental science program, as well as independent advisory panels: Science Advisory Panel (SAP) and Indigenous Wisdom Advisory Panel (IWAP) (IWAP was discussed in section 6.3) ✓ These panels periodically review and assess the integrity and credibility of the program. The SAP provides independent review and recommendations on Alberta's environmental science program (pg.7) ✓ Advice from the SAP will be used to guide continuous improvements in scientific standards and processes to ensure they are credible and meet or set global best practices (pg.7). ✓ Responsibilities of the SAP include: Providing the Chief Scientist and the Minister of Environment and Parks independent advice and recommendations on Alberta's environmental science program, including recommendations on priorities and methodologies. ✓ Reviewing the scientific quality and relevance of the environmental science program, including its components and any related research programs and plans; Assessing the scientific integrity of the environmental science program and commenting publicly as necessary ✓ The Chief Scientist is empowered to undertake their duties openly and transparently in order to build public trust in the credibility and integrity of the environmental science program.
<u>Ministry of Environment and Parks Annual Report 2019/2020</u>	<ul style="list-style-type: none"> ✓ To support this mandate, the Environmental Monitoring and Science Division (EMSD) of Alberta Environment and Parks (AEP) was also formed with an accountability to provide scientific leadership for the planning, coordinating and conducting of environmental monitoring and science in Alberta and the subsequent reporting of the analysis, evaluation and assessment of the information. ✓ Alberta Environment and Parks is recognized as the regulatory authority under the Water Act and technical expertise lies within the AEP. ✓ EMSD scientists, together with partner and collaborative organizations, are designing and implementing adaptive monitoring ✓ The mandate of the chief scientist fulfills the Minister of Environment and Parks' obligation to report on the condition of the environment in Alberta
<u>Professional responsibilities in completion and assurance of wetland science, design and engineering work in Alberta</u>	<ul style="list-style-type: none"> ✓ AEP requires signoff of an authenticating professional on regulatory documents submitted under the Alberta Wetland Policy. ✓ These same individuals will provide professional oversight on wetland replacement projects. ✓ The mobilization of this highly qualified workforce will help provide assurance to Albertans that wetlands in the province are being managed to a high standard of professional excellence. ✓ Alberta Environment and Parks and ten Professional Regulatory Organizations in Alberta have collaboratively developed and agreed upon a common set of standards that define the responsibilities and requirements for authenticating professionals in the province.
<u>Institute for Wetland and Waterfowl Research</u>	<ul style="list-style-type: none"> ✓ The IWWR is the research arm of Ducks Unlimited Canada ✓ Their research delves into the unique relationships between wetlands, waterfowl, watershed health, biodiversity and more. ✓ The data acquired from research activities gives the organization credibility and influence with governments, industries, and landowners. ✓ The data also guides on-the-ground conservation work to achieve the best outcomes for people and wildlife. ✓ IWWR has four objectives: Discover new information that will help solve fundamental problems facing North American waterfowl and wetland ecosystems; Develop highly skilled professionals in wetland and waterfowl conservation; Enhance communication of the latest information on wetland and waterfowl biology and conservation; Broaden support for wetland and wildlife conservation.
<u>Alberta (NAWMP) Partnership: 2018-2019 Progress Review</u>	<ul style="list-style-type: none"> ✓ AB NAWMP has a foundation in solid scientific principles. ✓ Research and science lay the groundwork upon which our programs to conserve wetlands are developed and implemented. ✓ Work closely with the top waterfowl and wetland scientists and fund science projects related to our priorities each year. ✓ Habitat Joint Venture Science are activities that evaluate the effects and inform future improvement of the NAWCA program throughout the Prairie Habitat Joint Venture. ✓ Species Joint Venture Science are activities that evaluate the effects and inform future improvement of the NAWCA program throughout the Prairie Habitat Joint Venture.

6.4.1c Scientific Knowledge: Monitoring Documents	
The existence of scientific guidance and technical methodologies about conserving and managing wetlands are developed and are available to policy makers and practitioners in an appropriate format and language.	
<u>Guidelines for the approval and design of natural and constructed treatment wetlands for water quality improvement</u>	<ul style="list-style-type: none"> ✓ This manual was prepared to provide standardized guidelines for the approval of candidate treatment wetland sites by the Alberta Environment Regional Services Engineers and to provide design guidance to agencies and consultants for natural and constructed wetlands for wastewater polishing. ✓ This document was cited in the <u>NAWCC report</u> as supporting the protection of natural wetland functions because provides a detailed understanding of the wastewater loadings and the condition and function of wetlands. It also noted that the manual could be used to provide national standardized controls to the approach presented.
<u>Stepping back from the water [2012]</u>	<ul style="list-style-type: none"> ✓ The question often arises: what is the minimum setback needed to protect aquatic ecosystems from development such as buildings, roads and other permanent structures ✓ This handbook answers this question by providing decision makers with information for determining setback widths and designing effective buffers adjacent to water bodies.
<u>Alberta Wetland Mapping Standards and Guidelines</u>	<ul style="list-style-type: none"> ✓ This standard is intended to be used by those in Alberta that have a professional interest in/or are working on wetland conservation and management, including, wetland mapping and inventory development. ✓ These were developed based on minimum standards and guidelines to promote consistency and improve data quality in wetland mapping at a provincial scale within the Prairie/Parkland and Boreal/Foothills zones of Alberta.
<u>Alberta Wetland Classification System Field Guide</u>	<ul style="list-style-type: none"> ✓ Based on the Alberta Wetland Classification System Field Guide ✓ Funding and support from <i>Alberta Innovates</i>' Water Innovation Program and the Alberta North American Waterfowl Management Plan Partnership ✓ Ducks Unlimited Canada (DUC) is leading the <u>development of an Alberta wetland field guide</u>. ✓ This project will result in a free, online field guide available to the public beginning in April 2021. ✓ Hardcopies will also be available for purchase. ✓ From April to September 2021, DUC will offer information webinars and field demonstrations (pending COVID outcomes) to educate users on how to use the field guide.
<u>Advancing Citizen Science in Alberta</u>	<ul style="list-style-type: none"> ✓ Through citizen science, Albertans are able to contribute to data and information gaps and inform environmental decision making. ✓ <i>Citizen Science Principles of Good Practice</i> were co-developed by AEP and the Miistikis Institute, with guidance and input from external organizations, researchers and practitioners to guide good practice and appropriate application of citizen science in Alberta.
<u>Your Guide to Making Wetlands Work in Your Municipality</u>	<ul style="list-style-type: none"> ✓ Alberta NAWMP Partnership developed this guide to help support decision-makers in municipalities in wetland conservation. ✓ This guide is meant support municipalities in wetland conservation and the guide is meant to outline the variety of ways a municipality can undertake wetland conservation. ✓ With in the guide are ten modules covering different aspects of municipal wetland conservation. ✓ There are also case studies, examples, links, resources, contacts, etc. available to assist municipalities in wetland conservation.

6.4.2a Communication, Education, Participation, and Awareness: Government Documents	
The existence and level of implementation of policy that integrates communication, education, participation and awareness to promote wetland values.	
<u>Alberta Wetland Policy</u>	<ul style="list-style-type: none"> ✓ Broader policy approach to wetland management in AB includes planning, education and awareness, and voluntary stewardship programs (pg.15) ✓ Public education and outreach programs are acceptable non-restorative replacement measures (pg.18) ✓ The policy identifies education and outreach programs as one of eight AWC system needs (pg.21) ✓ The Government of Alberta encourages all Albertans to enable wetland conservation and protection through voluntary stewardship activities. ✓ A wide range of initiatives, such as education and awareness, voluntary programs, and/or incentives will encourage wetland conservation, restoration, and protection activities to help sustain the benefits that wetlands provide.
<u>Water for Life: A Renewal</u>	<ul style="list-style-type: none"> ✓ Strategy: Key direction is Albertans will have access to the knowledge needed to achieve safe drinking water, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy ✓ Knowledge and research specific outcome: Incorporation of education tools and strategies into all Water for Life actions. ✓ Strategy: Key direction: All sectors understand how their behaviours impact water quality, quantity and the health of aquatic ecosystems, adopt a “water conservation ethic” and take action. ✓ Although it is not an outcome or key action for the strategy above the GoA “will expand the use of education as a strategy for influencing and helping Albertans make personal and public decisions regarding Alberta’s water resources” (pg.15). ✓ GoA commits to reporting on its progress on commitments. ✓ Water for Life partners are encouraged to report on their progress relative to their actions and participation. ✓ This information will support the Alberta Water Council’s role to provide advice on any new direction. ✓ No mention of communication but it is assumed through reporting commitments and AWC’s mandate to guide the implementation of Water for Life ✓ This strategy includes AWC’s recommendation to clarify roles and accountabilities, improve data collection and analysis, and increase public awareness about water and water resources. ✓ The strategy enables partners and NGOs the “opportunity to increase other stakeholders’ awareness of the vital benefits that wetlands provide in maintaining healthy watersheds” (pg.6). ✓ The action plan should be updated to reflect progress
<u>Government of Alberta communications policy [2018]</u>	<ul style="list-style-type: none"> ✓ To understand and meet the needs and interests of Albertans, the Alberta government engages the public actively through consultations and public opinion research. Public engagements and public opinion research must be coordinated through – and approved in advance by – CPE. ✓ Departments will ensure that engagement activities are aligned with government priorities and support government’s key themes and messages. ✓ Other ongoing feedback mechanisms include the Alberta Connects phone lines and e-mail response system, web tools and applications, social media and correspondence. ✓ All government materials provide a phone number, mailing or web address for more information and to encourage input. ✓ Public consultations invite input and feedback on particular issues and topics. Consultations are organized by departments as part of their operational requirements. CPE coordinates, advises and approves in advance all public engagement activities by departments across government. ✓ Consultations also require approval from Cabinet and the Policy Coordination Office. ✓ Mechanisms may range from town-hall meetings, forums and information sessions, to printed ✓ or online surveys, to individual submissions, to meetings and regular interactions between ministries and affected parties.

6.4.2b Communication, Education, Participation, and Awareness: Planning Documents	
The existence and functioning of institutions, groups, or other platforms that are actively involved in delivering any CEPA activities.	
Alberta Conservation Association Annual Report 2019/20	<ul style="list-style-type: none"> ✓ 24 rivers/creeks, 25 lakes, and 11 ponds were surveyed, generating information on fish population status, distribution, fishing effort, spawning and rearing habitat, and water quality. ✓ 100,000 acres of new ranching partnerships coming onstream. This includes a new focus area in central Alberta with the SHARP project with 15,000 acres of ranch land entering into a long-term commitment to align ranching goals with benefits for wildlife. ✓ Conservation, Community and Education Grants supported 82 conservation activities' projects that contribute to wildlife, fish and habitat health with \$969,635 of funding.
Alberta Environment	<ul style="list-style-type: none"> ✓ Wetlands: Webbed Feet Not Required is a resource guide that combines a variety of hands-on, interactive activities with inquiry-based learning. Wetlands: Webbed Feet Not Required aligns with curriculum expectations for Grade Five Science Topic E: Wetland Ecosystems. The activities in this guide also make connections to other subjects such as Language Arts, Physical Education, Geography and Social Studies. Supplementary resources related to the activities can be found on Alberta Environment's website.
Alberta NAWMP Wetland Education Network	<ul style="list-style-type: none"> ✓ The Alberta NAWMP Partnership currently funds the Wetland Education Network, providing support for the network as it establishes its Action Groups and resources. ✓ The Alberta NAWMP Partnership also led a pilot for the Wetland Education Network in 2016 to identify sector wetland education and outreach needs. ✓ This work involved identifying potential wetland education tools and ways to share them. ✓ This work has continued beyond the pilot as the need for a network of this type in Alberta continues to be expressed. Action Groups (divided by sector) are working together on wetland education to network and share resources that have been identified as important by various stakeholders. ✓ Available documents: 2018 Workshop Synopsis; WEN Pilot: Summary Report; WEN Pilot: Agriculture Action Group Summary Report; WEN Pilot: Industry Action Group Summary Report; WEN Pilot: Municipal Action Group Summary Report ✓ Spent \$333,357 on communication and education in the 2018-19 year
Cows and Fish	<ul style="list-style-type: none"> ✓ Cows and Fish offers presentations, workshops, field guides, and youth education programs ✓ Their offerings are related to riparian areas, landscapes, management tools, communities and conservation. ✓ The workshops, presentations and training opportunities listed are applicable and available to urban, rural, recreational and agricultural communities as well as agencies, organizations and governments at various levels.
Ducks Unlimited	<ul style="list-style-type: none"> ± No wetland centres of excellence (WCE) in Alberta, but the website for WCE education provides other resources to enable project development, mentorship and offers scholarship ✓ The Wetland Heroes program recognizes motivated young people who support wetland conservation through their own projects and initiatives. We are inspired by these young change-makers, and we celebrate hundreds of them across the country. ✓ Wetland Activities are offered for teachers developing lesson plans, nature interpreters and camp staff, parents introducing their kids to wetlands, and anyone interested in knowledge and conservation action. ✓ Graduate students can kick-start their careers in conservation with fellowships through our Institute for Wetland and Waterfowl Research. In addition, we provide online and in-person resources to industry professionals, landowners and community officials interested in learning more about wetland and waterfowl conservation.

6.4.2c Communication, Education, Participation, and Awareness: Monitoring Documents	
The existence and level of implementation of mechanisms to engage people at the regional and local levels in CEPA activities.	
<u>Wetlands Alberta Website</u>	<ul style="list-style-type: none"> ✓ The website is dedicated to "Engaging Albertans to conserve and protect wetlands" by providing timely and relevant information that will help us all conserve and protect this vital resource and enjoy all that Alberta's wetlands have to offer. ✓ The website is sponsored by Alberta NAWMP Partnership, Ducks Unlimited Canada, and the GoA ✓ The site offers information about Alberta's wetlands, stewardship, policy and legislation, conservation, resources and contact information. ✓ Visit a Wetland Map tool lists a number of wetlands, some of which have information centres, that a person could visit. Unfortunately none of the links on the website work, but I have manually entered them here: Beaverhill Lake Nature Centre; Bow Habitat Station; Clifford E. Lee Nature Sanctuary; Elizabeth Hall Wetlands; Frank Lake; Inglewood Bird Sanctuary & Nature Centre; Kimiwan Lake; Lois Hole Centennial Provincial Park; Muskoseepi Park; Saskatoon Island Provincial Park; Strathcona Wilderness Centre; Wagner Natural Area; Waskasoo Park ✓ Updating the site seems like a good idea
<u>Alberta Amphibian Monitoring Program</u>	<ul style="list-style-type: none"> ✓ Alberta Volunteer Amphibian Monitoring Program (AVAMP) is a citizen science program that allows participants to learn about the amphibians in their communities and help conserve amphibian populations by reporting frog, toad, and salamander observations. Become an Amphibian Monitoring Program volunteer.
<u>Wetland BMP Knowledge Exchange</u>	<ul style="list-style-type: none"> ✓ The purpose of the Knowledge Exchange is to provide a venue for sharing and exchanging information about boreal wetland best management practices (BMPs) with industry, government, academia, consulting, conservation organizations, and other interested contacts. ✓ The goal of the Knowledge Exchange is to increase information transfer, foster collaboration, and increase trust and transparency amongst these groups. ✓ The Knowledge Exchange was developed to address a need identified by participants of the Wetlands BMP Workshop for a coordinated network of contacts with an interest in working together to develop, implement, evaluate, and share information about potential wetland BMPs.
<u>Water Quest</u>	<ul style="list-style-type: none"> ✓ WaterQuest is a joint project between EPCOR & Alberta Agriculture, Food and Rural Development ✓ WaterQuest is based on Alberta Environment's Water for Life: Alberta's Strategy for Sustainability and is intended as a learning supplement to the Grade 8, Freshwater Ecosystems unit. ✓ WaterQuest is designed to increase student awareness of human impact on our watersheds and to encourage responsible and sustainable watershed practices.
<u>Wetland Stewardship in Alberta</u>	<ul style="list-style-type: none"> ✓ This document published by AEP in 2014 describes a range of initiatives to encourage wetland stewardship and to help sustain the benefits that wetlands provide. ✓ The range includes education and awareness, voluntary programs, and incentives to encourage wetland conservation, restoration and protection
<u>Reclamation and Restoration of Land and Water</u>	<ul style="list-style-type: none"> ✓ Faculty of Agricultural, Life & Environmental Sciences Department of Renewable Resources ✓ Research programs are focused on understanding the complexities of natural and managed ecosystems with the aim of providing creative solutions to ensure their long-term resilience and sustainability. ✓ Reclamation and Restoration of Land and Water research focuses on: ✓ Reclaiming terrestrial and aquatic ecosystems impacted by anthropogenic activities, including agriculture, forestry, urban development and industry ✓ Natural disturbance such as fire and floods ✓ Research domains that contribute to enhancing success and informing new approaches in contaminant remediation, reclamation and ecological restoration include soil science, plant science, aquatic science, hydrology, ecology, microbiology and forestry. ✓ An integrated, multi-disciplinary approach to reclamation and restoration ensures establishment of functional and resilient ecosystems in a changing environment

<h3 style="text-align: center;">6.4.3a Financial Resources: Government Documents</h3> <p style="text-align: center;">The existence and level of implementation of governance arrangements or frameworks that help water institutions collect or distribute funds for the purpose of wetland conservation and management.</p>	
Ministry of Environment and Parks	<ul style="list-style-type: none"> ✓ Alberta Environment and Parks (AEP) established and administers the Watershed Resiliency and Restoration Program (WRRP). ✓ The WRRP aims to promote the long-term ability of watersheds to mitigate the effects of future flood and drought events. ✓ The primary objective of the program is to increase the natural capacity of the Province's watersheds to reduce the intensity, magnitude, duration and effects from flooding and droughts for the benefit of Albertans and their communities. ✓ The WRRP focuses on projects that will contribute to meeting the following overall program outcomes: Advancing flood and drought resiliency in priority areas within watersheds in Alberta; Restoring and enhancing ecological connectivity and function in critical areas; Increasing knowledge, awareness and tools that enhance watershed resiliency ✓ Funding priorities include but not limited to wetland restoration and creation, and projects geared toward wetland enhancements ✓ The Alberta Community Resilience Program (ACRP) is a multi-year grant program supporting the development of long-term resilience to flood and drought events, while supporting integrated planning and healthy, functioning watersheds. The ACRP provides grants for the design and construction of projects that protect critical infrastructure from flooding and drought and help to ensure public safety is protected. This provincewide, cost-shared capital funding program is not intended to provide emergency funds or duplicate funding opportunities offered by other provincial grant programs. ✓ Funds collected from replacement activities, such as in lieu payments, will be allocated toward specified restorative or non-restorative measures, as determined by established guidance documents ✓ Wetland Restoration Program Supporting Initiative: In 2019-20, \$4.0 million was allocated to the Wetland Restoration Program to enable the Government of Alberta to collect wetland replacement fees and expend them on wetland restoration projects in priority areas. ✓ The Wetland Restoration Program (WRP) operates under the Alberta Wetland Policy and Alberta Wetland Mitigation Directive, and works with stewardship partners to conserve, restore, protect and manage Alberta's wetlands to, for example, support healthy watersheds, manage flooding, address water quality issues, provide habitat for biodiversity and offer recreational and educational opportunities. ✓ Through the program the ministry empowered Ducks Unlimited Canada (DUC) to collect wetland replacement fees when development resulted in permanent loss of wetland area. DUC used these funds to annually reclaim or restore approximately 400 hectares of priority wetlands in Alberta. ✓ In September 2019, the ministry took back collection of these fees and finalized the transfer of \$18.9 million from DUC. In 2019-20, the ministry collected \$9.1 million in new wetland replacement fees. ✓ Through Water for Life the GoA commits to ensuring the AWC, WPAC and WSG partnerships are resourced and have the scientific information required to fulfill their mandates.
Alberta Wetland Policy	<ul style="list-style-type: none"> ✓ The policy seeks to incorporate a broad range of knowledge and science around wetland functions and benefits into the establishment of an informed and considered approach to wetland management. ✓ The introduction of this value-based system will necessitate fundamental changes to the province's existing wetland management program. ✓ To be fully realized, these changes will require the investment of time, expertise, and resources. ✓ A phased approach to implementation with an adaptive management plan is the extent to which implementation is discussed in the policy, but a policy implementation page is available on the GoA website ✓ A need to identify governance structure and accountabilities, which will help establish roles and responsibilities of government (municipal, provincial, and federal), as well as proponents, other stakeholders, and Albertans.

6.4.3b Financial Resources: Planning Documents	
<p>This indicator seeks to appraise the extent to which wetland institutions exist and are in charge of collecting financial resources and allocating them in a transparent, efficient and timely manner for wetland conservation, management or planning.</p>	
Alberta (NAWMP) Partnership: 2018-2019 Progress Review	<ul style="list-style-type: none"> ✓ Alberta NAWMP coordinates joint projects, communications, planning and policy support, and it facilitates funding options among the Partners. ✓ Contributions to NAWMP in Alberta, 2018-19 and 1986-2019 listed on pages 10-11 ✓ Activity expenditures and habitat accomplishments 2018-19 and 1986-2019 listed on page 12 ✓ A list of cooperators on pages 13-17 ✓ AWNAMP Science Fund
DUC Annual Report 2020	<ul style="list-style-type: none"> ✓ Despite COVID-19, DUCs will not run a deficit. ✓ "Making the most of every charitable dollar is a responsibility we take seriously" (pg.25) ✓ Direct funds in ways that produce the greatest conservation impact. ✓ DUC goal is to invest 80 per cent of our expenditures in habitat conservation annually. ✓ DUC invested 82% of its expenditures in habitat conservation in the 2020 fiscal year

6.4.3c Financial Resources: Monitoring Documents	
<p>The existence and level of implementation of mechanisms to identify where resources for wetland conservation and management are most needed.</p>	
Watershed Resiliency and Restoration Program Prioritization	<ul style="list-style-type: none"> ✓ This project identified riparian areas and wetland areas as the highest priority for projects that should get funding under the WRRP. ✓ The three priorities identified by WRRP are flood, drought, and water quality. In order to provide decision makers with information that can be used to inform program decisions, three priority maps were produced, one for each of flood, drought, and water quality. ✓ These maps were created using a criteria and indicators framework, where specific indicators representing each of the criteria (hazard, consequence, and resilience) were selected and quantified to represent overall priorities for flood, drought, and water quality at the watershed scale.

6.4.4a Capacity: Government Documents	
<p>The existence and level of implementation of framework conditions to assure the presence of competent staff able to deal with technical and non-technical wetland-related issues across agencies, responsible ministries and water or wetland-management bodies.</p>	
<u>Annual Report Environment and Parks 2019/20</u>	<ul style="list-style-type: none"> ✓ Alberta Environment and Parks is recognized as the regulatory authority under the Water Act and technical expertise lies within the AEP.
<u>Professional responsibilities in completion and assurance of wetland science etc.</u>	<ul style="list-style-type: none"> ✓ AEP requires signoff of an authenticating professional on regulatory documents submitted under the Alberta Wetland Policy. ✓ These same individuals will provide professional oversight on wetland replacement projects. ✓ The mobilization of this highly qualified workforce will help provide assurance to Albertans that wetlands in the province are being managed to a high standard of professional excellence. ✓ Alberta Environment and Parks and ten Professional Regulatory Organizations in Alberta have collaboratively developed and agreed upon a common set of standards that define the responsibilities and requirements for authenticating professionals in the province.
6.4.1b Capacity: Planning Documents	
<p>The existence and functioning of mechanisms to identify the level of capacity of responsible authorities in carrying out duties related to the wise use of wetland management.</p>	
<u>Alberta Wetland Policy Implementation Review TOR</u>	<ul style="list-style-type: none"> ✓ The AWC approved forming a project team to explore a potential high priority body of work relating to a review of implementation of the Alberta Wetland Policy. ✓ The purpose of the Wetland Policy Implementation Review is to identify potential performance measures for the goal, outcomes, and strategic directions of the Alberta Wetland Policy and describe the challenges, opportunities, or unintended consequences experienced by sectors in the implementation of the Alberta Wetland Policy. ✓ This project is intended to support continuous improvement and public reporting on the efficiency and effectiveness of Alberta Wetland Policy's implementation. ✓ The Wetland Review project has three objectives: <ul style="list-style-type: none"> ○ Preliminary Review: Determine the potential performance measures, challenges, opportunities, and unintended consequences for the policy goal, outcomes, and directions. ○ Cross-Sector Input: Seek cross-sector perspectives on the proposed performance measures and on implementation challenges, opportunities, and unintended consequences ○ Finalize Review and Report: Describe a select few performance measures for the policy goal, outcomes, and directions, and prioritize across sector perspectives to identify potential priority
<u>Water for Life: A Renewal</u>	<ul style="list-style-type: none"> ✓ Increased capacity for wetland conservation can be acquired by collaborating with local watershed initiatives undertaken by WPACs and WSGs. ✓ Taking a watershed approach may also lead to stronger collaboration with neighboring jurisdictions.
<u>Alberta (NAWMP) Partnership: 2018-2019 Progress Review</u>	<ul style="list-style-type: none"> ✓ The AB NAWMP Partnership is composed of three government and two non-government organizations. ✓ AEP, Ministry of Agriculture and Forestry, Environment and Climate Change Canada, Ducks Unlimited Canada, and the Nature Conservancy of Canada ✓ The JV partnerships strive for sustainable and responsible management of the landscape considering social, economic and environmental factors. ✓ Alberta NAWMP coordinates joint projects, communications, planning and policy support, and it facilitates funding options among the Partners. ✓ It supports Partner activities through technical and logistical assistance and by advancing innovative ideas through facilitation, funding support and capacity building.

6.4.2c Capacity: Monitoring Documents	
The existence and level of implementation of capacity-related programs that enable learning from past experience and continual improvements to strengthen the capacity of water institutions and stakeholders in critical areas such as planning, financing and monitoring.	
Alberta's Water Research and Innovation Strategy 2014	<ul style="list-style-type: none"> ✓ Innovation Capacity ✓ The strategy provides a direction for water research and innovation in Alberta within this context of interconnectedness and interdependence for the next decade ✓ Provide a systems-based, strategic approach that focuses investment in water research and innovation on those areas that have direct relevance to Alberta ✓ Capitalize and build on strengths that Alberta has established through past investments, ensuring Alberta's water resource system remains robust ✓ Encourage the effective mobilization of knowledge enabling innovative policies, practices, products and services in order to capture the benefits of Alberta's investments in water research.
A Guide to Municipal Wetland Conservation in Alberta	<ul style="list-style-type: none"> ✓ Alberta NAWMP coordinates joint projects, communications, planning and policy support, and it facilitates funding options among the Partners. ✓ It supports Partner activities through technical and logistical assistance and by advancing innovative ideas through facilitation, funding support and capacity building. ✓ Developing a wetland conservation workplan can identify which steps are required, which are priorities, and which can wait. ✓ A workplan can also identify leads as well as potential partners. It can also identify sources of funding, including potential grants that might be applied for before work is initiated. ✓ However, a wetland conservation workplan may not need its own budget or separate resources. There are always benefits to aligning multiple priorities or objectives when facing resource constraints. ✓ Instead, a municipality can include wetland conservation activities as part of its "source water protection" or "flood mitigation" workplans. ✓ Whichever approach is taken, there are a number of resources and collaborative initiatives available to assist with this work. Both the province and a number of non-government groups in Alberta have been experimenting with new tools for funding wetland conservation. These might include the use of development credits; payments to landowners for ecological goods and services, or reverse auctions (see links to these initiatives in the resources table below). Although it is a bit early to tell, these and other such initiatives may provide insight into how municipalities can sustainably fund wetland conservation in the future. ✓ A lot of ideas for municipalities to find ways of increasing their capacity to conserve and manage wetlands.
Water for Life Program	<ul style="list-style-type: none"> ✓ Municipalities can apply for funding for new regional water supply and treatment facilities, and wastewater treatment facilities.

Jennifer Dubon

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Dr. D L, PWS, P.Biol.
Associate Professor

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There are a few figures in your presentation that would be helpful to include in my thesis, and so I would like to ask for your permission to reproduce the images in my thesis. For now I would like to use the map showing Alberta's Two Wetland Region, but it's possible I could use another image from your presentation.

Let me know your thoughts.

Jennifer

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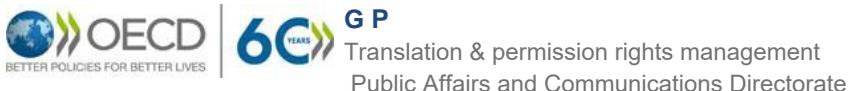
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