A Wetland Action Plan
for British Columbia

March 2010

Photo: Bruce Harrison

Wetland Stewardship Partnership

The Wetland Stewardship Partnership (WSP) is a multi-agency group dedicated to the conservation of wetlands and other sensitive ecosystems. WSP partners include:

- Environment Canada
- BC Ministry of Environment
- BC Ministry of Forests and Range
- BC Ministry of Healthy Living and Sport
- BC Hydro
- The Union of BC Municipalities
- Ducks Unlimited Canada
- The Nature Conservancy of Canada
- BC Wildlife Federation
- BC Nature (The Federation of BC Naturalists)
- The Grasslands Conservation Council of British Columbia
- The Nature Trust of British Columbia
- The Pacific Salmon Foundation
- Royal Roads University

This partner list is current to March 1, 2010. The WSP makes decisions based on consensus, and has a provision in the partnership agreement that allows for the addition of new partners. Any questions regarding partners should be directed to info@bcwetlands.ca

Executive Summary

The Wetland Stewardship Partnership (WSP) is a group of organizations and government agencies committed to wetland conservation in BC. In this document, the WSP proposes a comprehensive *Wetland Action Plan* to be implemented cooperatively by governmental and non-governmental organizations in order to protect British Columbia's remaining natural wetlands, and to restore important wetlands that have been severely damaged.

The WSP's vision is that "*BC becomes a province where the functions and values of wetlands and the larger watersheds of which they are a part are appreciated, conserved, and restored for present and future generations*." The plan recognizes the need to collaborate with all levels of government, other stakeholders, and all British Columbians to collectively address wetland habitat loss throughout the province. Opportunity exists to cooperate with ongoing conservation initiatives such as Living Water Smart, Biodiversity BC, the BC Climate Action Plan, and the BC Conservation Framework.

BC's Wetlands

Wetlands include five primary freshwater types: bogs and fens (both are peatlands), swamps, marshes, and shallow open waters such as sloughs and ponds. Other unique types of wetland are the intertidal marshes that often form where freshwater flows into the sea at the mouths of rivers and streams, and vernal or ephemeral wetlands that dry up during the summer months.

The common characteristic of all of these areas—and the thing that defines them as wetlands—is that each is land saturated by water, permanently or intermittently, for a long enough time that the excess water and resulting low oxygen levels produce conditions where aquatic plants grow and other biological activity adapted to a wet environment occurs.

Working with Wetlands

Wetlands have historically been undervalued to the point of being considered worthless. Now it is widely understood that they are not only valuable, but make such a vital contribution to social, economic and ecological well-being that we can ill afford to lose more of them.

Why should we care what happens to wetlands? Are not agriculture and building sites and transportation corridors a more beneficial use of sodden land otherwise wasted? The answer to that depends on how much value we place on effective flood control and clean and abundant community water supplies, pollution control, mitigating the impacts of climate change, and maintaining waterbird populations at a healthy level.

Do we really need to sacrifice one to attain the other? The problem is that many of the most important functions of wetlands relate to ecological services provided to communities, and human settlements tend to congregate along watersheds and estuaries where wetlands are most abundant. Difficult decisions must now be made about how and whether to protect and restore wetlands. These choices can be tough because the benefits produced by wetlands may be subtle, long-term and largely invisible, albeit of crucial importance, whereas the benefits of converting wetlands to agricultural, urban, or industrial uses often seem obvious and immediate. The magnitude of wetland losses to date adds urgency to the need for action to protect, conserve, or restore wetlands in BC.

Seven Key Wetland Contributions to Society

The first step in evaluating whether and what actions are needed is to properly understand what benefits wetlands currently provide. Here are seven of the most important ecological, social, and economic benefits provided by wetlands in BC:

- Wetlands play an important role in ensuring adequate water supplies for urban and rural communities.
- Wetlands protect communities from extreme flooding and guard against erosion.
- Wetlands absorb and dissipate contaminants, preventing pollution of water supplies.
- Wetlands have the potential to mitigate the magnitude and impacts of global warming.
- Wetlands provide essential habitat for wildlife species.
- Wetlands create important recreational, cultural, and educational opportunities.
- Wetlands can be important agricultural resources.

The Status of BC's Remaining Wetlands

Wetlands cover almost 7% of BC's land area, but are being destroyed and damaged at an alarming rate. The nature of the threats to wetlands has shifted in recent years. For most of the twentieth century, the destruction of wetlands in BC occurred primarily as a result of large-scale agricultural drainage schemes and water diversion projects. Today the province is losing wetlands primarily to draining and filling for new subdivisions and industrial development. In addition, many wetlands are damaged or destroyed as a result of shoreline protection projects, removal of streamside vegetation, invasion by non-native species, non-point source pollution, and climate change.

In a single decade between the late 1980s and late 1990s, a thousand acres of wetlands disappeared in the lower Fraser Valley. In the South Okanagan, five to 10 hectares are lost every year out of only 800 remaining hectares of significant wetland. Globally, about 50% of the world's wetlands have been destroyed, and losses in BC include 70% of the original wetlands in the Fraser River delta, 70% of wetlands in the Victoria region, and 85% of natural wetlands in the South Okanagan. How much has been lost altogether in BC is hard to estimate with any precision because of the lack of tools and expertise needed to assess what has been lost and what remains.

Constraints to Effectiveness of Wetland Conservation Policies

Recognition of the vital contribution wetlands make to society and of the importance of preventing further losses is nothing new. Almost 40 years ago, parties to the Ramsar Convention (159 countries have signed on to date) committed to maintain the ecological character of their wetlands of international importance and to plan for the sustainable use of all wetlands in their territories. Almost 20 years ago, the federal government instituted its current policy of "no net loss" of wetland functions on federal lands and waters. The British Columbia government has embraced a variety of initiatives favourable to wetland conservation, including the BC Water Plan (Living Water Smart), the BC Conservation Framework, the BC Riparian Areas Regulation, and the BC Climate Change Strategy.

Effective action on wetland conservation requires clear objectives and long-term dedication. The initiatives currently underway by different levels of government are hampered by an absence of smooth coordination, inconstant commitment, and a lack of solid information about the location, status, and functions of wetlands. The absence of a comprehensive solutions-based approach to wetland conservation means that there are serious gaps in the current approach to wetland conservation in BC as well as, in some instances, wasteful duplication of effort by agencies and NGOs.

The Wetland Action Plan Goals

The multi-year Wetland Action Plan proposes to address the above issues, focussing on promoting collaboration among government and non-government organizations to maintain, restore, and protect wetland ecosystems throughout BC. The six related goals of the Wetland Action Plan are each accompanied by a set of objectives and actions needed to achieve the goals. The goals and objectives of the Wetland Action Plan are as follows:

A. Clear and Comprehensive Information

Goal 1. Develop a comprehensive and reliable wetland information base to support effective planning, law-making, and policy development.

Goal 2. Increase public, industry, and government awareness of the importance of wetlands and commitment to wetland protection and restoration.

B. Effective Legal and Planning Tools

Goal 3. Enhance legal protection of wetlands through effective and effectively enforced laws and policies.

Goal 4. Ensure the effective integration of wetland protection in strategic land use processes.

C. Effective Actions and Incentives for Wetland Protection

Goal 5. Secure the protection of priority wetlands and the conservation and restoration of natural wetlands throughout the province.

Goal 6. Improve coordination and strengthen partnerships to maximize effectiveness in wetlands protection and restoration.

The implementation of strategies and actions aimed at achieving these goals will be overseen by the Wetland Stewardship Partnership; however, successful implementation of the WAP will depend on active participation by many stakeholders. A scientific support team will ensure that actions are based on sound science and will address information gaps. Each year a workplan will be implemented to address priority actions and associated tasks. The Wetland Action Plan will be reviewed in five years.

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Part 1: Rationale for the Wetland Action Plan

Introduction

Water is the essence of life. We use it every day for cooking, drinking, bathing, swimming, and fishing. Although water covers almost 70% of the earth's surface, it is not limitless. Every drop of water that exists on the planet today was here in one form or another the day our planet came into being. The saltwater in oceans accounts for more than 97% of all the water on the planet. Frozen freshwater in polar ice caps and ice floes are the next largest component of the earth's surface water (2.7%). The rest of the freshwater on earth (0.3%) is what we see every day in rivers, streams, creeks, ponds, lakes, riparian areas, groundwater, and wetlands.

Wetlands are a key to the survival of many living things on our planet. They provide a unique refuge for a wealth of plants and animals: complex ecosystems that help sustain life not just in the wetlands themselves, but in their surrounding habitats as well. British Columbia's wetlands are home to some of the richest biodiversity on the planet. They host a spectacular array of wildlife ranging from beavers to salamanders, herons to dragonflies, and an abundance of plant life.

Wetlands also have an economic value – not only to the people that derive their livelihoods from wetlands, but also to distant communities. They are important sources for food and fresh water and also provide valuable ecological services such as water purification, flood protection, and erosion control. Because they are usually in low-lying areas, and easily accessible, wetlands are prime targets for development. By draining or filling a wetland, and building houses, roads, and factories, a community may boost its economic performance; but this is almost always at the expense of biodiversity.

Yet it's not all bad news. Many natural wetlands are being protected throughout the province, while urban conservation initiatives are beginning to focus on restoring and creating new wetlands in low impact developments. Together, through a BC Wetland Action Plan, we can make a difference.

The Need for Coordinated Wetland Conservation Initiatives

A variety of non-governmental organizations and levels of government have begun the work of conserving intact natural wetlands in British Columbia and restoring others that are damaged. What has been missing has been a comprehensive plan of action to build on existing initiatives and coordinate the efforts of public agencies and private-sector bodies. This action plan addresses and integrates the several key components needed to bolster the effectiveness of wetlands conservation actions and increase the efficiency of their delivery. These components include:

- developing a reliable information base describing the current and historical extent of BC wetlands and their functions;
- enhancing public, industry and government understanding of the economic, social and environmental importance of wetlands and of the threats causing their decline, and increasing their commitment to conserve wetlands;

- strengthening the legal protections and planning tools needed to give practical effect to conservation commitments;
- protecting priority wetlands and ensuring sufficient incentives for conservation and restoration of wetlands throughout BC; and
- ensuring a coordinated effort by governmental agencies and non-government organizations to conserve and restore wetlands in BC.

Government and NGO Cooperation through the Wetland Stewardship Partnership

A coordinated approach is important not only to overcome potential obstacles created by the division of jurisdictions among different levels and agencies of government, but also to maximize the advantages to be gained from combining the expertise and resources of government and non-governmental groups (NGOs) with a stake in wetlands conservation. It is precisely for this reason that three levels of government (federal, provincial, and municipal) cooperated with several key non-governmental bodies in 2002 to form the Wetland Stewardship Partnership, which includes representatives from:

- Environment Canada
- BC Ministry of Environment
- BC Ministry of Forests and Range
- BC Ministry of Healthy Living and Sport
- BC Hydro
- The Union of BC Municipalities
- Ducks Unlimited Canada
- The Nature Conservancy of Canada
- BC Wildlife Federation
- BC Nature (The Federation of BC Naturalists)
- The Grasslands Conservation Council of BC
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We have taken care to create an action plan that we believe is both realistic and achievable, although we recognize that those qualities alone provide no guarantee of success. Coordination of the efforts of governmental agencies and NGOs will be the key to effective conservation, but the deeper and more essential foundation is a continuing conviction and commitment from the elected officials who chart government priorities. It is our job to show convincingly that making wetlands conservation a priority is not only in the broad public interest in the immediate future but is also a vital foundation for BC's long-term economic prosperity and social well-being, and is worth continued and meaningful support even when it requires a little political courage. The purpose of this action plan is to guide wetland conservation efforts in BC.

> The mission of the Wetland Stewardship Partnership is to promote collaboration among government and non-government organizations to maintain, restore, and protect wetland ecosystems throughout British Columbia by implementing the Wetland Action Plan.

The Structure of the Action Plan

We begin by describing exactly what wetlands are and what roles they play in maintaining healthy ecosystems, regulating the quality and quantity of water flows in the hydrological cycle, protecting communities from the impacts of extreme weather events, and slowing climate change—in short, all the reasons why wetlands are valuable ecologically and to society. Then we describe the current status of wetlands in BC (how much we have and how much we've lost), the nature of ongoing threats to remaining wetlands in the province, and why those threats continue to occur in spite of almost universal acknowledgement in BC of the importance of not damaging our wetlands. From there we move to a discussion of who has authority to do what (the jurisdictional roles of federal, provincial, and local governments), what they have done to date and how successfully, and what gaps remain. Part 1 concludes by stating a Vision for the Action Plan, and sets meaningful and realistic goals that can be achieved with coordinated and cooperative effort. That discussion provides an introduction to Part 2, in which the Wetland Action Plan is formulated around six key goals and the actions needed to conserve and restore BC's natural wetlands.

The Value of British Columbia Wetlands

The Many Meanings of "Wetland"

Wetland words entered the English language centuries ago; the earliest reference to "fen" comes from the Old English epic poem Beowulf written sometime between the 8th and 11th century CE.[1] In Britain "marsh" has been used since 1180, and was derived from "meer" an older term used in the Low Countries around the Netherlands to describe a water meadow. "Bog" also has a long history of usage going back to 1505 to describe wet spongy ground in Scotland. The term "swamp", however, is North American in origin, and was first used in 1625 by early colonists in Virginia to describe a different landscape than they knew in Europe. In 1743 the words "wet" and "land" were joined together by an early American naturalist to describe a bottomland forest in the Carolinas. Formal definition of "wetland" came in 1965 as governments and international organizations met to begin developing a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources, which culminated in the Ramsar Convention on Wetlands of International Importance in 1971. Under Ramsar, wetlands are defined as follows:

> *"...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."*

Specifically, wetlands are a type of ecosystem saturated with water, permanently or intermittently, for a long enough time that the excess water and resulting low soil oxygen levels produce conditions favourable to typically aquatic plants and biological activity adapted to a wet environment. Whereas lakes, rivers, streams, and underground aquifers are identified primarily by the water they contain, the emphasis with wetlands tends to be on the surface of water-saturated land where a wetland occurs; typically at or close to the level of the water table. All wetlands provide similar ecological functions of water storage and release, erosion protection, nutrient exchange, and habitat for fish and wildlife.

Depending on the topography, the amount and type of water and soil in different wetlands can vary considerably, as can the plants and animals found there. Wetlands encompass a range of plant communities which include western redcedar/skunk cabbage swamps, cattail marshes, sphagnum moss-dominated bogs, and coastal salt marshes, as well as intertidal, vernal or ephemeral wetlands, and wet meadows. Two or more wetland classes often occur together in a wetland complex. The five main wetland classes include bogs, fens, marshes, swamps, and shallow open water.

Article 2.1 Ramsar Convention
"[Wetlands] may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands".

Riparian pertains to *"anything connected with or immediately adjacent to the banks of a stream or other water body."*

Burns Bog, the largest undeveloped urban landmass in North America. Photo: Corporation of Delta

Bogs

Bogs are acidic, nutrient-poor peatlands with or without trees that support sphagnum mosses and ericaceous shrubs such as Labrador tea and bog-rosemary. Being generally isolated from mineral-rich groundwater or surface water, their primary source of water and nutrients is from rainfall. The peat formed in bogs and fens is rich in fossil carbon, removed from the atmosphere by plants and often accumulated over millennia. There are many types of bogs in BC, some of which are globally rare. Bogs are especially abundant in the Boreal White and Black Spruce (BWBS) biogeoclimatic zone in northeastern BC, and on the outer coastal lowlands in the hypermaritime subzones of the Coastal Western Hemlock (CWH) biogeoclimatic zone.

Fens

Fens are peatlands formed by sedges or brown moss, and contain many plant species in common with bogs. Most fens have more than 40 cm of peat accumulation. In addition to rainfall, fens receive low to moderate mineral and nutrient-enriched water from upslope drainage or groundwater. These environmental factors allow a broader range of plants, including shrubs and small trees such as birches, willows, hardhack, and sweet gale, to grow on the slow draining peat. Fens are the most common wetland type in British Columbia's intermountain region between the Coast Range and the Rocky Mountains. In some cases, fens are considered the transitional successional stage from marsh to bog.

Swamps

Swamps are wooded wetlands dominated by 25% or more cover of flood-tolerant trees or shrubs. Characterized by periodic flooding and nearly permanent subsurface water flow through mixtures of mineral and organic materials, swamps are high in nutrient, mineral, and oxygen content. The water table in a swamp may seasonally drop below the rooting zone of vegetation, creating aerated conditions at the surface. Vegetation may consist of dense coniferous or deciduous forest or tall shrub thickets dominated by alder and willows. Swamps are most common in southern temperate areas of BC.

Marshes

Marshes are wetlands that are periodically or permanently inundated by standing or slowly moving nutrient-rich water that form wet mineral soils in an oxygen -saturated environment. Freshwater marshes are dominated by emergent vegetation such as reeds, horsetail, rushes, cattails, sedges, and grasses; floating plants such as duckweed and smartweed are sometimes present; estuarine marshes occur at the mouths of most of the major rivers; and intertidal marshes are described below. While the surface water levels of marshes can fluctuate seasonally (or even daily) with declining levels exposing drawdown zones of matted vegetation, mud, or salt flats, water remains within the rooting zone or plants for most of the growing season.

Shallow Open Water

Shallow open waters are characterized by water less than 2 m in depth in mid-summer, and support less than 5-10% rooted emergent vegetation. They include potholes, sloughs, and ponds as well as waters along river, coast, and lakeshore areas. They are usually relatively small bodies of standing or flowing water commonly representing a transitional stage between lakes and marshes. Shallow open waters are found throughout the dry interior region of the province. Submerged and floating aquatic plants commonly associated with shallow open water are bladderwort, duckweed, smartweed, pondweed, and water lily.

Intertidal Wetlands

Intertidal wetlands fall within the marsh class of wetland and consist of mudflats and salt marshes that are found in coastal BC. Salt marshes occur between land and salty or brackish water, often around stream estuaries. Estuaries are found at the mouth of rivers and streams where freshwater meets the sea and creates diluted brackish water within a tidal environment. The productivity of plants in intertidal wetlands is among the highest on earth. The fresh water brings nutrients and organic debris into the marine environment, fuelling highly productive ecosystems with high values for waterfowl, shorebirds, coastal bear populations, and fish habitat. In particular, brackish water is often vital for the success of eelgrass communities, most of which provide nursery habitat for hundreds of fish and marine invertebrate species.

Vernal or Ephemeral Wetlands

Vernal pools are seasonal depressional wetlands that occur under the Mediterranean-like climate conditions of the West Coast. They hold shallow water for variable periods from winter to spring, but may be completely dry for most of the summer and fall. These wetlands range in size from small puddles to shallow lakes and are usually found in a gently sloping plain of grassland or coastal bluff. Although generally isolated, they are sometimes connected to each other by small drainages known as vernal swales. Beneath vernal pools lies either bedrock or a hard clay layer in the soil that helps keep water in the pool. They are sometimes associated with wet meadows, and often provide habitat for rare and specialized species.

Wet Meadows

Common in British Columbia's intermountain region, wet meadows appear as lush, grassy expanses within open forests and grasslands, and are often associated with marshes, shallow open water, and small streams. Their annual wet-dry cycle is the source of their rich productivity; this allows for an influx of nutrients, aeration of soils, and rapid decomposition of plant litter.

Ramsar Convention Wetland Sites in BC

Three well-known Ramsar wetlands in BC are recognized for their international significance by the International Convention on Wetlands, known as the Ramsar Convention. Each provides crucial habitat for migratory birds in addition to local wildlife species.

Alaksen National Wildlife Area: This migratory bird sanctuary is Ramsar Site No. 243. Located in the Fraser River Delta, the area includes arable land and grassland along with scattered wetlands varying from fresh to brackish, plus mud and sand flats supporting three primary types of vegetation. The area is an important link in the chain of wetlands used by waterbirds migrating between arctic breeding grounds and southern wintering grounds. More than 40,000 geese of the Wrangell Island breeding population and up to one million other shorebirds stage and winter here. Up to 25,000 ducks pass through in autumn and 10,000 Surf Scoters congregate to feed on the tidal flats in late summer. They share the Fraser River Valley with the more than one million people living there.

Creston Valley: This wildlife management area is Ramsar Site No. 649, a wide river delta at the edge of the deep waters of Kootenay Lake, where marsh, riparian habitats, and dry mountain forest all interface, providing some of the most important waterbird habitat in the province. During the spring and autumn migrations, spectacular concentrations of birds may gather—over 40,000 at a time. The area also provides significant habitat for numerous mammals, fish, plants, birds, amphibians, and reptiles that are at risk. Aboriginal peoples have lived in the area for thousands of years. Current human activities include recreation, limited agriculture, and water-control regimes to help prevent damage to the wetlands.

Columbia Wetlands: At 15,070 hectares, this Wildlife Management Area (Ramsar Site No. 1463, designated on June 5, 2005) is the largest of its kind in BC. It comprises a regionally unparalleled diversity of 16 habitats, and shelters around 216 species of which the bull trout, peregrine falcon, and badger are endangered. The area provides nesting and rearing habitat for over 180 species of birds; total counts in excess of 10,000 swans, geese, and ducks have been recorded in spring, 15,000 ducks in autumn, and up to 1200 tundra swans in single-day counts in 1977. Several indigenous and introduced fish species spawn and feed in the area, 31 percent of which is composed of standing and flowing water. The Ramsar site notes that despite a management plan being in place, human use and disturbance has been on the rise in the past few years.

A complete list of the 37 Canadian Ramsar sites is available at www.ramsar.org

Columbia Wetlands WMA & Ramsar Site. Photo: B. Harrison

Creston Valley WMA & Ramsar Site. Photo: Bruce Harrison

Restored and Created or Constructed Wetlands

Naturally occurring wetlands can take from decades to hundreds of years to evolve, and in doing so they grow to support a diversity of species that evolve with them. Consequently, great differences exist in the nature and composition of various wetlands, and in the functions they are able to perform. Protecting a natural wetland makes the most financial sense as the costs to restore or create a wetland can be an expensive mitigation option. For these reasons, conservation and avoiding or minimizing harm to natural wetlands is always the first and best action. Mitigation can be offset through wetland restoration or creation. Wetlands that have been damaged or destroyed and are undergoing conservation interventions fall into two management categories: restored, and created or constructed wetlands.

Wetland restoration involves returning one or more of the wetland components, such as water retention, to a degraded or drained wetland site. Sites that have been ditched, tiled, diked, or degraded by previous land uses are all candidates for restoration. Projects can span the spectrum from preventing damaging practices such as logging or cattle grazing, to restoring the water source and/or replanting vegetation. Because the degree of current damage varies, the effort needed to restore sites will also vary. Voluntary wetland restoration programs are happening throughout the province as landowners recognize they can help reverse the tide of wetland losses by restoring wetlands on their property. For over 60 years Ducks Unlimited has worked with landowners to create, restore, and manage wetlands in BC.

Created or 'constructed' wetlands are wetlands constructed in very short time frames for specific purposes such as sewage or stormwater treatment ponds, flood control, or low-impact development, and can provide important functions and services of great value to people. Design and construction must take into account changes in the quality and quantity of the run-off water due to climate change and population growth, as well as the need to provide wildlife habitat or refuge for wetland species incapable of escaping the effects of climate change. Constructed wetlands should not become a sink, concentrating contaminants and becoming detrimental or toxic to wildlife and to adjacent areas.

There are many examples of schoolyard and backyard wetland creation projects in BC; all have increased biodiversity in local communities and some have become habitat for species at risk. The additional benefits are educational and include learning about wetlands from practical experience, and learning about wetland stewardship.

Tribune Bay Provincial Park, constructed wetland.
Photo: K. Dunster

Functions and Benefits: How Wetlands Behave & Why They Are Important

The role of wetlands in helping to ensure adequate high-quality water supplies for communities, controlling floods, checking erosion, and providing critical habitat for many wildlife species only begins to describe their benefits to human communities. The extraordinary capacity of certain types of wetlands to store massive amounts of carbon has gained sudden relevance for a province charting a leadership role in the struggle to reverse or at least slow global warming. Finally, recreational enjoyment of wetlands is constantly expanding beyond the traditional activities for which wetlands have always been appreciated—from scenic viewing to swimming, photography, bird-watching, fishing, and duck-hunting.

The more scientists come to comprehend wetland functions, the more valuable the benefits they provide society are understood to be. Wetland functions are defined as the capabilities of wetland environments to provide goods and services, including basic life-support systems, and those functions may benefit society either directly or indirectly. The following is only a partial list of all the benefits attributable to wetland functions.

Wetlands play a vital role in ensuring adequate water supplies to urban and rural communities

British Columbia's river systems—including tributary streams, lakes and wetlands—permeate every part of the province as absolutely as the circulatory system in a human body. Wetlands—even those that appear superficially to consist only of standing water—are an integral component of the constant flow that replenishes surface and underground water supplies.

Interrupting the natural flow of a water body can damage other parts of a watershed as surely as a cut to a blood vessel can harm the whole person. One of the mistakes made in earlier decades of watershed management was the assumption that each wetland existed more or less in isolation, so that damage to or destruction of any given wetland affected only the immediate vicinity. In reality, disruption of a wetland's natural functions can have a significant impact on both the quantity and quality of water somewhere far removed but intricately connected through barely perceptible and far-reaching flows.

During the wet season, wetlands hold excess rain, snow, and surface waters, to be released much later into underground aquifers and streams. It stands to reason that waters at or near the water table, whether at the surface or underground depending on the rise or fall of the landscape, constantly flow into one another. Consequently, wetlands are the source of water recharge for many aquifers that serve as community water supplies. In agricultural areas, wetlands can prevent adjacent fields from drying up in periods of low or no precipitation. They can also—in grasslands, for instance—create microclimates promoting much-needed precipitation.

Boundary Bay. Coastal intertidal wetlands can be invaluable not only for absorbing surging floodwaters, but also for their capacity to stabilize shorelines and discourage erosion. Photo: K. Dunster

Wetlands help protect communities from extreme flooding and guard against erosion

The wetland function of absorbing water not only ensures storage to top up aquifer supplies, but also prevents excessive quantities of water produced by storms from overwhelming communities in the area. Wetlands along shorelines absorb floodwaters, protecting adjacent lands from damage, while inland marshes soak up runoff, reducing flood crests downstream.

When wetlands are eliminated, flood damage can increase dramatically. For example, the draining and diking of wetlands near Abbotsford resulted in serious flood problems along the Nooksack River, and $40 million had to be invested in remedial projects. Loss of wetlands in the upper Mississippi River basin significantly contributed to the most disastrous flood in modern American history in 1993.[2] Environment Canada has estimated the economic value of the flood control functions performed by Canada's wetlands to be $2.7 billion annually.

Additionally, by maintaining natural drainage and water storage systems, conserving wetlands can avoid the need for expensive storm sewer construction. Johnson County, Kansas, estimated that it saved $120 million on stormwater controls by setting aside $600,000 worth of riparian greenways and wetlands.[3] At a smaller scale, individual developers and communities can save enormous amounts in infrastructure costs by maintaining natural drainage systems (including wetlands), instead of destroying them and installing engineered solutions.

By stabilizing shorelines and riverbanks, wetlands protect against the type of erosion that can make land more vulnerable to damage from flood surges, in addition to avoiding the quantity of siltation that can destroy fish habitat and water purity alike. In addition to these ecological consequences, shoreline and riverbank erosion is also capable of gradually (or catastrophically) reducing the extent of an adjacent property, destabilizing both the ground and any buildings or structures.

Wetlands absorb and dissipate contaminants, preventing pollution of water supplies

By stabilizing shorelines and riverbanks, wetlands protect against the type of erosion that can make land more vulnerable to damage from flood surges.

Wetlands are such effective water purifiers that constructed wetlands are commonly used in the tertiary treatment of industrial and municipal waste water.

Wetlands are complex and dynamic systems (part of the reason why science has only recently managed to understand how they work), and several characteristics contribute to their roles as nutrient sinks. They accumulate organic matter, retain nutrients in buried sediments, convert inorganic nutrients to organic biomass, promote sedimentation of solids, and their shallow water depth maximizes water-soil contact and therefore microbial processing of nutrients and other material in the overlying water.

Wetlands absorb water quickly, then release it slowly with an improvement in quality. They do this by naturally filtering out and absorbing nutrients—up to 87 percent of nitrates and 94 percent of phosphates—while retaining up to 98 percent of suspended solids and other contaminants, and reducing pathogenic microbes by up to 98 percent. [4] [5] [6]

The sources of human pollutants distributed over the landscape are many and varied. In some cases, the source of a pollutant may be easily identifiable; for example a mine leaking metallic wastes through its drainage, or excess fertilizer spilling from a farm field. In other cases, people may be unaware that their daily actions contribute to wetland contamination and pollution. Runoff from highway surfaces used by thousands

of vehicles is one of the most widespread sources of pollutants. All too often, natural wetlands provide value-added filtration services for other human-caused pollutants such as pesticides, heavy metals, pathogens, and sediments. The range of toxic pollutants entering wetlands can have devastating impacts on ecosystems and community water supplies alike. Fortunately for human communities, wetlands, when left intact, create natural filtration systems that effectively trap pollutants and prevent their harmful impacts from spreading far afield. Some wetland plants have the ability to remove and bio-accumulate contaminants such as heavy metals and arsenic.

Wetlands associated with riparian areas are particularly important for protecting watercourses from non-point source pollution, such as leachate from septic systems and stormwater runoff from agricultural fields, lawns, roads, and parking lots. Wetland plants such as duckweed can mitigate nitrogen eutrophication. Other pollutants are either recycled or filtered before they can contaminate neighbouring water bodies. Wetlands are also very efficient in removing pathogens such as coliform bacteria from water supplies. Wetlands are such effective water purifiers that constructed wetlands are commonly used in the tertiary treatment of industrial and municipal waste water. [7]

Wetlands have the potential to mitigate the magnitude and impacts of climate change

Wetland ecosystems, their biodiversity, functions, and the wetland ecosystem goods and services on which humans depend, are threatened by the likely impacts of climate change. It is a commonly held assumption, even by people who recognize the contribution wetlands make to human well-being, that the only good wetland is one that's nearby—one that's good for flood control or duck hunting or other direct and easily perceived benefits that come with having a wetland in the neighbourhood. That may be true in the short-term, but in the long run the most valuable wetlands of all may prove to be those that are both most remote from settlement and largest in area—the vast bogs and fens that form the peatlands of northeastern BC.

Wetland ecosystems are important for **climate change impact mitigation**. Peat-forming wetlands—along with our temperate coastal rainforests and marine plankton—perform the vital function of keeping the atmosphere in balance. Wetlands take in carbon dioxide and release oxygen, thereby acting as 'carbon sinks' that are important in the control of global warming trends. It has been estimated that if the world's peatlands were all drained, the amount of carbon dioxide in the atmospheric greenhouse would almost triple.[8] Although they cover only 3% of the world's land area, peatlands are estimated to store between 20 - 25% of the global soil organic carbon stock.[9] It is estimated that Canadian peatlands store approximately 56% of the soil organic carbon in this country.[10] BC peatlands (fens and bogs) are estimated to store 6.8 billion tonnes (Gt) of carbon or approximately 5% of the 147 billion tonnes of carbon stored in Canada's peatlands.[11] Peatlands continue to sequester carbon on an annual basis, and collectively may sequester about 1.5 million tonnes of carbon per year.[12]

Wetland ecosystems are essential for **climate change impact adaptation**. If storm patterns continue to grow more extreme as global warming progresses, the role of wetlands in flood and erosion control may be expected to become gradually more important. It's also worth noting that as sea levels rise and eat away at coastlines, it will become more important to conserve inland wetlands inland in the expectation that their future importance as potential buffer zones will grow. Similarly, conserving wetlands in areas projected to become more arid (some parts of BC's Interior, for example), may be expected to increase in urgency in the coming years.

Wetlands provide essential habitat for wildlife species

Environmental scientists around the world believe that a quarter of the earth's species may have become extinct by the end of the last century, as a consequence of predation, pollution, urban and agricultural sprawl, the spread of alien invasive species, global warming and assorted other activities of humankind. Anything we can do to lessen the parade of extinctions, we should do.

Wetlands play a disproportionately important role among ecosystems in providing food, shelter, and safety for wildlife species. It is estimated that more than 50% of wildlife species in North America rely on access to wetland habitat for at least part of their life-cycles, and almost 35% of all rare, threatened, and endangered wildlife species are dependent on wetland ecosystems.[13] This is because wetlands form a transition zone between land and water, providing a broad spectrum of habitats ranging from wet meadows to open water. In British Columbia, approximately 500 species of named plants and animals are associated with wetlands, and 70 of those species are federally listed as endangered or threatened. The unique environment of vernal pools provides habitat for numerous rare plants and animals that are able to survive and thrive in these harsh conditions, where predatory fish are absent. Many of these plants and animals spend the dry season as seeds, eggs, or cysts, and then grow and reproduce when the ponds are again filled with water. In addition, birds use vernal pools for bathing, and as a seasonal source of food and water.

A majority of BC's commercial fish species depend directly or indirectly upon wetlands during at least one stage in their lives.[14] Wetlands provide fish with critical spawning and nursing areas, maintain stream flows during dry seasons, and produce nutrients that enrich entire watersheds.[15] Wetland plants provide the protection that juvenile fish populations need to escape predators. Estuaries and their associated coastal wetlands provide vital transition zones between fresh and salt water for migrating fish.

Migratory birds are so dependent on wetlands for their survival that a few examples will serve to adequately illustrate the point. The wetlands of the Fraser River Delta, located on the Pacific Flyway, help support the highest winter densities of waterbirds, shorebirds, and raptors in all of Canada. Roberts Bank and Sturgeon Bank, together with Boundary Bay, form one of the richest and most important ecosystems for migrant and wintering waterbirds in Canada. During the peak of migration, up to 1.4 million birds use the delta, exceeding the Ramsar Convention minimum for "internationally important wetlands" by some 30- to 60-fold.[16] Other coastal and interior wetlands also create important bird habitat. For example, BC wetlands support the world's largest breeding population of Barrow's Goldeneye.

Western Sandpiper. Photo: Jared Hobbs

Wetlands create important recreational, cultural, and educational opportunities

Because of their abundant wildlife, wetlands have traditionally been heavily used for fishing, hunting, and trapping. Increasingly, wetlands are being used for non-consumptive recreation, such as bird watching, photography, canoeing, and hiking. Environment Canada estimates that fishing, hunting, and non-consumptive recreation in Canada's wetlands generates $4 billion in economic value each year. Wetlands help generate the $1.5 billion that British Columbians spend annually on outdoor activities in natural areas, including $302 million annually on wildlife viewing, $329 million for recreational fishing, and $112 million for hunting. On the negative side, off-road vehicles can cause damage to wetlands in all seasons, and wetlands are increasingly vulnerable to permanent damage as they dry out due to climate change.

Wetlands near communities provide students with local outdoor classrooms that engage students in many different aspects of environmental education. Diminishing opportunities for educational travel during the economic recession is being addressed in some regions by the construction of schoolyard wetlands and outdoor education classrooms on school property, with the help of organizations such as BC Wildlife Federation, Evergreen, and BC Nature. For example, eight wetlands have been created at schools in the Thompson Okanagan Region in the past four years, and others are being constructed across the province. The complex ecosystems found in wetlands provide scientists with opportunities for research that increase our understanding of hydrology and complex ecological processes. The cultural community has long found creative inspiration from wetlands, and is also actively engaged in wetland stewardship in BC through efforts by such groups as Earth Artists and Sustainable Earth.[17]

Wetlands can be important agricultural resources

Recognition of the potential value of reclaimed land from wetlands has caused the destruction of many of them through conversion to farmland. Without proper management cattle can cause extensive damage to wetlands through unrestricted access. Nevertheless, agriculture and wetland conservation can be very compatible provided that the extent of agricultural use does not significantly diminish the functions of natural wetlands in an area. In the Lower Fraser Valley (Richmond, Pitt Meadows, and Fort Langley), significant quantities of cranberries are raised in managed freshwater wetlands.[18] In the BC interior, wet meadows provide an important source of hay and forage for cattle production in addition to ensuring high quality, reliable water supply. In coastal areas, marine shellfish farms are primarily located on the west coast of Vancouver Island and around the Salish Sea, with major aquaculture activity concentrated around Baynes Sound, Cortes Island, and Okeover Inlet.[19]

Apart from their direct role in crop production, wetlands provide a source of water for irrigation and can help to prevent farm fields from becoming parched in dry seasons. Seasonally flooded agricultural fields provide important habitat for overwintering birds, while at the same time reduce pests remaining in the fields and provide valuable fertilizer. Organizations such as Ducks Unlimited and many land trusts and conservancies have been working for several decades, often in partnership, with farmers to conserve wetlands in agricultural landscapes throughout BC. These stewardship initiatives show that the protection of wetlands and agriculture into the future can be positive and mutually beneficial.

Healthy wetlands mean healthy communities...

Only the healthy functioning of wetlands can help sustain the living things that rely upon them, including the people. Wetlands provide us with clean water. While wetlands provide habitat for insects such as mosquitoes, in healthy wetlands mosquito larvae is part of the food chain which ultimately leads back to fish on our tables. For people to be healthy, good quality food is essential, and BC wetlands provide fish, berries, and other food. Many wetland plants have been used in traditional medicines, and wetland plants such as blueberries and cranberries are now known to have important beneficial nutritional, antioxidant, and anti-inflammatory health properties.[20] Mental well-being is necessary for good health, and wetlands can be important places for recreational activity that helps maintain physical and mental health.[21]

Blaney Bog: Ideal for cranberries, but more valuable as a park

Blaney Bog and the Codd Island Wetlands, located 2 km downstream and protected in 2004, represent the largest off-channel salmon rearing habitat in the Alouette River watershed, and one of the last in the Fraser River's lower reaches. Fish found in Blaney Creek within the park reserve include Chinook salmon, coho salmon, cutthroat trout, prickly sculpin, and threespine sticklebacks. Prior to extensive diking and land conversion in the early 1900s, the Pitt Valley wetlands were one of the largest inland estuarine habitats in coastal BC.

Blaney Bog is characterized by a regionally significant domed peat bog surrounded by a unique combination of fen, riparian shrubland, riparian forest, and creek habitats. On its eastern boundary the transition to upland is abrupt. In addition to fish, the diversity of habitats supports a wide variety and wildlife species, some of which are listed provincially as rare and endangered. At-risk or uncommon birds include the greater sandhill crane, peregrine falcon, American bittern, great blue and green-backed herons, Virginia and sora rails, and Audubon, yellow-rumped and orange-crowned warblers. Uncommon or at-risk amphibians are northwestern salamander and red-legged frog.

The 92-hectare site of Blaney Bog is a remnant of the much larger, tidally influenced historic Pitt Valley wetlands. The Pitt Polder Preservation Society spearheaded a three-year multi-stakeholder conservation effort to purchase Blaney Bog from private owners who intended to convert it to an industrial cranberry operation. The campaign was successful and in 2000 the land was set aside as a conservation area that is managed as a Metro Vancouver park reserve.

The campaign to purchase Maple Ridge's Blaney Bog as a park rather than see its conversion to cranberry farming is an example of the challenges of resolving conflicts among different wetland values. Many bogs provide ideal sites for cranberry and blueberry farms in BC, but Blaney Bog has very high conservation values such as important habitat for juvenile salmon as well as provincially at risk species within the highly populated Lower Mainland.

For additional information, see www.pittpolder.com.

Fen-creek transition to Ledum-Sphagnum Bog.
Photo: Pitt Polder Preservation Society

Looking east across Blaney Bog to upland transition zone.
Photo: Pitt Polder Preservation Society

The Dollars Saved and Earned by Conserving Wetlands

Given the variety of essential services that healthy wetlands provide to human communities, it's not surprising that they are also assumed to have considerable economic value. Even so, the magnitude of the economic significance ascribed to wetlands is impressive. A few examples of recent estimates:

- $4 billion - the annual economic value generated by hunting and non-consumptive recreational uses of Canadian wetlands.
- $2.7 billion - the annual value of the contribution of Canadian wetlands to flood-control.
- $230 million - the annual value of waste-cleansing services supplied by lower Fraser Valley wetlands.
- $300,000 - the estimated cost of replacing the water supply service provided by a single acre of wetland.
- $5,792-$24,330 - the range of annual value of the goods and services provided by a single hectare of lower Fraser Valley wetlands.
- 5% to 32% - the range of increase that undeveloped green space contributes to the value to nearby properties, resulting in a direct taxation benefit to local governments.
- $66 million - the ecological services that 3,000 hectare Burns Bog in Delta provides annually.

The Economic Value of Wetlands

The United Nations 2004 Millennium Ecosystem Assessment (MA), a four-year study involving more than 1,300 scientists worldwide, grouped ecosystem services into four broad categories: provisioning, such as the production of food and water; regulating, such as the control of climate and disease; supporting, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational benefits.[22]

While there is now wide public recognition of the ecosystem services that wetlands provide, their economic and social contributions to our welfare are still largely unappreciated. The economic benefit provided by goods with a ready market value—fish, berries, timber, wild rice, and medicine[23] —is self-evident. Wetlands also provide tangible societal benefits for which it is far more difficult to establish a market value—improved water quality, decreased treatment costs, avoidance or mitigation of flooding, lower dredging costs, maintenance of wildlife, fish and cultural values, and increased educational, research, and recreational opportunities.[24, 25]

Despite the difficulty of evaluating the economic benefit of conserving wetlands, examples do exist where their value has been realized. In 1997 the City of New York's recognized that it was far cheaper to pay $1.8 billion to private landowners to protect 80,000 acres in the watersheds that provide its drinking water than it would have been to spend $8 billion to construct a new water filtration plant. The city decided to spend the much smaller sum to protect upstate watersheds, buy land as buffers, and upgrade polluting sewage treatment plants.[26] The decision not only saved the capital costs of the filtration plant, but also an additional $300 million per year in operating costs.[27]

In 1997, Costanza *et al.* [28] derived an estimate for the economic value of a wetland. Their analysis considered all the services provided, including for example water purification, flood control, refuge for and animals and derived an estimated value of $22,000 (CDN) per hectare per year in 1994. About 80 percent of this figure was attributable to flood control, water supply and treatment costs, making these the most valuable services. The remaining roughly 20 percent represented the value of services such as cultural and recreational pursuits and the provision of habitat and refugia for species at risk.

In this study the services given the most importance were those benefiting humans directly, with the value placed on providing habitat for species much lower on the list. While all such figures are uncertain given differently functioning ecosystems, the underlying principle is clear. Natural systems, including wetlands, provide society with benefits of very appreciable economic and social worth—benefits that are seldom considered in evaluating costs for proposed developments. To put this in perspective, it is estimated that 3,000 hectare Burns Bog in Delta provides ecological services to the value of $66 million annually.

The Current Status of Wetlands in British Columbia

The extent of wetlands in BC remains impressive even as their area rapidly diminishes. Canada contains almost one-quarter of the wetlands on the planet and well over half the wetlands in North America.

Different Tools, Different Results: Measuring British Columbia's Wetlands

The area of BC's wetlands has been calculated in *Taking Nature's Pulse: The Status of Biodiversity in BC* as 7% of the provincial land base. An earlier 1992 Agriculture Canada study[29] estimated that wetlands cover 5.6% or 5.28 million hectares of the area of BC, primarily in the northeast, where peat bogs and fens predominate. Baseline Thematic Mapping data derived from 1999 satellite imagery indicates that roughly three-quarters of BC's wetland area is comprised of individual wetlands larger than 15 hectares.

Other studies, such as the digitized BC Watershed Atlas, have produced significantly different estimates of the area of BC wetlands, indicating the need for standardized wetlands inventory assessment tools. Accurate information, both locally and province-wide, is an essential starting point for wetlands conservation. See Appendix 1 for more information on wetlands lost and remaining in British Columbia, and provides a general overview of historical losses in different parts of the province.

Wetland Losses To Date

Globally, about 50% of the world's wetlands have already been lost,[30] drained and diked for agriculture, filled in to accommodate housing and industry, dredged and channelized out of existence, or dried up in response to upstream dams, excessive groundwater extraction, or global warming. Fifty percent of the wetlands in the continental United States are gone and another 35% have been damaged.[22] Approximately 68% of all wetlands in southern Ontario have been drained or converted to other uses,[23] and wetland loss in the vicinity of some major Canadian cities has reached 80% to 98%.[24]

Naturally, wetlands are most likely to be converted for other uses in heavily settled areas, and this trend is as evident in BC as in other parts of the country. Some examples of losses to date in BC include (approximate figures):

- 70% of the original wetlands in the Fraser River delta (draining and diking)
- 60% of marsh habitat along Strait of Georgia estuaries[25]
- the 11,700 acre Sumas Lake wetland in the Fraser Valley (once one of North America's most productive wetlands but was drained to create farmland and control flooding)[26]
- 70% of wetlands in the Victoria region[27]
- 85% of the natural wetlands in the South Okanagan (stream channelization, agricultural drainage, and housing)[28]

Current Threats to BC Wetlands

Over time, the nature of threats causing wetland losses in BC has changed. Whereas most wetlands were once lost to large-scale agricultural drainage schemes and water diversion projects, today BC is steadily losing wetlands to draining and filling for new subdivisions, industrial development, shoreline protection projects (rip-rap), removal of streamside vegetation, invasive species, and climate change.

Climate change is considered the greatest threat to wetlands in BC. For example, in years of drought, some vernal pools and shallow wetlands may not fill at all; these ecosystems are highly vulnerable to other impacts such as compaction and trampling if they do not receive enough rain in the wet season or dry out too quickly in the spring. Urban development has become a major contributor to wetland loss in the Okanagan, Vancouver Island, the Lower Mainland, and other high-growth areas of the province. From the late 1980s to the late 1990s, an additional 1,000 hectares of wetlands were lost in the lower Fraser Valley.[29] In the South Okanagan, of approximately 800 hectares of significant wetland remaining, an estimated five to 10 hectares are lost annually, mostly to residential development.[30] Approximately 10% of the wetlands remaining in Kelowna in 1995 have been lost in the last decade.[31]

Many of the wetlands remaining in BC are at risk from degradation or destruction from other threats such as the following:

- invasive species;
- development activities related to mining and oil and gas extraction;
- forest management practices;
- construction of transportation and utilities networks; and
- recreational activities.

Even wetlands that are ostensibly protected may still be subject to secondary threats such as water pollution from run-off from agriculture, roadways or from waste dumping, or from the diversion of water sources upstream. Invasive species such as purple loosestrife and Eurasian milfoil are difficult to control and have serious impacts on native aquatic plant and animal populations.

Climate change is considered the greatest threat to wetlands in British Columbia.

Conserving Wetlands through Low Impact Development Design

Wetlands have an incredible ability to absorb wastes from human activities while simultaneously providing beauty beyond measure to community residents and field laboratories for local schools. Until recently, most communities saw wetlands as wasted space. These days more and more communities are recognizing the value of the services wetlands provide for green infrastructure, wildlife conservation, sense of place, and recreational amenity. In recognizing the value of wetlands, many communities are beginning to consider stormwater treatment on individual parcels and subdivisions as a way to protect watershed integrity and flood safety within a broader regional context.

By incorporating Low Impact Development (LID) techniques and practices into both new and re-development plans, communities can accomplish much to prevent measurable harm to wetlands and other natural aquatic and riparian ecosystems. Besides protecting existing wetlands, LID incorporates on-site stormwater retention using design techniques such as:

- Rain Gardens
- Green Roofs
- Living Walls
- Permeable or Porous Pavement
- Bioswales
- Constructed Wetlands
- Bioretention Ponds

Baxter Pond. Photo: Aqua-Tex Scientific Consulting

Rogers Farm / Baxter Pond, Saanich

Rogers Farm is a 72-house, phased development on the north side of Christmas Hill in Saanich. The developer was initially asked to provide on-site stormwater detention ponds that would have required blasting and excavation of bedrock on an area of land equivalent to three full-sized lots valued at over $275,000. The stormwater from these detention ponds would have been sent to storm drains that empty directly into a tributary of Rithet's Creek.

The cost of the proposed on-site treatment was very expensive and a cost-effective ecological alternative was found. A wetland at the northern base of Christmas Hill had become a fill dump that had lost ecological function. The wetland was restored as part of the Rogers Farm subdivision development and the water supply to support the wetland was obtained from the stormwater collected from the subdivision. The cost of rebuilding the wetland on public land was $75,000 for an immediate cost savings of $200,000 to the developer. The community permitted the Rogers Farm subdivision to use public land for stormwater management, but in return received stormwater treatment for the entire sub-watershed, a restored wetland, increased biodiversity, improved connectivity to other ecosystems in the area, and an improved park amenity.

For more information see *An Economic Rationale for Integrated Stormwater Management - A Resource for Urban and Rural Land Development in BC* at http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

Mitigating Threats: Existing Wetland Policies and Legislation

As discussed above, the array of threats to wetlands in BC continues to expand despite growing awareness of the importance to society of keeping wetlands intact. Reducing the impact of those threats requires a high level of intergovernmental cooperation and coordination because of overlapping levels of jurisdiction.

To cite just one example, ensuring habitat protection for anadromous fish such as salmon falls under the authority of Fisheries and Oceans Canada, while habitat for other fish and wildlife falls under the jurisdiction of the provincial government. Canadian government obligations regarding wetland conservation under international agreements may also necessitate close cooperation with provinces and First Nations to ensure those obligations are met. At the local government level, responsibility for land use planning within municipal, regional district, or Islands Trust Area boundaries requires cooperation and collaboration with provincial and federal levels of government to ensure local compliance with laws and policies of higher levels of government.

The success of the action plan we propose in Part 2 of this report will depend very much on coordinated interaction among and between federal and provincial levels of government. Coordinating federal and provincial efforts will ensure a comprehensive and complementary overarching suite of effective laws and policies that address both authorized and unauthorized threats to wetlands, and promote wetland conservation initiatives. All these efforts must bear in mind that for the most part, negative changes to wetlands happen incrementally — parcel by parcel — at the local and regional government levels.

This section provides a brief listing of the many existing conventions, policies, and legislative instruments with implications for the management and conservation of wetlands in BC. Appendix 3 (Wetland Legislation in BC) provides a detailed tabular review of provincial, federal, and local mechanisms such as land use designation tools, regulations governing land use activities and environmental protection, and legislation affecting wetlands. Appendix 3 also identifies the relevance of each instrument to wetland application, along with lead agencies and affected parties, and provides an assessment of the effectiveness and limitations in each case. Appendix 4 compares BC's policy and guidelines to those of other jurisdictions, and Appendix 5 reviews Canadian federal government policy on wetland conservation.

International Conventions, Agreements, and Programs

Four international conventions and agreements confer wetland-related responsibilities directly on BC:

- The Convention on Wetlands of International Importance (Ramsar, Iran, 1971)
- The Convention on Biological Diversity (CBD) (Rio de Janeiro, Brazil, 1992)
- The North American Waterfowl Management Plan (NAWMP) (1986)
- The Britain (Canada) – USA Migratory Birds Convention Act (1916 and 1994)

National Policies and Legislation

The following national policies and legislation directly affect wetlands:

- Federal Policy on Wetland Conservation
- Canada Wildlife Act – National Wildlife Areas
- Species at Risk Act
- National Parks Act
- Oceans Act - Marine Protected Areas Act
- Canadian Environmental Assessment Act
- Canadian Environmental Protection Act
- Federal Fisheries Act
- Income Tax Act

Jericho Park East, Vancouver. Constructed wetland and shallow open water. Photo: K. Dunster

Provincial Legislation

Although the provincial government directly or indirectly controls resource management on the majority of the provincial land base, and although many of the applicable statutes affect wetland management, no single statute directly addresses wetland loss. All of the following provincial legislation and regulations may affect or help protect BC wetlands:

- Agricultural Land Commission Act - Agricultural Land Reserve Use, Subdivision and Procedure Regulation
- Agriculture Land Reserve Act
- Columbia Basin Trust Act
- Community Charter - Spheres of Concurrent Jurisdiction — Environment and Wildlife Regulation
- Dike Maintenance Act
- Drainage, Ditch and Dike Act
- Drinking Water Protection Act - Drinking Water Protection Regulation
- Ecological Reserve Act and Regulations
- Environmental Assessment Act - Reviewable Projects Regulation
- Environmental Management Act - Contaminated Sites Regulation; Municipal Sewage Regulation; Agricultural Waste Control Regulation
- Farm Practices Protection (Right to Farm) Act
- Fish Protection Act - Riparian Area Regulation; Sensitive Streams Designation and Licensing Regulation
- Fisheries Act - Fisheries Act Regulations; Aquaculture Regulation
- Flood Relief Act
- Forest Act
- Forest and Range Practices Act
- Greenbelt Act
- Heritage Conservation Act
- Islands Trust Act - Islands Trust Regulation; Islands Trust Natural Area Protection Tax Exemption Regulation
- Land Act - Land Use Objectives Regulation
- Land Title Act
- Local Government Act
- Local Services Act
- Mineral Tenure Act
- Mining Right of Way Act
- Motor Vehicle (All Terrain) Act
- Muskwa-Kechika Management Area Act
- Park Act - Park, Conservancy and Recreation Area Regulation
- Petroleum and Natural Gas Act - Drilling and Production Regulation; Geophysical Exploration Regulation
- Plant Protection Act
- Protected Areas of British Columbia Act
- Public Health Act - Sewerage System Regulation; West Nile Virus Control Regulation; Health Act Communicable Disease Regulation[32]
- Range Act and Range Regulation
- Significant Projects Streamlining Act
- Transportation Act – No Net Loss Wetland Policy
- Water Act - Water Regulation
- Weed Control Act - Weed Control Regulation
- Wildlife Act – Wildlife Management Areas Regulation; Tofino Mudflats Wildlife Management Area Regulation; Wildlife Management Areas (e.g., Serpentine and Bert Brink) Regulation; Wildlife Management Areas (Squamish Estuary) Regulation

Chemainus Estuary
Photo: Ducks Unlimited Canada

Provincial Strategies and Programs

Several non-statutory provincial strategies and programs have the potential to affect wetlands:

- Provincial Water Strategy (Living Water Smart)
- BC Climate Action Plan (Live Smart BC)
- BC Conservation Framework
- BC Air Action Plan
- Integrated Watershed Management/Land Use Planning
- Water Use Planning
- Invasive Species Strategy
- Best Management Practices (Develop with Care)
- Drought Protection Strategy
- Watershed Based Fish Sustainability Planning
- Code of Practice for the Use of Reclaimed Water (Municipal Sewage Regulation)
- Flood Hazard Land Use Management Guidelines
- Integrated Community Sustainability Planning Initiative (ICSP)

Local Government Responsibilities

The Community Charter and the Local Government Act allow local governments to undertake land use planning and protect wetlands through:

- Official Community Plans
- Local Area Plans
- Land Use Bylaws
- Environmental Protection Bylaws
- Regional Growth Strategies
- Environmentally Sensitive Areas (ESAs) mapping
- Environmental Development Permit Areas (EDPAs)
- Local and Regional Conservation Strategies.

Fort Nelson submergents.
Photo: B. Harrison

The Legislative Framework for the Wetland Action Plan

The **Wetland Action Plan** is intended to operate as an integral component of the existing legislative and strategic framework for natural resource management and biodiversity conservation in British Columbia. Appendices 3, 4, and 5 describe the laws, policies and practices at the various levels of government. At the provincial level, the legislative and policy framework is intended to be consistent with the BC government's stated Great Goal to "*Lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management - bar none*." Sustainability Principles include accountability, transparency, science-based decision-making, and continual improvement.

While the prime mechanism for managing and allocating water and protecting water regimes in BC wetlands is the provincial Water Act, the responsibilities for wetland management in BC are shared between a number of authorities and groups. Many other policy and legal instruments at the international, intergovernmental, national, provincial, and municipal levels have direct or indirect impacts on wetland resource management.

Because of the wide range of human activities with the potential to influence wetlands, a considerable variety of policies and pieces of legislation have a bearing on wetland conservation and degradation. A comprehensive examination and gap analysis of the legal and policy framework governing BC's wetlands conducted by the Wetland Stewardship Partnership identified several specific opportunities for improving decision-making processes and for enhancing wetland conservation. In future, the provincial government is likely to need to develop comprehensive policy and legislation specifically to guide management practices in, and improve conservation for wetlands on concert with amendments to existing legislation to identify the importance of protecting wetlands while managing other land uses and resources. The objectives and recommendations of the Wetland Action Plan include addressing this need to develop effective, practical legislation in consultation with all stakeholders and interested parties.

In order to establish a coherent approach to implementing effective, regionally prioritized, and locally informed conservation strategies on the ground throughout the province, a coordinated plan of positive action is needed to achieve the several clear objectives described in the action plan we propose.

Realistic Goals and How to Achieve Them

To recap, here are ten key reasons why wetlands must be considered the most valuable of all of BC's natural ecosystems, especially in light of the ecological and economic benefits they provide to human communities:

Ten Key Wetland Values

1. ***Wetlands ease freshwater shortages and drought*** by storing excess moisture during wet seasons and gradually releasing it to streams and underground aquifers during dry periods.
2. ***Wetlands maintain and improve water quality*** by filtering out pollutants and thus protecting the purity of lakes, rivers, streams, and community water supplies.
3. ***Wetlands help mitigate flooding and erosion*** by absorbing precipitation, runoff, and high water.
4. ***Wetlands provide protection against the impacts of climate change*** by acting as carbon sinks that absorb and hold carbon dioxide instead of releasing it into the atmosphere.
5. ***Wetlands provide critically important habitat*** for up to half of BC's fish, bird, mammal, and plant species.
6. ***Wetlands provide popular recreational opportunities*** for activities such as fishing and hunting, as well as "non-consumptive" recreation such as bird-watching, photography, canoeing, and hiking that connects people with nature through active living.
7. ***Wetlands provide educational, cultural, and scientific opportunities*** by serving as outdoor classrooms for school and college students and labs in the field for scientists studying hydrology and complex ecological processes, as well as providing lifelong learning opportunities for older learners and creative inspiration for artists and musicians.
8. ***Wetlands create ideal growing conditions for diverse food and agricultural products*** such as wild-harvested cranberries, blueberries, shellfish, hay, and forage.
9. ***Wetlands provide open space within the landscape mosaic*** and the diversity and beauty of wetland habitats are unmatched and contribute to human satisfaction.
10. ***Wetlands are the third most important life-support system on the planet*** after forests and farmlands, according to the World Conservation Strategy.

The Need to Commit to Action Now

Tracking the disappearance of wetlands is a little like tracking climate change — the impacts are sometimes so subtle and slow you don't notice them from year to year. It's only when you look at the big picture and analyze projections for the future that it hits home. If we don't act immediately and decisively, future generations faced with the extreme cost of repairing the damage will wonder why their ancestors could not see that the economic and ecological long-term benefits would far exceed the short-term costs associated with slowing the destruction of wetlands and restoring those not damaged beyond repair.

The trend towards loss of wetlands shows no signs of abating. For example, in a single decade between the late 1980s and late 1990s, the lower Fraser Valley lost 1,000 acres of wetlands, and currently the South Okanagan is estimated to be losing about 1% every year, due to residential development. As a society we are learning from our past mistakes and have begun to take adequate measures to prevent them from occurring in the future. The ecological goods and services provided by BC wetlands — whether protecting precious sources of drinking water, strengthening flood protection, providing habitat for species at risk, or storing carbon— provide clear reason and direction for acting with urgency to protect them now and forever.

The Need for Coordinated, Comprehensive Action

It's the right time to initiate a provincial wetland action plan because it complements many other government green initiatives. As demonstrated in the previous section and related Appendices, the extensive array of policy and legal instruments that operate at various governmental levels (international, national, inter-governmental, provincial, and municipal) to directly and indirectly contribute to wetland conservation display varying degrees of effectiveness. The potential these instruments provide for effective conservation is subject to complex and unclear hierarchies of interacting provisions and responsibilities that often lead to administrative uncertainty and a lack of coordination in determining the ultimate lead agency and the appropriate statutory authority for protecting a particular wetland.

In order to establish a coherent approach to implementing effective, regionally prioritized, and locally informed conservation strategies on the ground throughout the province, a coordinated plan of positive action is needed to achieve the several clear objectives described in the action plan we propose. An effective plan of action needs to:

- enable wetlands to be inventoried, classified, assessed, and evaluated for benefits and threats;
- provide for development of appropriate guidelines and wetland-specific legislation;
- provide for appropriate actions to be taken in conjunction with education and the provision of practical information and recommendations to local decision makers on the right method and the right place, to reduce the impact of human activities on sensitive wetland areas; and
- provide incentives for stewardship.

Acknowledgement of the need for a coordinated approach led to the formation of the Wetland Stewardship Partnership in 2002 to begin considering what kind of actions a plan should include in order to be achievable and effective. The result of work over the past several years is the action plan described in Part 2 of this report.

Our Vision of a Province Well-Endowed with Wetlands

The ongoing threats to BC's remaining wetlands are seemingly obvious, as is their importance to the human and wild communities that, knowingly or unknowingly, depend on wetlands for nourishment, for pure and abundant water, and for protection from natural disasters such as flooding and drought.

The Wetland Stewardship Partnership has a vision of British Columbia as a province where the functions and values of wetlands and the larger watersheds of which they are a part are appreciated, conserved, and restored for present and future generations.

It is a vision that we believe virtually everyone in the province—whether government agency or industry, community, or individual—would readily claim as their own.

One might like to think such a vision might be achieved through a little tweaking of laws and policies and plans and practices. Unfortunately, it won't be quite so easy as that. It will be hard work that requires not just lip service but ongoing commitment and cooperation among all who benefit from healthy wetlands and, as well, from all with the potential to harm them.

The Wetland Stewardship Partnership hopes that everyone who wishes to join in making our vision come true will also endorse our mission — to promote collaboration among government and non-government organizations to maintain, restore, and protect wetland ecosystems throughout British Columbia by implementing the **Wetland Action Plan**.

Our Vision: British Columbia is a province where the functions and values of wetlands and the larger watersheds of which they are a part are appreciated, conserved, and restored for present and future generations.

Making Actions Meaningful

Awareness of the importance of wetlands has indisputably increased in recent years, as reflected in the government commitments described above. Unfortunately, the widespread will to protect and restore what we say we value has not yet wholly matched our understanding of the problem. The changes that need to occur if we truly mean to address the considerable threat to our remaining wetlands will require consultation and cooperation among differing and sometimes competing interests. This will not happen overnight.

To have any hope of succeeding, a realistic plan of action must not only be able to adapt to unexpected developments but must also take a multi-year, iterative approach to conserving and managing wetlands. Also, plan objectives and actions must be flexible enough to permit amendments in response to arising opportunities and constraints as identified under constantly monitored performance.

The **Wetland Action Plan** proposed in Part 2 is long term in scope, but begins with steps that can be taken immediately. It will be a mark of failure if wetland conservation becomes merely "the flavour of the day" — a feel-good enterprise that makes for a few good press conferences followed soon after (a couple of months, a couple of years) by a self-congratulatory announcement of mission accomplished. We don't believe it will be that simple for a problem that has been a long time in the making, continues to persist without significant letup, and will require serious recognition before a fix gets underway.

The **Wetland Action Plan** is guided by seven over-arching principles that set the ground rules for assessing the effectiveness of the actions we recommend. The principles act as a foundation for six broad, interrelated goals we then describe as being necessary to satisfy three essential requirements for the action plan:

- **clear and comprehensive information** about, and widespread understanding of the significance of and threats to remaining wetlands in the province;
- **effective use of legal and planning mechanisms** to protect wetlands in the face of ongoing and persistent threats; and
- **practical incentives and tools** for protecting undamaged wetlands and restoring those that have already been compromised.

Principles for Wetland Management

The following seven principles for wetland management inform the goals of the Wetland Action Plan and flow from our vision of a province that appreciates, conserves, and restores its wetlands:

1. Wetlands serve numerous, valuable, environmental, social, and economic functions, and contribute significantly to the health and well-being of British Columbians. As such, they are a priority for efforts toward environmental conservation and sustainable development.

2. In recognition of the long history of lost and damaged wetlands that continues today, concerted efforts are now required to protect remaining wetlands.

3. Wetland management must strive to maintain or restore the natural functions and structures of wetlands, and wherever possible, mitigate the effects of human activities.

4. The management and protection of wetland values must be recognized and provided for in all relevant planning processes, both statutory and non-statutory.

5. Wetlands of recognized significance for conservation must be given the special protection and management required to maintain their ecological values.

6. The ongoing development and refinement of scientific knowledge and inventory data are fundamental to the achievement of wetland conservation in BC.

7. The preferred option for addressing wetland loss, particularly in areas under pressure from growth and development, is integrated watershed management and planning for all water bodies.

Goals of the Wetland Action Plan

The following six goals form the Wetland Action Plan in Part 2, where for each goal we describe three objectives that must be met as well as the specific actions that must be taken to fulfil those objectives. The responsibility for undertaking various actions may fall to government, to industry, to communities, even to individual citizens — whomever has the motivation and means. Some actions may require a cooperative effort by all of the above over a very long time, but will ultimately result in lasting benefits for the environment, for our communities and, most important of all, for generations to come.

The implementation of strategies and actions aimed at achieving these goals will be overseen by the Wetland Stewardship Partnership. However, successful implementation of the Plan will depend on active participation by many stakeholders. A scientific support team will ensure that actions are based on sound science and will address information gaps. Each year a workplan will be implemented to address priority actions and associated tasks. The Wetland Action Plan will be reviewed every five years.

Goal 1. Develop a comprehensive and reliable wetland information base to support effective planning, law-making, and policy development.

Goal 2. Increase public, industry, and government awareness of the importance of wetlands and commitment to wetland protection and restoration.

Goal 3. Enhance legal protection of wetlands through effective and effectively enforced laws and policies.

Goal 4. Ensure the effective integration of wetland protection in strategic land use processes.

Goal 5. Secure the protection of priority wetlands and the conservation and restoration of natural wetlands throughout the province.

Goal 6. Improve coordination and strengthen partnerships to maximize effectiveness in wetlands protection and restoration.

Kootenay Marsh with shallow open water
Photo: B. Harrison

Part 2: The Wetland Action Plan

Clear and Comprehensive Information

Goal 1. Develop a comprehensive and reliable wetland information base to support effective planning, law-making, and policy development.

Comprehensive, reliable, and up-to-date information is a prerequisite for effective decisions about wetland protection and restoration. To determine priorities for wetland protection and restoration, it is important to know how much of various types of wetland we have and need, their condition, the nature and causes of ongoing risks, and what type of action is most likely to be effective in the long-term.

Developing an adequate information base requires sufficient and effectively directed research funding, refined tools for monitoring and managing wetlands, a uniform wetland classification scheme, and effective means of sharing information with all who may need it.

Chilanko Marsh Bay. Photo: B. Harrison

Goal 1. Develop a comprehensive and reliable wetland information base to support effective planning, law-making, and policy development.	
Objective	**Actions**
OBJECTIVE 1.1 **Create a comprehensive and reliable wetlands information base.**	• Assess and improve the capability of existing tools and resources for mapping, documenting, monitoring, and managing wetlands and conducting scientific research about wetlands. • Encourage use of MacKenzie & Moran (2004) provincial wetlands classification system.[33] • Develop baseline data on wetland locations, classification, and function using these tools and resources. • Develop a provincial wetland evaluation system using remotely-sensed information, GIS technology, and field information to identify wetlands and evaluate their ecological significance. • Explore and promote opportunities for cooperation between BC government agencies, between the provincial and federal governments and throughout the Pacific Northwest (including BC, Washington, Oregon, and Alaska) in the compiling and sharing of information and funding of research about wetlands, including wetland functions, biodiversity, and species at risk; and adoption of uniform wetland classification schemes and evaluation systems. • Identify all wetlands protected by conservation covenants on privately-owned lands.
OBJECTIVE 1.2 **Assess the current and historical extent of BC wetlands and of each wetland type.**	• Determine wetland inventory needs and support initiatives to meet those needs. • Coordinate existing wetland inventories, using all available up-to-date data at multiple scales. • Map the historical extent of wetlands in BC beginning with four pilot areas. • Liaise with the Canadian Wetland Inventory (CWI)[34] regarding these pilot areas and providing a series of maps on a Terrain Resource Information Mapping (TRIM) base to provide a broad overview of the historic and current extent of wetlands in the province.
OBJECTIVE 1.3 **Study wetland functions, status, and trends to improve understanding of wetland values and establish priorities for wetland protection and restoration.**	• Update NCC Ecoregional assessments (include assessments of wetlands and other aquatic ecosystems).[35] • Conduct and report the results of a comprehensive assessment of the nature and extent of trends and threats to each type of wetland in each region of the province, determine why these threats continue to occur, and find feasible options for terminating or mitigating these threats. • Investigate the hydrological functions of how wetlands contribute to maintaining/enhancing drinking water quality and the hydrological connectivity of wetlands to the broader watershed/sub-watershed. • Assess the function and measure the relative effectiveness of wetlands as carbon sinks in all regions of the province. • Encourage and support development of federal and provincial standards for assessment of wetland function. • Develop standards for wetland conservation evaluation to establish and justify priorities for wetland conservation and restoration of habitat and function. • Map all priority wetlands in priority areas at 1:10,000 (TRIM) • List priority wetlands in the province for protection through purchase or covenant. • Make available a database to electronically store information on the status of and threats to BC wetlands. • Incorporate wetlands information in the State of the Environment report.

Clear and Comprehensive Information

Goal 2. Increase public, industry, and government awareness of the importance of wetlands and commitment to wetland protection and restoration.

Making the case for the many benefits of wetlands is not always easy when, depending on your perspective, they may seem far more valuable drained for farmland or building development, for waste disposal, or when their presence gets in the way of potential transportation corridors, industrial or commercial uses, or damaging recreational activities.

Comprehensive information in itself may not be enough to convince those who might knowingly or inadvertently do damage to wetlands (individuals, corporations, industries, government agencies, and institutions) of the need to protect them or the self-interest of doing so.

With support, education programs—whether through K-12 school-based curricula or part of community lifelong learning efforts—holds much promise and opportunity to raise knowledge and awareness about wetlands and wetland stewardship. With support, there are many opportunities to engage the creative community in raising wetland awareness through art, song, and the written word in all forms.

Wetland Restoration. Photo: C. de la Salle

Goal 2. Increase public, industry, and government awareness of the importance of wetlands and commitment to wetland protection and restoration.	
Objective	**Actions**
OBJECTIVE 2.1 **Encourage public understanding of the importance of wetlands and incentives available for wetlands conservation.**	• Promote the use of educational resources such as the *Wetkit* produced by the North American Wetland Conservation Council (Canada)[36] • Prepare and distribute print, web-based, and audio-visual materials with convincing and easily understood information on the importance of wetlands in BC, including the role of wetlands within the hydrological cycle and as a component of watersheds, and as carbon sinks. • Prepare education and information packages appropriate for inclusion in school curricula. • Prepare and distribute to local governments brochures or fact sheets on Wetland Best Management Practices, the Green Bylaws Toolkit, the Wetlands Primer, and other relevant information on wetlands conservation. • Encourage community groups and individuals to monitor changes to local wetlands through the national *Ecological Monitoring and Assessment Network* (EMAN)[37] • Encourage protection and stewardship of wetlands on private lands by distributing materials and information on the benefits of conservation covenants and other legal tools.
OBJECTIVE 2.2 **Assess and publicly communicate the nature and ongoing risk of threats to wetlands and to specific wetland types, as well as opportunities for risk mitigation.**	• Ensure public online access to wetlands inventory and mapping data and results of research on functions, status, and trends. • Prepare and distribute information materials on threats to BC wetlands, practical solutions, and opportunities for individual involvement in wetland stewardship. • Communicate stories of wetland conservation successes as well as failures, with an emphasis on opportunities for positive solutions.
OBJECTIVE 2.3 **Build a strong case for government and industry motivation for and long-term commitment to wetlands protection.**	• Communicate clearly to government agencies, elected officials, and corporate and industry representatives, the cost-benefit relationships between wetland conservation, wetland loss, and economic revenues and losses. • Analyze and describe practical opportunities for industry to undertake wetland protection projects, including Ecogifts.[38] • Promote the Wetland Stewardship Partnership's *Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia* to help avoid loss of and impacts to wetlands as an addition to the *Develop with Care* suite of best management practices.[39]

Goal 3. Enhance legal protection of wetlands through effective and effectively enforced laws and policies.

Laws are only as good as the information on which they're built, which is one reason why a clear and comprehensive information base needs to be a priority in a wetlands action plan that works.

Even well-informed laws need to be reviewed from time to time to ensure that they're meaningful and up-to-date and that the laws and policies in a provincial jurisdiction such as British Columbia follow a consistent approach—and ideally are also consistent with federal and municipal regulations. Inconsistencies may occur either between conservation-oriented laws or between conservation-oriented laws and other laws authorizing activities potentially harmful to wetlands. Either way, inconsistency undercuts effectiveness.

A comprehensive legislative review provides the opportunity not only to check for effectiveness and consistency in the existing legal regime but also to examine the legal approaches taken by other jurisdictions, with a view to emulating what has been proven to work particularly well elsewhere.

Dry Interior Grassland with aspen stands indicating an area of wet meadow in a depression below the upland forest. Photo: K. Moore

Goal 3. Enhance legal protection of wetlands through effective and effectively enforced laws and policies.	
Objective	**Actions**
OBJECTIVE 3.1 **Review existing BC laws and policies with the potential for conservation of or harm to wetlands, and promote development of legislation and bylaws.**	• Adopt a provincial requirement for no net loss of wetland area and function for BC. • Review the effectiveness of existing federal and provincial laws, regulations, and policies with the potential for positive or negative impacts on wetland conservation, and propose improvements as necessary. • Develop a wetlands policy for BC with specific links to requirements for BC Carbon Trust eligibility and BC Conservation Framework criteria for conserving priority species and ecosystems. • Integrate wetlands-specific factors into the BC Conservation Framework.[39] • Ensure BC policies are founded on a hierarchy of avoidance, minimization, and compensation, with avoidance being the priority and compensation for unavoidable adverse impacts the last resort. • Develop criteria for compensatory mitigation methods, including protection, restoration, enhancement, and creation of wetlands. • Develop a guide to implementation of the Federal Policy on Wetland Conservation to aid interpretation and use of the policy, specifically in environmental assessment. • Ensure effective protection of wetland interests under a modernized BC *Water Act*. • Encourage Regional Managers to require a wetlands assessment / evaluation report where a water license may impact an environmentally significant wetland. • Compile information on local governments that have enacted bylaws to protect wetlands. • Develop and distribute a model wetland bylaw for use by regional districts, Islands Trust, and local governments to protect wetlands. • Promote use of Environmental Development Permit Areas (EDPAs) as a wetland conservation tool.
OBJECTIVE 3.2 **Review laws, policies, and experiences of other jurisdictions (nations, states, provinces, municipalities) with a view to identifying model laws and policies with potential lessons for British Columbia.**	• Conduct an inter-jurisdictional review of what works and what doesn't elsewhere. • Draw upon the experiences of other jurisdictions to recommend legislative and policy improvements that might facilitate the conservation and restoration of BC wetlands.
OBJECTIVE 3.3 **Promote effective and enforceable best management practices for activities with the potential to adversely affect significant wetlands.**	• Encourage local governments to develop bylaws adopting *Wetland Ways* guidelines and Ministry of Environment's *Develop with Care*: *Environmental Guidelines for Urban and Rural Land Development in BC*[40] • Employ an ecosystem-based management approach emphasizing risk and harm reduction. • Revise the *Wetland Evaluation Guide* published by Wildlife Habitat Canada and Environment Canada in 1992 to improve its relevance for BC. (The purpose of the guide is to assist decision makers in evaluating development proposals with the potential to impact wetlands).[41] • Develop multi-stakeholder pilot projects in high priority areas of the province to support the adoption of jointly developed wetland conservation policies and guidelines. • Develop provincial standards for activities or projects in or near significant wetlands. • Emphasize prevention of wetland losses as the most effective mitigation option, with compensation for wetland losses as a backup, last-resort option.

Goal 4. Ensure the effective integration of wetland protection in strategic land use processes.

Laws and land use planning guide decision-makers in determining whether, and what type of protection wetlands will receive, either through constraints on potentially harmful activities or through proactive conservation such as the legislated creation of protected areas.

All wetlands are integral components of watersheds, and in its entirety, the landscape of BC is simply an unbroken mosaic of watersheds. It therefore makes sense that the most effective form of wetland planning occurs through **Integrated Watershed Management Planning**, in which the rules governing industry and development in watersheds are negotiated. Other forms of planning related to particular resources enable a precise focus on specific natural values.

Examples of planning in BC that integrate wetland protection include *Living Water Smart*, the province's water quality and quantity plan; the BC Conservation Framework; and the BC Plant Health Strategy. At the request of the Living Rivers Advisory Group, in 2008 the Collaborative Watershed Governance Initiative (CWGI) was initiated by the Fraser Basin Council, Pacific Salmon Foundation, and the BC Conservation Foundation to establish and implement a framework for collaborative watershed governance in BC. If implemented, the result would be a shift toward ecosystem management in BC based on watersheds, using advanced governance arrangements and more collaborative local decision-making.

Shallow Open Water, BC Interior. Photo: B. Harrison

Goal 4. Ensure the effective integration of wetland protection in strategic land use processes.	
Objective	**Actions**
OBJECTIVE 4.1 **Support and promote integrated watershed management planning (IWMP) processes.**	• Analyze how to incorporate wetland interests and local knowledge in IWMP processes. • Promote water use planning. • Continue ecoregional biodiversity and threats assessments of freshwater ecosystems. • Develop a Wetland Decision Support Tool to support watershed scale management and planning.
OBJECTIVE 4.2 **Ensure that all new plans—including resource management, watershed management and local land use plans—incorporate wetland protection and restoration strategies.**	• Ensure adequate guidance is available to local governments on how to incorporate wetland protection strategies in local planning. • Develop draft regional wetland conservation strategies to guide local governments, stakeholders, and interest groups. • Link wetland restoration and planning efforts to other watershed planing efforts by local governments, such as off-site stormwater management planning.
OBJECTIVE 4.3 **Ensure effective incorporation of wetland ecosystem protection in multi-scale biodiversity protection and water strategies, and climate change action initiatives.**	• Ensure effective integration of wetlands protection in BC Conservation Framework action planning. • Develop and implement regional biodiversity conservation strategies that include wetlands. • Ensure effective integration of wetland protection in *Living Water Smart*, the provincial water strategy.[42] • Integrate wetland conservation strategies with provincial climate action strategies.[43] • Include wetlands in initiatives to expand provincial core protected areas into a climate conservation network.[44]

Goal 5. Secure the protection of priority wetlands and the conservation and restoration of natural wetlands throughout the province.

An assessment of the extent of different types of wetlands and risks to those remaining is the starting point for setting priorities. A variety of other tools can be employed to complement land use planning and legal protection mechanisms. These include various forms of direct government action to protect wetlands and legal incentives for protection on private lands. The key is to encourage contributory efforts from a broad range of stakeholders ranging from individual landowners to large industries and various levels of government. Given that large-scale protection is naturally an expensive proposition, innovative fund-raising initiatives are a vital component of effective wetlands protection.

Priority wetlands are to be identified by the WSP and include the following:

1. Wetlands of provincial, federal, or international importance;
2. Wetlands with rare, threatened, or endangered species;
3. Wetlands having unusual or unique community types;
4. Wetlands providing important buffers or water quality improvement to water supply sources;
5. Wetlands providing important flood hazard reduction function;
6. Wetlands providing habitat for commercially or recreationally important species;
7. Wetland complexes that remain in urban areas;
8. Wetlands of cultural significance; *and*
9. Other criteria identified by local interests, e.g., carbon sinks, educational, and scientific values

Little Big Bar on Fraser River, emergent marsh. Photo: B. Harrison

Goal 5. Secure the protection of priority wetlands and the conservation and restoration of natural wetlands throughout the province.	
Objective	**Actions**
OBJECTIVE 5.1 **Protect priority wetlands through fee simple acquisition, Crown land reservations, conservation covenants, creation of protected areas, or other means.**	• Confirm criteria for determination of priority wetlands. • Identify and map priority wetlands for protection. • Prioritize wetland areas for conservation or restoration based on priority criteria. • Employ BC Conservation Framework prioritization tools to rank wetlands for conservation purposes based on wetland species' and ecological communities global, national, and provincial status, population trends, threats, stewardship responsibility and feasibility of recovery. • Support the efforts of land securement bodies in all sectors to protect priority wetlands. • Establish a framework for determining province-wide priority areas for securement and conservation that considers the broader landscape context (e.g., importance of habitat connectivity, watershed context, adjacent lands, natural heritage systems, protected area networks). • Encourage formal national/provincial designation of priority wetlands as National Wildlife Areas, Ecological Reserves • Pursue Ramsar and other international designations for a wide range of wetland types and sizes throughout the province, and secure and protect with WMAs, conservation covenants or other legal tools. • Establish management/conservation plans on secured wetlands.
OBJECTIVE 5.2 **Encourage the involvement of individuals, groups, corporations, and industries in all aspects of wetlands protection and restoration.**	• Publicly distribute clear information on practical ways of maintaining and restoring wetlands in communities. • Improve economic, tax, and other incentive programs to encourage conservation of wetlands on privately-owned land. • Encourage the use of property tax incentive programs for conservation covenants (such as the Natural Areas Tax Exemption Program (NAPTEP) in the Islands Trust Area).[45] • Recognize stewardship organizations, land trusts, and individuals involved in purchasing or covenanting land by publicizing the location and extent of wetlands, riparian areas, and estuaries protected each year. • Provide technical advice to organizations involved in the restoration or creation of wetlands, including assistance in determining optimal locations. • Expand the tracking system for wetland creation, restoration, and enhancement projects and publicize the results to improve public awareness and encourage similar projects. • Develop clear criteria to indicate under what circumstances creation of artificial wetlands is appropriate and deserving of support. • Encourage participation in Joint Ventures to secure priority wetland habitats.
OBJECTIVE 5.3 **Develop and support innovative funding mechanisms for acquisition, protection, and restoration of wetlands.**	• Ensure core funding support for volunteer-based land trusts and stewardship groups involved in purchasing, covenanting, and managing wetlands. • Promote the expansion and emulation by other levels of government of tax-incentive programs such as Environment Canada's Eco-Gifts program. • Encourage uptake of grants, loans, and other financial incentives to improve wetland protection (e.g., Conservation Land Tax Incentive Program, Managed Forest Tax Incentive Program, Agricultural Policy Framework, and Natural Areas Conservation Program). • Encourage establishment of local and regional government conservation funds through tax levies. • Assess opportunities for grants from foundations for community wetland restoration efforts. • Provide technical advice to Pacific Carbon Trust regarding the carbon storage ecosystem services provided by BC wetlands; expand provincial climate change action and adaptation initiatives to recognise the existing carbon storage in wetlands and need for wetland conservation to achieve greenhouse gas reduction in BC. [46, 47]

Goal 6. Improve coordination and strengthen partnerships to maximize effectiveness in wetlands protection and restoration.

The importance of cooperation is frequently overlooked as a key contributor to achieving public interest objectives. As with inconsistencies in laws and policies governing wetland protection, lack of coordination (sometimes extending to outright competition among agencies) can severely diminish opportunities for effective approaches to wetlands protection and restoration.

In addition, coordination of efforts — which can only be achieved through proactive and constructive communication across agency and jurisdictional borders — is essential both for avoiding duplicated efforts and combining forces to lower costs and increase effectiveness.

Land Development will require landowner cooperation, sensitive environmental planning, and inter-agency coordination to protect this marsh wetland. Photo: Ducks Unlimited Canada

Goal 6. Improve coordination and strengthen partnerships to maximize effectiveness in wetlands protection and restoration.	
Objective	**Actions**
OBJECTIVE 6.1 **Encourage a coordinated approach among different levels of government and non-governmental organizations for acquiring or otherwise protecting priority wetlands.**	• Create mechanisms for formal and informal information-sharing through Joint Ventures[48] and between levels of government, and between the provincial government and NGOs for priority-setting and sharing of ideas on effective approaches to wetlands conservation.
OBJECTIVE 6.2 **Promote effective coordination of regulatory efforts among provincial government ministries and among federal, provincial and municipal levels of government.**	• Work toward greater cooperation and harmonization between BC and other jurisdictions on cross-jurisdictional wetland issues. • Promote effective wetland conservation relationships among all BC government ministries or agencies whose responsibilities include the potential for conservation of or harm to wetlands. • Implement wetland protection policy development at the local government level, e.g., through the Riparian Areas Regulation assessment, integration into community plans, green bylaws, and by existing permitting and approvals processes. • Set up a provincial monitoring authority to ensure policy compliance and goals are achieved on a province-wide basis. • Ensure coordinated participation in North American Wetlands Conservation Council and use of NAWCC wetland tracking database.
OBJECTIVE 6.3 **Achieve efficiencies through coordinated approaches to information gathering and analysis, public education, training in wetland restoration techniques, and fund-raising.**	• Encourage a federal-provincial data sharing and data use agreement that facilitates interagency collaboration and communication across shared programs (including biodiversity, species at risk, wetlands, forests, and other natural heritage areas). • Encourage and support groups and agencies offering training in wetland restoration techniques.

Appendix 1: Wetlands Lost or Remaining in BC and Canada

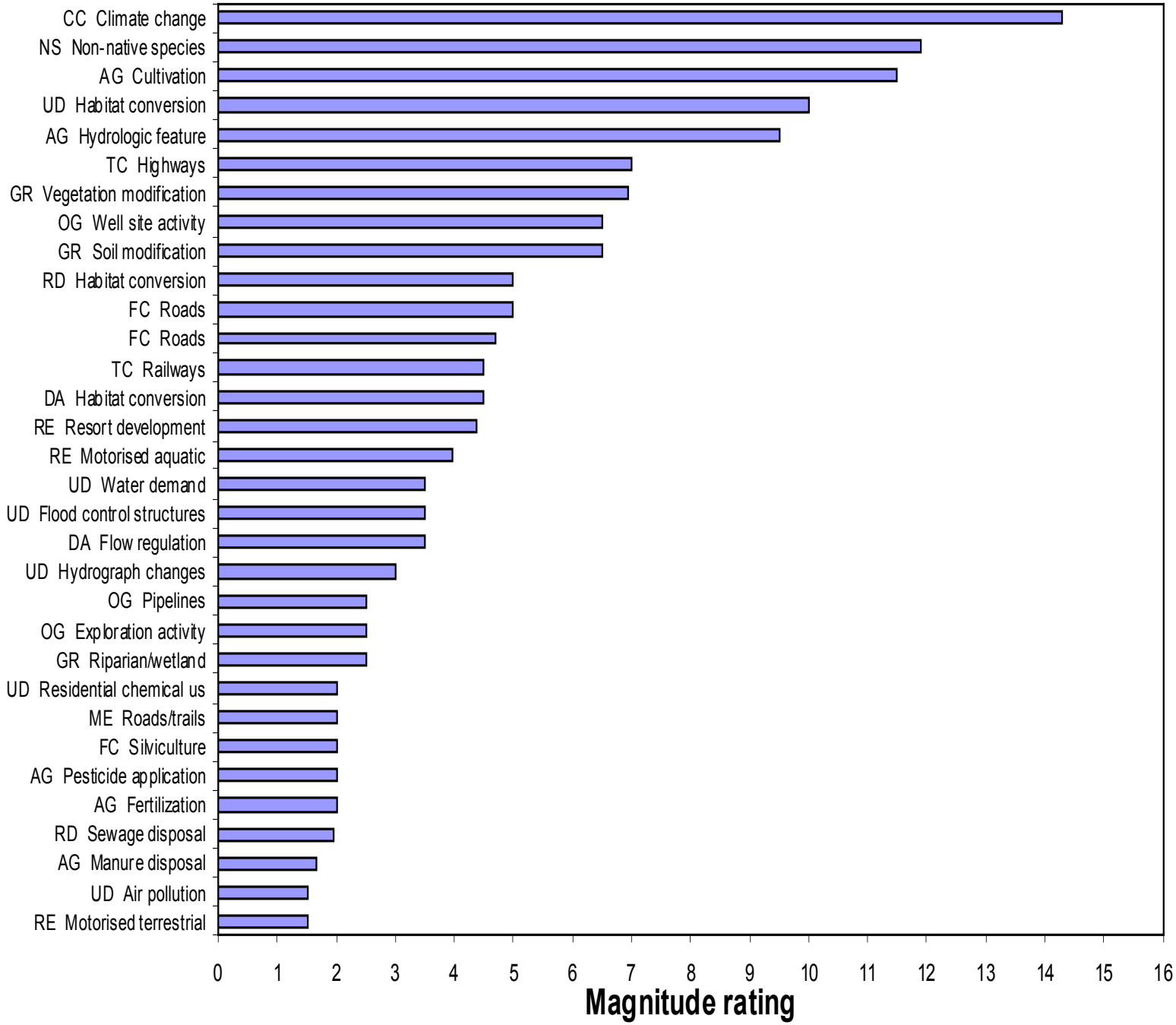
REGION	AMOUNT OF WETLAND LOST (L) OR REMAINING (R)
Canada	**R** About 60 percent of North America's wetlands are found in Canada, which lays claim to almost 25 percent of the world's wetlands.[49] **L** Wetland alteration or conversion has reached 70 percent in central prairie sloughs, 65 percent in Atlantic salt marshes, 80 to 98 percent in urbanized regions, 70 percent in Pacific estuarine marshes and 70 to 80 percent in southern Ontario and the St. Lawrence Valley hardwood and shoreline swamps.[50]
Georgia Basin	**L** A 1994 study of marsh habitat at estuaries in the Strait of Georgia outside the Fraser River showed a loss of about 60 percent of this type of habitat, including a loss of over 50 percent in the Nanaimo and Cowichan estuaries, and a loss of more than 30 percent in the Squamish estuary.[51]
Vancouver Island	**L** In the Victoria region, approximately 70 percent of the original wetlands have been lost.[52] **R** On east Vancouver Island and the Gulf Islands, the Sensitive Ecosystems Inventory found that only 1.7 percent of the land base was occupied by wetlands in a relatively natural state, based on 1992 air photo interpretation.[53] **R** A recent mapping project using 2002 air photos examined ecosystem loss over time in the above study area, and found that 2 percent of the wetlands originally mapped had been lost to disturbance or degradation in the ten years since the original inventory. This figure is alarming given the fact that only 1.7 percent of the landscape was originally occupied by wetland ecosystems.[54]
Lower Mainland	**L** In the Fraser River Delta, since 1880, 99.9 percent of the seasonal wet meadows and 84.6 percent of the bog habitat has been lost.[55] **L** In the 1920's the 11,700-hectare Sumas Lake wetland, one of North America's most productive wetlands, was drained for agricultural purposes.[56] **R** A 1989 inventory indicated that 41,906 hectares of wetland remained in the Fraser Lowland.[57] **L** A 10-year update to the Ward *et al* study indicated that of the 330 freshwater wetlands assessed for change that occurred between 1989 and 1999, one in five had experienced some encroachment to varying degrees. One quarter experienced a loss of 5 to 15 percent of the original size in just ten years.[58]
Prince George	No historic data available to report.
Thompson / Okanagan	**L** In the ecologically critical S. Okanagan valley area, 85 percent of the natural wetlands have been lost due to channelization, land drainage, filling, vegetation removal, etc.[59] **R** Only 15 percent (297 ha) of the wetland habitats existing prior to European contact remain in the study area.[60] **L** Much of the drier portions of the wetlands of the Okanagan and Similkameen Valleys have been cleared of forest, drained, and used for a wide range of vegetable, cereal and forage crops because of the suitable climate.[61]

REGION	AMOUNT OF WETLAND LOST (L) OR REMAINING (R)
Kootenays	**L** In the 1930s a dam was built on the Kootenay River and 10,000 acres were converted to agriculture, including the large Kootenay Flats wetlands.[62] **L** Hydroelectric projects on the Columbia River in the 1960s led to the inundation of large areas of wetland when 100,000 hectares of Kootenay valley lands were flooded.[63] **R** A 2001 study by Smith and Allen noted with regards to remaining wetlands, "*the majority of the wetlands sampled were classified as non-functional or at-risk. Many of the plant communities have floristic changes that are problematic. With the exception of the fens sampled, the vegetation composition of the wetlands indicates a trend away from the desired plant community towards a greater percent cover of increaser species.*" [64]
Cariboo / Chilcotin	**L** Wetlands of the Cariboo-Chilcotin region of BC comprise up to 15 percent of the total land area. They have been responsible for producing 50 percent or more of the total forage available to domestic livestock in that region since the first settlement in the 1800s. Many families' ranching operations still exist based on wetland forage from "the meadows".[65] **L** The majority of wetland loss in the Cariboo-Chilcotin is a result of improved drainage via ditching and shrub clearing.[66] **R** A detailed analysis of remaining wetlands was done for the Cariboo CORE table in 1994 following the Cariboo Forest Region boundary. In general, wetlands larger than 10 hectares were recorded, but in some cases, based on map resolution, wetlands as small as 2 hectares were also recorded.[67] The wetland map has not been digitized and a final tally of the extent of wetlands is unavailable. **R** *"In the late 1930's, James A. Munro described 54 wetlands...in the Cariboo parklands region. Concerned about the potential loss of these wetlands... he revisited these same wetlands in 1958 and recorded the changes he observed. A new survey re-sampled 35 (65%) of these wetland areas in 2001 and compared results with Munro's. Munro's qualitative descriptions of these wetlands were similar to that observed in 2001. Nearly half (46%) of the 35 wetlands ...we examined had been enhanced for waterfowl by Ducks Unlimited Canada. We found that many of Munro's concerns had not materialized over the period in review."* [68]
Northwest	**L** Many upper intertidal lands, which make up the tidal marsh area, were granted by the Province to private ownership in the early 1900s, resulting in a variety of land uses. Unfortunately, many of these land uses in estuaries are incompatible with fish and wildlife habitat.[69]
Northeast	**L** The majority of wetland loss in both the Cariboo-Chilcotin and the Peace River – Fort St. John area is a result of improved drainage via ditching and shrub clearing.[70]

Appendix 2: Magnitude Rating for Threats Affecting BC Wetlands

The following excerpts from a July 2004 report by Veridian Ecological Consulting,[71] identify and rank by magnitude, at a provincial level, the threats to wetlands in BC as compiled from a review of regions established as Watershed Groupings in the province:

> *"In total, 32 of the Threat Activities identified in the original project affect wetlands in BC. Of these, eight–climate change, roads and silviculture on crown forests, mining roads and trails, invasive non-native species, motorized aquatic and terrestrial recreation, and highways–affect all 11 Watershed Groupings in the province. Agricultural cultivation, oil and gas pipelines, railways and rural habitat conversion and sewage disposal affect at least nine watershed groupings…"*
>
> *"At a province-wide scale, Climate Change is the largest Threat Activity affecting wetlands in BC. With an average magnitude of 14.3, climate change is expected to have extensive impacts on ecological processes and whole ecosystems over a long time frame. The extent, persistence, degree of change, and reversibility of climate change are all ranked very high for wetlands in BC…"*
>
> *"Invasive non-native species have the second highest impact on wetlands with a magnitude ranking of 11.9 followed by AG [Agricultural] cultivation (11.5), UD [Urban Development] habitat conversion (10) and AG [Agricultural] hydrologic feature modification (9.5). Note that oil and gas well site activity is ranked 8th on the magnitude scale,[72] but is restricted to a small portion of the province. Conversely, motorized aquatic and terrestrial recreation, silviculture activities, forestry roads, rural habitat conversion and sewage disposal have less severe impacts, but are far more extensive. Conservation concerns should be noted where threats are ranked highly for magnitude, extent or a combination of the two."*


CC Climate change
NS Non-native species
AG Cultivation
UD Habitat conversion
AG Hydrologic feature
TC Highways
GR Vegetation modification
OG Well site activity
GR Soil modification
RD Habitat conversion
FC Roads
FC Roads
TC Railways
DA Habitat conversion
RE Resort development
RE Motorised aquatic
UD Water demand
UD Flood control structures
DA Flow regulation
UD Hydrograph changes
OG Pipelines
OG Exploration activity
GR Riparian/wetland
UD Residential chemical us
ME Roads/trails
FC Silviculture
AG Pesticide application
AG Fertilization
RD Sewage disposal
AG Manure disposal
UD Air pollution
RE Motorised terrestrial
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Magnitude rating

Appendix 3: Wetland Legislation in British Columbia

3.1 Land Use Designation Tools to Protect Wetlands

Designation	Legislation (Lead Agency)	Applies to:	Implemented by:	Effectiveness	Limitations	Who May Be Impacted?
Provincial						
Wildlife Management Areas (WMA) Critical Wildlife Areas (CWA) Wildlife Sanctuaries	Wildlife Act Ministry of Environment (MoE)	Land under the administration of the Minister responsible for the Wildlife Act (e.g., Provincial Crown land, or private land leased to Minister)	Minister, with Cabinet's approval	Provides reasonably strong protection, enforceability, and flexibility due to regional manager's authority over all activities in a WMA; strong degree of decision-making by agency responsible for wildlife habitat; example is Columbia River Wetlands WMA.	Requires formal act of designation in order for wetlands to be protected; requires high level (Cabinet) consent for Minister's designation decisions; may be difficult for agency to acquire "administration" of land as prerequisite for WMA designation; cannot regulate all activity impacting wetlands (e.g., boating restrictions).	Expanding WMA designations could affect licensed users of the Crown land gaining WMA status; however, some uses could be accommodated depending on the impact to wetlands.
Provincial Parks	Park Act	Provincial Crown land	Legislature, or Cabinet	Strongest "protected area" designation, because many require Act of Legislature to change boundaries.	Park Act has strong recreation focus; requires high level approval to designate; may not be suitable for wetlands that require active interventions; not well-suited to small designations of specific wetlands.	None
Ecological Reserves	Ecological Reserves Act (MoE)	Provincial Crown land	Cabinet (some require the Legislature to modify boundaries)	Strong legislation for protection of ecosystems; takes priority over all other legislation.	Science-based research and education focus; good for many wetlands, but not for those that require active management.	None
Ad Hoc designations	Environment and Land Use Act	All land in BC	Cabinet	Good, flexible legislation that can be tailor-made to special circumstances, where other tools are a poor fit; prevails over other legislation.	Protection and enforcement is only as good as the Order in Council (OIC) that is passed by Cabinet in a given situation. Past enforcement problems were addressed under s.6 of the Park Act, but that might not fit every situation.	Depends on the Cabinet OIC – potentially anyone

Designation	Legislation (Lead Agency)	Applies to:	Implemented by:	Effectiveness	Limitations	Who May Be Impacted?
Wildlife Habitat Areas (WHAs) Wildlife Habitat Features (WHFs)	Forest and Range Practices Act (Government Actions, Forest Planning and Practices, Range and Woodlots Regulations)	Crown forest land, range land, and private land in a Tree Farm Licence area, Community Forest Area, or Wildlife Management Area	Minister of Environment (delegated to Deputy Minister of Environment)	WHAs are probably of limited use for wetlands, but may provide additional protection, e.g. where general wildlife measures prohibit activity that might occur in smaller wetlands coincidentally with no reserve zone. See Table 6.2 below for other provisions for wetlands. WHFs are mentioned as a possibility where the Minister of Environment (Deputy Minister) could identify specific localized features of a wetland habitat to protect a species at risk. Practices requirement for a WHF, once established, is "must not damage or render ineffective" the WHF. WHAs can be put into WMAs	WHAs only apply to identified wildlife (but some, e.g., spade foot frog and tiger salamander) are wetland species; depends on strength of general wildlife measure for the identified wildlife; not very flexible; implementation is highly constrained by occurrences of species and timber impacts.	Would mostly affect forest or range licensees carrying out forest or range practices
Reserves, notations, and transfers	Land Act ss.15, 16, 17	Crown land (reserves are sometimes referred to as wildlife habitat management areas, natural environment areas, recreation conservation mgmt areas)	Ministry of Forests and Range - Integrated Land Management Bureau (ILMB)	Effective in withdrawing Crown land from disposition; could be important tool in implementing a provincial policy in which important Crown wetlands are not sold; serves to notify.	Not necessarily effective in protecting wetlands habitat from land use practices, because there are no enforceable measures to protect habitat per se; seen more as an interim designation to preserve conservation opportunity until more appropriate designation is made.	Possibly potential purchasers of Crown land
Federal						
Migratory Bird Sanctuaries	Migratory Birds Convention Act (Canadian Wildlife Service, Environment Canada)	Any land in Canada (in theory) Mostly where hunting regulation is main objective	Federal Cabinet	Used extensively in northern Canada; in southern Canada used more on private lands. Potentially useful designation that can provide protection for wetlands where there are nationally significant migratory bird populations.	Primary focus is hunting regulations; poor to no protection for habitat other than nests while active; would not protect wetlands outside of nationally significant migratory bird habitat.	Depends on whether regulations apply only in sanctuaries, or in any areas frequented by migratory birds

Designation	Legislation (Lead Agency)	Applies to:	Implemented by:	Effectiveness	Limitations	Who May Be Impacted?
National Wildlife Areas (NWAs)	Canada Wildlife Act (Canadian Wildlife Service, Environment Canada)	Land under the "administration" of the Minister of Environment	Federal Minister of Environment	Flexible, open-ended designations for areas required for wildlife conservation; good enforcement provisions for NWAs; less difficult to establish and more flexible than National Park designations.	Regulations do not have habitat focus, but prohibit many activities that harm habitat; there should be stronger protection for NWAs from outside activity; requirement for federal "administration" of land requires provincial cooperation (purchase, donation or transfer).	Depends on areas designated NWA
National Parks	Canada National Parks Act (Parks Canada)	Lands owned by Canada, or agreed to by Province	Federal Cabinet	Generally strong protection for wetlands in national parks, but broad exceptions available; good ecological integrity requirements.	Purpose is not protection of wetlands; would be of ancillary benefit only; low penalty for environmental damage; long process to designate National Parks in legislation.	N/A
Marine Protected Areas	Oceans Act (Fisheries & Oceans Canada)	Internal waters of Canada (e.g., tidal wetlands which support fisheries	Federal Cabinet	Unproven, but shows promise for marine wetlands of federal and joint jurisdiction.	Premature to say at this time; main gap will be the limits on where MPAs apply.	N/A
Local Government						
Environmentally Sensitive Areas (ESAs)	Local Government Act	Potentially any land in a municipality, regional district, or area under Islands Trust jurisdiction	Municipal councils, regional district boards, local committees of the Islands Trust	Local governments have the capacity to declare wetlands as ESAs in official community plans and regional growth strategies, and to restrict use of wetlands through zoning bylaws, development permit areas, etc.	Enabling only – no provincial direction, policy or model to guide local governments; potential for wide discrepancy in results.	Owners of wetland properties
Development Permit Areas (DPAs) and Environmental DPAs	Local Government Act	Private and public land within a municipality	Local Governments	Attempts to control the form and character of development so as to preserve, protect, restore or enhance wetland values. DPAs provide an implementation option for the Riparian Areas Regulation (RAR)	Depends on local government willingness to designate DPAs, and quality of requirements in each development permit.	Local governments; property owners

3.2 Regulation of Specific Land Use Activities That Could Impact Wetlands

Activity	Legislation	Tools	Effectiveness	Limitations	Who is Impacted?
Provincial					
Coordinated impact assessment of proposed major development in BC.	Environmental Assessment Act (Bill 38)	Certain types of proposed projects must undergo environmental impact assessment & obtain an EA certificate in order to proceed. Major groundwater extraction or water diversion projects may be reviewable under EA Act.	The Reviewable Projects Regulation defines the types and sizes of projects that are automatically subject to EAA process. The Minister has power to designate a project as reviewable even though it is not included in Reviewable Projects Regulation.	Act's application is discretionary; increased threshold for review; no guaranteed participation for communities, First Nations, local governments, or the public; government may decide that economic interests prevail over environmental protection.	Major project proponents
Forest practices (including forestry, range, some oil & gas activities) on Crown forest and range land, and some private land within tenures	Forest and Range Practices Act (FRPA)	Riparian classification includes management area, management reserve zone and management zones with varying restrictions and buffers with well-developed discretionary management guidelines.	Effective because it requires classification of all wetlands with associated restrictions and buffers on wetlands as small as 0.25 ha in specific biogeoclimatic zones. Also provides restrictions and buffers for smaller wetlands within 60 m of each other with a combined size of 5 ha or larger.	Restrictions and buffers do not apply to all small wetlands some of which may have high habitat values. Restrictions and buffers are discretionary and only apply in the absence of an approved forest stewardship plan that does not include a result or strategy to meet the objective for water, fish, wildlife, and biodiversity set out in the Forest Planning and Practices Regulation.	Forest and range tenure holders
Forest practices on private land classified as "identified land", also known as "managed forest land" under the Assessment Act	Private Managed Forest Land Act and Regulations	Regulations that specify management requirements for timber harvesting, silviculture.& road-related activities.	Not effective for wetlands; may be some minor benefit to wetlands associated with fish streams.	This is a voluntary tax exemption program that has limited protection for wetlands. Anyone who intends to cut trees on lands covered by FRPA require a cutting licence and have to comply with the FRPA and associated regulations, or in the case of the oil and gas industry require a master licence to cut and the provision of the Forest Practices Code applies.	Owners of private forest reserve land
Mineral & coal exploration activities	Mines Act, Mineral Exploration (MX) Code	Regulatory Code of Practice with some restrictions according to size of wetland	Discourages road construction and exploratory work in most wetlands (those <1,000 ha and >0.25-0.5 ha, depending on biogeoclimatic zone).	Not as protective of wetlands as Forest and Range Practices Act; many discretionary exceptions and some contradictions; numerous small and some large wetlands would not be protected.	Coal and mineral exploration
Dike construction and maintenance	Drainage, Ditch and Dike Act (Part 1 of Act repealed by Bill 8, 2002) Dike Maintenance Act	None – but s.63 requires compliance with Water Act	Establishes authority for activities that can impact wetlands, but does not impose accountability for wetlands impacts; under the BC Environmental Assessment Act, new dikes that protect areas >10 km^2 from flooding are reviewable projects.	May have considerable impact on wetlands, yet does not address wetlands at all. However, most diking is historic; new diking is undertaken by local government or Ministry of Transportation.	Local governments, Ministry of Transportation

Activity	Legislation	Tools	Effectiveness	Limitations	Who is Impacted?
Agricultural land practices	Agriculture Land Commission Act Agricultural Land Reserve Use, Subdivision and Procedure Regulation	Regulated soil removal and fill in ALR BC Brownfield Removal Strategy	Variable		
Invasive species	Weed Control Act	The B.C. Weed Control Act imposes a duty on all land occupiers to control designated noxious plants.	Works for designated species that have an impact on agriculture	Designated species list is out-of-date and does not reflect invasive species that are impacting non-agricultural lands	
Protection of Crown lands	Environment and Land Use Act	Orders-in-Council can be made respecting the environment or land use.	Government has used this provision to establish 81 protected areas. Environment and Land Use Committee of Cabinet has broad powers to ensure that all aspects of the preservation and maintenance of the natural environment are fully considered in the administration of land use and resource development.	Management direction for protected areas is provided by any special conditions included in the establishing order in council and specified provisions of the Park Act and Park and Recreation Area Regulation as identified in the order in council.	N/A

3.3 General Environmental Protection Regulations Affecting Wetlands

Mechanism	Legislation	Lead Agency	Effectiveness	Limitations	Who is Impacted?
Provincial					
Ministerial Authority to set guidelines/ standards. Permitting and prohibitions relating to deposit of waste	Environmental Management Act Municipal Sewage Regulation under EMA	(MoE)	Provides good authority to order environmental protection for any existing or proposed work, undertaking, product use or resource use that has or potentially has a detrimental environmental impact; used to protect wetlands in Cowichan Estuary Environmental Management Plan. Provides protection for wetlands impacted by the deposit of waste into the environment. The Municipal Sewage Regulation encourages use of reclaimed water and identifies permitted uses, together with a code of practice. Local governments have a number of powers under EMA, e.g., Regional districts can, for the purposes of implementing an approved waste management plan, pass bylaws regulating the transportation and management of solid waste and recyclable materials. Bylaws can potentially be used to require land fills to install pollution prevention works or to follow codes of practice that avoid harm to the environment.	N/A	Industry, developers and land owners.
Regulation of hunting	Wildlife Act	(MoE)	Limited ability to help wetland species through hunting regulations, s.9 (beaver dams) and s.34 protection for birds, eggs, and some nests; ability to designate threatened and endangered species, and provide for critical wildlife areas within WMAs (see above).	Focus on "take" regulation is a limiting means of managing wildlife; habitat provisions are limited, usually requiring formal designation, but available; threatened & endangered provisions under-utilized.	Depends on approach taken. Presently, affects mainly hunters, some farmers.
Protection of fish & fish habitat	Fish Protection Act	(MoE)	Currently in force are sections dealing with designation of sensitive streams, recovery plans, and no new dams on specified rivers. Sections not yet in force provide for: issuance of stream flow protection licences; orders for temporary reduction in water use in case of drought; identify fish & habitat considerations in water management plans; authorize reduction of water rights in accordance with water management plans. Sec. 9 in force for orders for temporary reduction in water use in case of drought to protect threatened fish populations.	Not yet in force: s. 5 - fish and fish habitat considerations in licensing decisions; s.8 - streamflow protection licences; s. 10 - fish and fish habitat considerations in water management plans; s.11 - reduction of water rights in accordance with plan; Transitional pending Water Act applications s. 36	Local governments, land owners, water licence applicants & holders, developers / industry.

Mechanism	Legislation	Lead Agency	Effectiveness	Limitations	Who is Impacted?
Riparian Areas Regulation and Sensitive Stream Designation	Fish Protection Act (Section 12)	(MoE) Local governments	Directives will help fish-associated wetlands, especially if they are critical to maintaining mean annual discharge (MAD) and base-flow requirements under a recovery plan; wetlands expressly addressed in regulations; provides provincial guidance for local governments; regulations incorporate no net loss approach; restricts licensing under Water Act; Sensitive Stream designation allows for recovery plans that may help associated wetlands. Varied. Some local governments (e.g., Islands Trust local trust committees) have failed to implement as required by the Regulation	Fish-stream focused; limited ability to address agricultural impacts to wetlands; local governments must establish streamside protection and enhancement areas within 5 years of the Regulation being proclaimed. Only applies to urbanized areas of the province.	Local governments, land owners, some water licence applicants, developers/ industry.
Prohibitions on bulk water removal	Water Protection Act	(MoE)	Confirms provincial ownership of Crown surface water and groundwater. Province has right to ensure its protection & sustainable use. Prohibits bulk water removal from BC, and diversion of water between major watersheds within BC.		Water licence applicants, developers
Federal					
Prohibitions on deposit of deleterious substances & harmful alteration to fish habitat	Fisheries Act	Fisheries & Oceans Canada	Strong federal laws that may help wetlands associated with fish habitat; enforcement provides deterrent, and creative sentencing may require remediation.	Reactive and rarely applied.	
Environmental assessment where federal government has authority	Canadian Environmental Assessment Act	Canadian Environmental Assessment Agency	Casts a broad net over many of the potential ways that the federal government can affect wetlands; the primary means of implementing the Federal Policy on Wetland Conservation.		
Regulation of toxic wastes & substances	Canadian Environmental Protection Act	Environment Canada	Provides indirect benefits to wetlands by regulating release of toxic substances, pollutants, and wastes into the environment.		
Protection of international boundary waters	International Boundary Waters Treaty Act	International Joint Commission (Canada Ministry of Foreign Affairs)	Act created in 1909 with a focus on the Great Lakes. Boundary waters are bodies of fresh water that the U.S.-Canada border flows through. Addresses conflicts and rights arising between the two countries over the use of waters that crossed the borders of the two countries, in particular pollution and dams or other structures.	Does not include transboundary marine waters such as the Salish Sea. Doesn't include trans-boundary rivers, although the treaty has provisions related to such rivers, e.g., dams.	

3.4 Other Laws Affecting Wetlands

Legislation	Lead Agency	Relevance	Effectiveness	Limitations (Gaps)	Who is Impacted?
Provincial					
Agriculture Land Commission Act	Agricultural Land Commission	Regulates use of agricultural land	Allows for ecological reserves and wildlife habitat uses of agricultural land if surface is not subject to substantial works; very limited allowance for considering environmental values (ss. 43.1, 44), but always subordinate to farm use and no net loss principle for agricultural capabilities.	Strong priority given to agriculture (e.g., drainage of wetlands); no consideration of environmental impacts such as loss of wetlands for most decisions; assumes agricultural land is more scarce than wetlands; could impede ability to implement mitigation measures	Property owners in Agricultural Land Reserve (ALR)
Land Act	Integrated Land Management Bureau (ILMB) (MoE - for habitat acquired under s.106)	Governs the sale and granting of rights to use Crown land	Has provisions that could help wetlands by: • withdrawing wetlands from disposition, • requiring reservations and conservation covenants on Crown land sold; environmental assessment on Crown land before sale, • regulating activity in designated areas, • enforcing against trespass on Crown wetlands, • allowing for land exchanges (e.g. Crown land for important private wetlands), • allowing any ministry to acquire and manage land (s.106).	When it comes to the extraction of natural resources, the Province normally retains ownership of the land, but grants resource extraction rights through other legislation.	
Land Title Act (LTA)	Land Title Office(LTO); Agricultural Land Commission; Approving Officers under LTA (e.g. local government, Islands Trust, Ministry of Transportation officials)	Allows registration of s.219 conservation covenants on land title; specifies terms for subdivision approval	Good tool for protecting wetlands values through encumbrances (rather than outright ownership) on titles that survive ownership changes; allows approving officers discretion to refuse or impose conditions on subdivision of land.	Land Title Office policy requires approval of Agricultural Land Commission for ALR land (but not for FLR). This raises issues about weakness of ALC Act regarding wetlands values (see above). • Enforcement is problematic • Cost issues (e.g. survey for LTO, affordability for NGOs) • Discretion re subdivision approvals is adequate, but policy guidance on wetlands would improve consistency	Property owners, and conservation agencies seeking to negotiate and register conservation covenants

Legislation	Lead Agency	Relevance	Effectiveness	Limitations (Gaps)	Who is Impacted?
Local Government Act (LGA) Community Charter (CC)	Local governments Ministry of Community and Rural Development	Zoning and bylaw actions affect land use	In addition to ESA and DPA designations mentioned in Table 3.1, local governments have delegated authority to identify land use zones and pass bylaws affecting land use that could impact wetlands, for both public and private land. This can have both a positive or negative effect on wetlands. Wetland areas prone to flooding can be protected by bylaw (s.910 LGA) Forested wetlands could be protected from tree cutting by bylaw (s.50 CC)	Recognizes that a purpose of local government is to foster the "current and future economic, social, and environmental well-being of a community." Does not provide a definition of "environment", and protection of wetland environments, wetland habitats, and wetland species including species at risk is discretionary rather than mandated ("may" instead of "must"). Local governments are constrained by some provincial legislation, e.g., Farm Practices Protection (Right to Farm) Act, in their desire to protect wetlands as the highest use for a property.	Local governments, landowners, and constituents
Water Act	Ministry of Environment - Water Stewardship Division	Water Use Planning, Water Use Plans (WUPs)	WUPs define the proposed day to day operating parameters to be applied at all BC Hydro hydroelectric facilities. Based on a consultative process, WUPs recognize multiple water use objectives by balancing the social, economic, and environmental uses of water. The goal is to find a better balance between competing uses of water, such as domestic water supply, fish and wildlife, recreation, heritage, and electrical power needs. Once a WUP is accepted by the Comptroller of Water Rights, operational changes, monitoring studies and physical works outlined in the plans are implemented by the Comptroller through orders under the Water Act.		BC Hydro, other water stakeholders

Legislation	Lead Agency	Relevance	Effectiveness	Limitations (Gaps)	Who is Impacted?
Water Act Groundwater Protection Regulation	Land and Water BC Inc. (for dispositions) (MoE - groundwater technical standards and water management planning)	Issuance of water licences Groundwater protection	Water Act requires provincial approval for diverting or storing water, or changes in & about a stream (definition includes wetlands to some extent). New water licence applications with proposed diversion rate of >25,000 gpd (1.32 lps) must complete a Development Plan. Diversion of water can be harmful to wetlands, and is regulated under the Water Act. Under s.9, approval is required to divert water from a wetland. Exemptions in Part 7 of Water Regulation do not appear to have been drafted with wetlands in mind. Groundwater regulations (Part 5 of Water Act) protect wells/aquifers from contamination and thus afford some protection for wetlands that are groundwater-fed. Part 4 of Water Act provides for legally binding water management plans tailored to address local issues.	Wetland conservation issues are not effectively addressed in Water Act; some important wetlands have allegedly been harmed by licence approvals. Groundwater consumption is not regulated which could result in wetlands connected to groundwater going dry. Definition of stream is limited in that it may not be interpreted to include all wetlands	Water Licence applicants/holders. With respect to groundwater, well owners, drillers and pump installers are impacted. Consultants may also be impacted in that they may be required to make alternate specifications for well installations.
Drinking Water Protection Act (DWPA)	Ministry of Health Services	Multi-barrier approach to protecting drinking water (source to tap)	Protection of wetlands is incidental to the core function of drinking water protection because the DWPA is focused on threats to human health. A Drinking Water Protection Plan could be ordered by cabinet that may afford broader source protection that would include wetlands.	The DWPA is reactive and more focused on threats to human health. Comprehensive source assessment is discretionary.	Directly – water purveyors Indirectly- anyone undertaking activities that can negatively impact drinking water
Federal					
Canada Shipping Act	Coast Guard	Allows for boating restrictions	Good tool for regulating boating-related water impacts on wetlands (e.g. no motors, or setting horsepower limits on access to waters of Canada).	Implemented by the Coast Guard, which doesn't have a wetlands conservation mandate; lack of clear role for federal agency with wetlands expertise (e.g. CWS).	Recreational boaters
Income Tax Act	Revenue Canada	Provides tax incentive for ecological gifts, such as wetlands	Fosters use of voluntary land donations and conservation easements in return for tax deductions against income (from "Wetlands and Government")	N/A	Everyone, potentially

Appendix 4: How BC Compares with Other Jurisdictions

4.1 Comparison of Provincial, Territorial, State, and Federal Policies

Jurisdiction	Policy/Regulation/Guidelines	Success in Implementation
British Columbia	No overarching provincial wetland policy; ad hoc protection depending on kind of development pressure; Forest Practices Code currently protects wetlands on Crown land, especially those >1 ha in size. Ministry of Transportation has a "no net loss of wetland" policy.	Varying, wetland loss continues throughout BC without provincial policy.
Alberta	Alberta's New Wetland Policy, Implementation Plan, and Mitigation Decision Framework to be introduced sometime during 2010, outlines a number of strategies for mitigating and managing human impacts to wetlands, based on the Alberta Water Council's *Recommendations for a New Wetland Policy*. This policy will replace the *1993 Wetland Management in the Settled Area - An Interim Policy* and *Beyond Prairie Potholes - A Draft Policy for Managing Alberta's Peatland and Non-Settled Area Wetlands*, and provides a comprehensive policy for the entire province. The goal of the forthcoming Alberta Wetland Policy is to maintain wetland areas in Alberta such that the ecological, social, and economic benefits that wetlands provide are maintained, thereby helping to ensure that Albertans have healthy watersheds that provide safe and secure drinking water supplies, healthy aquatic ecosystems, and reliable, quality water supplies for a sustainable economy. In recognition of the high rates of wetland loss in some watersheds, this new policy also encourages Albertans to be proactive in increasing wetland area.	Not yet implemented.
Saskatchewan	New Wetland Policy adopted in 2002, administered by the Saskatchewan Watershed Authority (SWA). Has three key objectives: 1. To encourage sustainable management of wetlands on public and private lands to maintain their functions and benefits; 2. To conserve wetlands that are essential to maintain critical wetland species or wetland functions; 3. To restore or rehabilitate degraded wetland ecosystems where previous destruction or alteration has resulted in a significant loss of wetland functions or benefits. Some wetlands protected under the Wildlife Habitat Protection Act.	SWA created in October 2002 to manage the province's water resources including wetlands to "ensure safe drinking water sources and reliable water supplies for economic, environmental, and social benefits for Saskatchewan people." The SWA also coordinates implementation of waterfowl conservation programs in accordance with the North American Waterfowl Management Plan including preservation, management, and development of breeding habitat

Jurisdiction	Policy/Regulation/Guidelines	Success in Implementation
Manitoba	Under Manitoba Water Protection Act (2004) riparian, wetlands, and sensitive landscapes must be protected. The Act allowed creation of a Habitat Compensation Fund with a goal of no net loss of wetlands via avoidance, minimization, compensation. Need for a stand-alone provincial wetland policy recognized in 2008; Ducks Unlimited and other partners working towards achieving this goal.	Despite scientific research quantifying the essential role that wetlands play in maintaining healthy watersheds and the quality and quantity of water on the landscape, wetlands continue to be drained and degraded.
Ontario	In 1996, the Province issued a new Provincial Policy Statement that consolidated all provincial policies under Section 3 of the Planning Act. Policies related to wetlands are dealt with under the title "Natural Heritage" (s.2.3). While the revised policy states that natural heritage features and areas will be protected from incompatible development, in practice only Provincially Significant Wetlands are considered when the policy indicates that development and site alteration will not be permitted in these areas.	Compatible development and site alteration may be permitted in "fish habitat", "significant valleylands", "significant wildlife habitat", "significant areas of natural and scientific interest" and on "lands adjacent to wetlands" if it has been demonstrated that there will be no negative impacts on the natural features or the ecological functions of the area. This Policy statement also encourages maintaining and improving natural connections between natural features.
Quebec	The Province of Québec developed a Water Policy in 2002 and committed to a conservation campaign, including watershed management and increased protection for wetlands. In 2008, a provincial wetland plan was issued: *Guide d'élaboration d'un plan de conservation des milieux humides.*	Unknown.
New Brunswick	Adopted a wetland policy in 2002. Policy based on: 1) no loss of provincially significant wetlands (including all coastal marshes; 2) no net loss of all other wetlands; 3) education and public awareness programs; 4) mapping & inventory; 5) development guidelines; 6) development review process; 7) retaining Crown ownership of all significant wetlands; 8) acquisition and conservation easement strategies.	Policy applies to all lands, including private lands. Too early to comment on implementation, but appears to be based on "lessons learned" from other jurisdictions.
Nova Scotia	Draft Nova Scotia Wetland Conservation Policy released in July 2009, for public comment ending December 31, 2009. Goal is to prevent the net loss of wetland in Nova Scotia through wetland conservation practices that balance the need for wetland protection with the need for sustainable economic development, now and in the future. Aligns with New Brunswick and PEI. Wetlands under 100 m^2 currently excluded.	Draft Policy is under review. Policy based on "lessons learned" from other jurisdictions.
Prince Edward Island	A provincial Wetland Policy was released in 2003, and is based on the concept of development avoiding wetlands, and if that is not possible, minimizing impacts and if that is not possible, then compensation. A committee composed of the Federal Government, Provincial Government, and Ducks Unlimited assesses wetland function, determine costs and recommend appropriate compensation.	Policy is effective in preventing loss of wetlands, as well as establishing mitigation and compensation through creation of new wetlands where loss cannot be avoided.

Jurisdiction	Policy/Regulation/Guidelines	Success in Implementation
Newfoundland	Wetlands are protected under the Water Resources Act; includes a "Policy for Development in Wetlands (2001)". This policy establishes the criteria for issuing a permit under s.48 of the Water Resources Act, SNL 2002 cW-4.011, for all development activities in and affecting wetlands. The objective of the policy is to permit developments in wetlands which do not adversely affect the water quantity, water quality, hydrologic characteristics or functions, and terrestrial and aquatic habitats of the wetlands.	Unknown
Yukon	Special Management Areas provide permanent protection for wetland areas, e.g., Old Crow Flats Special Management Area. Protection is planned for more wetlands, as approved in the North Yukon Land Use Plan.	Unknown
National & International		
Canada	Wetland policy adopted in 1991, based on the following goals: 1) public awareness; 2) no net loss of wetland functions on all federal lands and waters; 3) conservation in protected areas; 4) enhancing cooperation, partnerships; 5) securing protection through designation of significant wetlands; 6) supporting sound scientific research; & 7) promoting international actions, such as Ramsar, NAWMP.	Thorough policy because it applies to programs and expenditures and is considered a world model; however it: 1. only applies to federal crown land; 2. is inconsistently applied due to lack of clear direction on competing policies.
Washington State	Required to implement US Federal no net loss of wetland policy.	One of the most effective states in implementing federal "no net loss" policy
United States	"No Net Loss of Wetlands" policy instituted in 1989 by President Bush – wetlands are considered to be part of the waters of the US under the Clean Water act originally passed in 1972. As such, a permit under section 404 has to be approved in order to infill a wetland. For every acre lost, 1.8 acres were to be mitigated. The Clinton administration encouraged compensation through mitigation banking which was passed in 1993.	A recent study by the US Fish and Wildlife Service suggests that the rate of loss of wetland area has slowed over the past decade. From 1986 to 1997, the estimated annual rate of wetland loss (58,545 acres/yr) was about 23% that of the previous decade (Ntl Academy Press, 2001, Compensating for Wetland Losses Under the Clean Water Act, Committee on Mitigating Wetland Losses, Board on Environmental Studies and Toxicology, Water Science and Technology Board, National Research Council)
North America	The North American Wetlands Conservation Act (NAWCA) is a U.S. Act passed by Congress in 1989 to aid in the conservation of wetland ecosystems continentally, and to provide a mechanism to support North American Waterfowl Management Plan (NAWMP) objectives for waterfowl as well as for other wetland-related migratory species.	Funds generated under the Act must be used for wetlands conservation projects - essentially the securement, restoration, enhancement, and/or management of wetland ecosystems. Act funds can not be used for research, policy or communications activities. The Act specifies that partnerships are a necessary and valuable mechanism for wetland conservation, and proposals submitted for funding under the Act must include a substantial partnership component. In Canada, NAWCA proposals support a broad scale wetland conservation program. National, Joint Ventures, and provincial bodies each play a role in the proposal process.

Appendix 5: Federal Government Policy on Wetland Conservation

In 1991, the federal government responded to its Ramsar Convention obligations by adopting the Federal Policy on Wetlands Conservation. The policy aims to maintain wetland values and functions throughout Canada and sets a goal of no net loss of wetland functions on all federal lands and waters. The policy may also apply to non-federal lands when an environmental assessment is required or federal funds are expended. The Ramsar Convention, whose signatories include 158 other countries as well as Canada, provides a framework on international cooperation on the conservation and wise use of wetlands and their resources.

Objective

The objective of the Federal Government 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."*

Goals

In support of the above objective, the Federal Government, in cooperation with the provinces and territories and the Canadian public, will strive to achieve the following goals:

- maintenance of the functions and values derived from wetlands throughout Canada;
- no net loss of wetland functions on all federal lands and waters;
- enhancement and restoration of wetlands in areas where the continuing loss or degradation of wetlands or their functions have reached critical levels;
- recognition of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activities;
- securement of wetlands of significance to Canadians;
- recognition of sound, sustainable management practices in sectors such as forestry and agriculture that make a positive contribution to wetlands conservation while also achieving wise use of wetland resources; and
- utilization of wetlands in a manner that enhances prospects for their sustained and productive use by future generations.

Guiding Principles

In pursuing the above objectives, the Federal Government will respect the following principles. All are critical to this Policy and are not presented in a particular order of importance:

- Wetlands and their functions contribute significantly to the health and well-being of Canadians and are a desirable element of Canada's natural diversity; as such, they are a priority requirement of environmental conservation and sustainable development efforts.

- Wetland conservation is dependent on the incorporation of environmental objectives into the economic decision-making process, as recommended by the (Brundtland) World Commission on Environment and Development, the CCREM National Task Force on Environment and Economy, the Federal-Provincial Agriculture Committee on Environmental Sustainability, and the Sustaining Wetlands Forum.

- Wetlands and wetland functions are inextricably linked to their surroundings, particularly aquatic ecosystems, and therefore, wetland conservation must be pursued in the context of an integrated systems approach to environmental conservation and sustainable development.

- On-going development and refinement of scientific knowledge and expertise in Canada is fundamental to the achievement of wetland conservation.

- Wetland conservation can only be achieved through a coordinated, cooperative approach involving all levels of government and the public, including land-owners, non-government organizations, and the private sector.

- The Federal Government will play a major role in advocating and achieving wetland conservation, while respecting the jurisdiction of the provinces and territories and the rights of individual landowners.

- In consultation and cooperation with native institutions and representatives in Canada, the Federal Government will promote a cooperative approach to wetland conservation for lands and waters held by the Federal Government for native peoples.

- A basic change in the attitude and perceptions of Canadians regarding wetlands, through communication and education programs, is a vital prerequisite of wetland conservation.

- Canada has a special responsibility to provide leadership in international wetland conservation efforts, through the management of trans-boundary resources such as water and wildlife in North America, encouragement of global wetland conservation, and active participation in international treaties, conventions and forums.

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