

# Wetlands in British Columbia

a Primer for Local Governments



A COMPANION TO THE GREEN BYLAWS TOOLKIT  
FOR CONSERVING SENSITIVE ECOSYSTEMS AND GREEN INFRASTRUCTURE





The Wetland Stewardship Partnership (WSP) is a multi-agency group dedicated to the conservation of British Columbia's wetlands and other sensitive ecosystems. WSP Partners include BC Hydro, BC Nature (Federation of BC Naturalists), BC Ministry of Environment, BC Ministry of Forests and Range, BC Ministry of Healthy Living and Sport, BC Wildlife Federation, Ducks Unlimited Canada, Environment Canada, Fisheries and Oceans Canada, Grasslands Conservation Council of BC, Nature Conservancy of Canada, The Nature Trust of BC, Pacific Salmon Foundation, Royal Roads University, and the Union of BC Municipalities.

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## Summary

*Wetlands in British Columbia: A Primer for Local Governments* provides the rationale and clear explanation as to WHY wetlands need and are worthy of protection. The Primer discusses the ecosystem services provided by wetlands and summarizes the status and trends of wetland ecosystems in BC. The Primer also describes current wetland conservation actions and legislation being used in BC and beyond to protect wetlands.

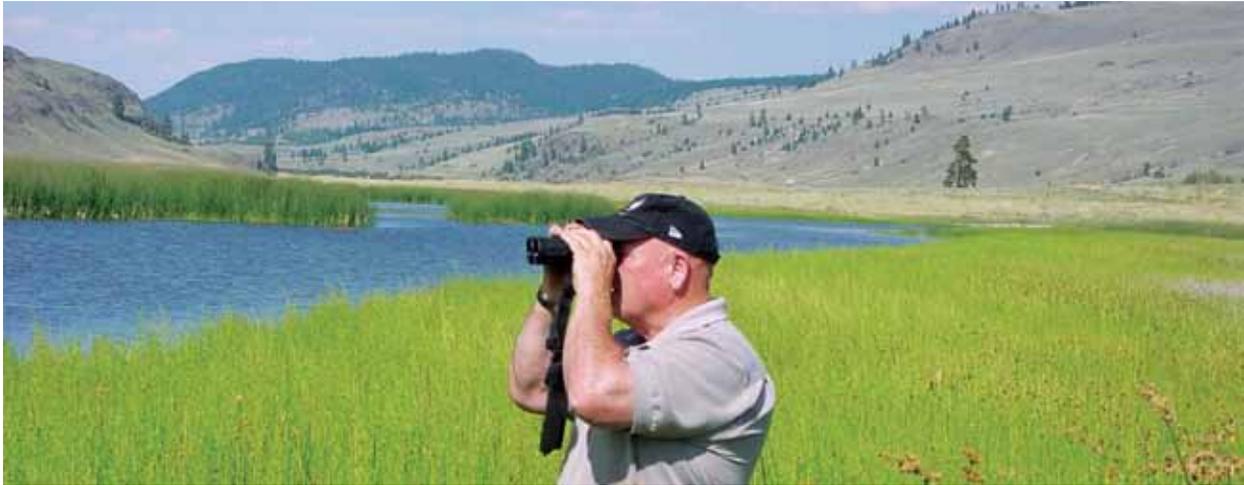
This *Wetlands Primer* is intended as a companion to the *Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure*. The *Green Bylaws Toolkit* provides information on a wide range of tools that can be used to protect natural values through both legal and voluntary measures. The Toolkit begins with a section on the values of green infrastructure, but does not provide detailed information on the values of different ecosystem types. The focus of the *Toolkit* is HOW to protect wetlands, other sensitive ecosystems, and the green infrastructure in general.

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# What Is a Wetland?

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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.

Wetlands provide recreational, educational, and scientific opportunities Photo: Ian Barnett

Under Ramsar, wetlands are defined as *“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.”*

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.

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

Wetlands are a critical component of the water cycle, which includes water entering as rain, moving across the surface as wetlands, streams and lakes, infiltrating the soil and becoming groundwater, and surfacing again. When we damage wetlands, we damage the water cycle upon which human life, economies and communities depend.

# Why Should Local Governments Protect Wetlands?

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Wetlands make an invaluable contribution to society by providing many ecosystem goods and services, described in more detail below, that are considered to be an important part of our natural capital. The World Conservation Strategy cites wetlands as one of the three most important life support systems on Earth, along with agricultural lands and forests.<sup>1</sup>

The ecological goods and services provided by 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. In addition to being an essential part of the environment and specifically the water cycle, wetlands are a critical part of your municipal green infrastructure. If their ecological function is impaired or destroyed, costs to local governments can increase.

## Wetlands Perform Vital Functions for Communities

Historically, the full value of wetlands has not been fully understood, and loss of this resource was simply viewed as a price of progress. Over the last three decades, concern over wetland loss has grown as we have gained a greater understanding of the vital role wetlands play in ecosystem health, vibrant economies, and healthy communities. 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 role of wetlands in helping to ensure adequate high quality drinking 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. Some wetland types have the capacity to store massive amounts of carbon, and through their protection, may be an essential component for communities seeking local solutions to reversing or slowing 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 G8 Ministers of Environment agreed in a 2003 Declaration:

*“If we fail to protect forests and wetlands, if we do not manage soils with precaution, water will disappear. We can build all the water pipes and treatment plants we want; there will be nothing to drain or clean.”<sup>3</sup>*

## What Healthy Wetlands Provide for Your Community

### ■ Wetlands ease water shortages and drought.

During the wet season, wetlands act like giant sponges, soaking up excess rain, snow, and surface water. In drier seasons, wetlands not only provide wildlife habitat, but also slowly release their stored waters into underground aquifers and streams. Wetlands are the source of groundwater recharge for many aquifers that serve as community water supplies.

When wetlands are damaged or destroyed, it is difficult if not impossible to replace this water supply function. A Massachusetts study estimated that to replace the water supply service provided by a single acre of wetland would cost almost \$300,000.<sup>2</sup>

*Wetlands are the source of groundwater recharge for many aquifers that serve community water supplies.*

### ■ Wetlands maintain and improve water quality.

Wetlands are Mother Nature's kidneys—they filter pollutants such as nitrogen, phosphorus, pesticides, heavy metals, pathogens, and sediments out of the waters of our lakes, rivers, and streams.<sup>4</sup> Wetlands trap many pollutants in runoff, protecting downstream watercourses from algal blooms and sedimentation. They are also very efficient in removing pathogens such as coliform bacteria from our water supply. Wetlands are such effective water purifiers that constructed wetlands are commonly used in the tertiary treatment of industrial and municipal wastewater.<sup>5</sup>



Riverine marsh near Brisco in the Columbia National Wildlife Area. Photo: Blair Hammond.

*Wetlands filter pollutants and pathogens out of the water that runs into our lakes, rivers and streams.*

In 1988 Environment Canada estimated that Canada's wetlands provided \$1.35 billion annually in water purification services.<sup>6</sup> More recently, it has been estimated that the waste-cleansing services of natural wetlands in the lower Fraser Valley are worth at least \$230 million each year – and many times that amount if replacement infrastructure costs are added.<sup>7</sup> In fact, New York City decided it was cheaper to pay \$1.8 billion to private landowners to protect 80,000 acres of watershed (including wetlands) that supplies its drinking water than to pay the \$8 billion dollars it would have otherwise cost to build a new water filtration system.<sup>8</sup>

*“Retaining natural wetlands can avoid the ironic situation where, after decades of draining and filling wetlands, communities are having to build expensive artificial wetlands to fulfill the pollution-cleansing and hydrological functions of the original wetlands.”<sup>9</sup>*

### ■ **Wetlands provide flood control, maintain natural drainage, and prevent soil erosion.**

Wetlands along shorelines absorb floodwaters, protecting adjacent lands from damage. When wetlands are eliminated, flood damage can increase dramatically. For example, the draining and dyking of wetlands near Abbotsford resulted in serious flood problems along the Nooksack River, resulting in the expenditure of \$40 million on remedial projects.<sup>10</sup> Loss of wetlands in the upper Mississippi River basin significantly contributed to one of the most disastrous floods in modern American history in 1993.<sup>11</sup> More recently, the flooding of New Orleans by Hurricane Katrina was partially attributed to the loss of a million acres of coastal wetlands that formerly helped buffer the city from catastrophic storms.<sup>12</sup>

Steering development away from areas like wetlands and grasslands that are important components of surface runoff management may reduce municipal liability for the cumulative impacts of development in areas subject to flooding and erosion.

### ■ **Wetlands provide important habitat for fish and wildlife.**

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 lifecycles, and almost 35% of all rare, threatened, and endangered wildlife species are dependent on wetland ecosystems.<sup>13</sup> 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.

When people think of wetlands, they tend to think of fish, waterfowl, amphibians, fur-bearers, moose and other ungulates. But in reality most wildlife species use wetlands at some point in their life cycle.<sup>14</sup> US studies have identified over 900 species that require wetlands during some part of their life—including 64% of all endangered and

threatened animal species.<sup>15</sup> In British Columbia, approximately 500 species of plants and animals are associated with wetlands, and 70 of those species are federally listed as Endangered or Threatened.<sup>16</sup>

### **Wetlands as habitat for fish**

Healthy wetlands are essential if we wish to maintain fish populations. A majority of BC's commercial fish depend directly or indirectly upon wetlands during at least one stage in their lives.<sup>17</sup> Wetlands provide fish with critical spawning and nursing areas, maintain stream flows during dry seasons, and produce nutrients that enrich entire watersheds.<sup>18</sup> Wetland plants provide the protection that juvenile fish populations need to escape predators. Furthermore, estuaries and their associated coastal wetlands such as salt marshes and eelgrass beds provide vital transition zones between fresh and salt water for migrating fish.

### **Wetlands as habitat for birds**

About one third of all North American bird species are wetland dependent.<sup>19</sup> Across Canada, more than 100 species of birds make use of Canada's marshes, swamps and sloughs.<sup>20</sup> Half of North America's waterfowl population depends on Prairie pothole wetlands.<sup>21</sup> In British Columbia, numerous coastal and interior wetlands create important bird habitat.<sup>22</sup> For example, the wetlands of the Fraser River Delta 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. The most abundant species found at Boundary Bay is the Western Sandpiper, with at least 500,000 congregating in the area daily during spring migration.<sup>23</sup> For this species in particular, the area is irreplaceable as Roberts Bank is a critical stopover on the Pacific Flyway for millions of Western Sandpipers on their spring migration from South America to their breeding grounds in Alaska. If the Roberts Bank link broke, the chain of stopovers would be severely compromised.

The Fraser Delta also supports 10% of the world's population of trumpeter swans, and most of Russia's last remaining snow goose population.<sup>24</sup> During the peak of migration, up to 1.4 million birds use the delta, exceeding the Ramsar International Convention on Wetlands<sup>25</sup> minimum criteria for "internationally important wetlands" by some 30- to 60-fold.<sup>26</sup>

### **Wetlands provide recreational, educational, and scientific 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.<sup>27</sup>

Environment Canada estimated that fishing, hunting, and non-



Most wildlife use wetlands at some point in their lifecycle. Examples include: Western Sandpiper feeding in the estuarine mudflats of Boundary Bay; Oregon Spotted Frog in the Fraser Valley; Western Painted Turtle basking in a riverine marsh and a Yellow-headed Blackbird in an fen in the Okanagan. Photos: Rob Butler, Kelly McAllister, Neil Dawe, Neil Dawe.

consumptive recreation in Canada's wetlands generates \$4 billion in economic value each year.<sup>28</sup> 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.<sup>29</sup>

Wetlands near communities can be used as outdoor classrooms that engage students in many different aspects of environmental education.<sup>30</sup> 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. 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.

In addition, the complex ecosystems found in wetlands provide scientists with research opportunities that will increase our understanding of hydrology and ecological processes. The surface of a peat bog is not only home to the plants and animals that live there, but also acts as a giant collecting tray for pollen and plant material that accumulate on it. By taking core samples of the bog, scientists can date the remains of the plants that once grew on the peat bog, and reconstruct the composition of previous landscapes in the region. This research is being used to better understand the consequences of climate change.

### ■ **Wetlands provide agricultural products**

Tidal wetlands are an important source of shellfish and wild harvest products. In the Fraser Valley, significant quantities of cranberries are raised in cultivated freshwater wetlands. In the BC Interior, wet meadows provide a source of hay and forage for cattle production in addition to ensuring high quality, reliable water supply. Apart from their direct role in crop production, wetlands provide irrigation and help 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.

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

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.<sup>31</sup> 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.<sup>32</sup> It is estimated that Canadian peatlands store approximately 56% of the soil organic carbon in this country.<sup>33</sup> 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.<sup>34</sup> Peatlands continue to sequester carbon on an annual basis, and collectively may sequester about 1.5 million tonnes of carbon per year.<sup>35</sup>

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.



Creston Wildlife Management Area.  
Photo: Bruce Harrison

## ■ Intact wetlands save money!

There is now wide recognition of the environmental benefits of conserving wetlands, and the estimates of the economic value of healthy wetlands are equally impressive. For example:

- The economic value of the flood control functions performed by Canada's wetlands is estimated to be \$2.7 billion annually.<sup>36</sup>
- A Simon Fraser University economist has estimated that the value of all the goods and services generated by a single hectare of lower Fraser Valley wetland ranges between \$5,792 and \$24,330 *every year*.<sup>37</sup> A Washington state study that looked at expanding wetlands to restore flood control estimated that the value of wetlands near Lynnwood and Renton ranged from \$89,000 to \$126,000 (USD) per hectare annually.<sup>38</sup>
- Local authorities in Massachusetts spent \$10 million to protect 3,400 hectares (ha) of wetlands along the Charles River as a natural storage area for flood control – and saved the \$100 million it would have cost to build the alternative of dams and dikes.<sup>39</sup>

Protecting wetlands can maintain natural drainage and water storage systems—and avoid the need for expensive storm sewer construction.<sup>40</sup> Johnson County, Kansas, estimated saving \$120 million on stormwater controls by setting aside \$600,000 worth of riparian greenways and wetlands.<sup>41</sup>

At a smaller scale, individual developers and communities can save enormous amounts in infrastructure costs if they maintain natural drainage systems (including wetlands), as opposed to destroying natural drainage and then constructing replacements.

Chilcotin Wetland - a wet meadow, marsh and shallow open water. Photo: Bruce Harrison



## The Costs of Damaging Wetlands

Wetlands make a critical and irreplaceable contribution to the natural world, the economy, and our communities. Damage to wetlands can cause:

- Increased flooding
- Increased costs to construct flood prevention infrastructure
- Increased stormwater flow, and costs for stormwater infrastructure
- Increased costs as groundwater levels rise in filled wetlands, resulting in flooded basements and impaired septic systems
- Shortages of surface water
- Depletion of groundwater supplies
- Increased costs for water storage infrastructure
- Increased non-point pollution
- Increased eutrophication of water bodies (i.e., excess nutrients)
- Increased shoreline erosion and sedimentation of water and reservoirs
- Increased costs for water treatment infrastructure, for both water bodies and stormwater
- Decreased fisheries production
- Loss of marketable goods, such as shellfish, fish, and wild harvest products
- Loss of biodiversity which includes plants, birds, animals, invertebrates and other wetland-dependent organisms
- High mosquito populations in poorly functioning wetlands, potentially harbouring West Nile Virus
- Loss of recreation and tourism opportunities
- Loss of educational and research opportunities
- Diminished ability to attract businesses to your community and decreased value of real estate
- Loss of wetlands as carbon sinks and loss of ability to mitigate climate change.

Filling in of wetlands to meet housing and industrial needs creates a significant financial cost to the province generated by the loss of the vital ecological services wetlands provide. Photo: Ducks Unlimited Canada



# Wetlands: A Vanishing Resource

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*Half of all wetlands on earth have already been lost.*

Regardless of their many values, wetlands have been converted to other uses at an astonishing rate. Wetlands have been diked and drained for agriculture and are filled to accommodate housing and industry. Dam construction has dried up downstream wetlands, while dredging and stream channelization have destroyed others. Excessive groundwater extraction has depleted wetlands, as has global warming.<sup>42</sup> Pollution and poorly managed livestock grazing have taken a toll on wetland health. Road and pipeline construction have cut off water flow to and from wetlands and limited the movement of species between habitats.

Approximately half of all the wetlands on earth are already lost.<sup>43</sup> Not only has the continental US lost over 50% of its original wetlands,<sup>44</sup> an additional 35% have been damaged.<sup>45</sup> Ten US states have lost more than 70% of their original wetlands, while losses in California and Iowa amount to more than 90% of natural wetlands.<sup>46</sup>

In Canada, approximately 68% of all the wetlands in southern Ontario have been drained or converted to other uses.<sup>47</sup> Seventy percent of the lower Great Lakes-St. Lawrence River shoreline marshes and swamps have been lost.<sup>48</sup> In Prairie agricultural areas, up to 70% of the wetlands have been lost. Approximately 65% of coastal saltmarshes in the Atlantic region are gone.<sup>49</sup> Wetland loss in the vicinity of some major Canadian cities is as high as 80-98%.<sup>50</sup>

## British Columbia Wetland Losses

Approximately 5.6% of BC is still wetland.<sup>51</sup> However, much of that resource is located in remote areas. The settled areas of BC are, like most settled areas of North America, far advanced in their loss of critical wetlands. For example:

- About 70% of the original wetlands in the Fraser River Delta have been altered by diking and drainage schemes.<sup>52, 53</sup> Since 1880, virtually all of the seasonal wet meadows and 84.6% of the bog habitat has been lost in the Fraser River Delta.<sup>54</sup>
- Approximately 60% of the marsh habitat along estuaries in the Strait of Georgia have been lost.<sup>55</sup>
- In the Fraser Valley the 11,700 ha. Sumas Lake wetlands—formerly one of North America’s most productive wetlands—was drained for agricultural uses in the 1920s.<sup>56</sup> After World War II, over 2,800 hectares were diked and drained between Pitt Lake and Pitt River, creating the Pitt Polder. Portions of Cheam Lake, Pitt Polder, and Hatzic Lake were also drained.
- In the Victoria region approximately 70% of the original wetlands have been lost.<sup>57</sup> On the east side of Vancouver Island and the Gulf Islands, only 1.7% of the land base remains as natural wetlands.<sup>58</sup>

- In the ecologically critical South Okanagan area 85% of the natural wetlands have now been lost to stream channelization, agricultural drainage and housing.<sup>59</sup> Historical ecosystem mapping completed for the Okanagan Valley by Lea (2008) found that greater than 90% of some wetland ecological community types have been lost.<sup>60</sup> Extensive drainage for agriculture and housing has taken place in other parts of the Okanagan. In the Cariboo, many wetlands have been drained and converted to hay production.
- In the 1930s, a dam was built on the Kootenay River and over 10,000 acres were converted to agriculture, including the large Kootenay Flats wetlands.<sup>61</sup>
- In the 1960s, the Columbia River projects led to the inundation of large areas of wetland when 100,000 hectares of the Kootenay Valley lands were flooded.<sup>62</sup> The Kemano Dam on the Nechako River also had major impacts on downstream wetlands, as did the W.A.C. Bennett Dam which drastically reduced flows into the Peace-Athabasca delta in Alberta, causing massive loss and degradation of wetlands and other wildlife habitat.<sup>63</sup>

Although historically most wetlands were lost to large-scale agricultural drainage schemes and water diversion projects, today British Columbia 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.

Urban development is a major contributor to wetland loss in the Okanagan, Vancouver Island, the Lower Mainland and other high-growth areas of the province. From 1966-1986, 45,330 hectares of rural land were converted to urban and related uses in BC, and numerous wetlands were lost in that transformation.<sup>64</sup> It has been estimated that 30% of all the lands converted to development in that era south of the Fraser River were natural wetlands.<sup>65</sup> Six percent of the potential wetlands in the study area were converted to development during that period alone.<sup>66</sup>

The problem of wetland loss continues. From the late 1980s to the late 1990s, an additional 1,000 hectares of wetlands were lost in the lower Fraser Valley.<sup>67</sup> In the South Okanagan, it has been estimated that 5-10 hectares of approximately 800 hectares of significant wetland remaining are being lost annually, mostly to residential development.<sup>68</sup> Approximately 10% of the wetlands Kelowna had in 1995 have been lost in the last decade.<sup>69</sup>

The productive Sumas Lake wetlands were drained in the 1920s for agricultural uses.  
Photo: Vancouver Public Library



# How Different Jurisdictions Are Protecting Wetlands

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## The United States Response

The US federal government federal wetland policy goal is for no overall net loss of wetlands, with the long-term goal of increasing the quality and quantity of wetlands.<sup>70</sup> This led to the *North American Wetlands Conservation Act* in 1989, resulting in an investment of \$1 billion in wetlands protection and restoration in the past two decades.

The US National Governors' Association unanimously endorsed the goal of no net loss of wetlands.<sup>71</sup> US states including Minnesota, Maryland, Vermont, Maine, Pennsylvania, and Illinois have adopted "no net loss" goals and requirements, while others are now explicitly or implicitly applying the no net loss goal in some or all of their programs.<sup>72</sup> A similar standard requiring maintenance of certain functions has been adopted in Oregon and New Jersey.

Over 5,000 local governments in the US have adopted specific wetland regulations.<sup>73</sup> Wisconsin and Washington require local governments to legislate wetlands protection. Washington's *Growth Management Act* requires each local government to identify wetlands and adopt development regulations to protect wetlands.<sup>74</sup> The *Act* articulates a general goal of protecting environmentally critical areas, including wetlands, and then requires local governments to identify such areas and develop a strategy for protecting them. The state provides a model ordinance (bylaw) and financial incentives to local governments to regulate wetland alteration. Local governments must at least consider a model wetlands protection ordinance, and cannot receive monies from the state Wetlands Protection Grant Fund unless they base their bylaw on the model ordinance.<sup>75</sup>

Still other states such as Minnesota, require local governments to enforce statewide wetlands protection.<sup>76</sup>

## The Canadian Response

In 1986, the Department of Fisheries and Oceans issued a no net loss policy for fish-bearing wetlands and other fish habitat. Then in 1991, the Government of Canada responded to its Ramsar Convention obligations by adopting the *Federal Policy on Wetland Conservation*. This 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.<sup>77</sup> The policy also applies to the delivery of all federal programs and services. This federal policy inspired a number of provinces to initiate development of provincial wetland policies.<sup>78</sup>

The City of Calgary adopted a Wetland Conservation Plan in 2004, with the goal of No-Net-Loss of Calgary wetlands.<sup>79</sup> Throughout Alberta, during subdivision a municipality can secure a ten percent dedication for parks and school purposes, and may also take possession of a strip of land not less than 6 metres in width along wetlands and other bodies of water.<sup>80</sup> In both Alberta and Saskatchewan, local governments can, on subdivision, require the public dedication of swamps, gullies, ravines, and floodplains.<sup>81</sup>

In Ontario, local government policies related to wetlands must be consistent with the provincial policy of protecting provincially significant wetlands. Lands adjacent to wetlands (120 metres) require impact studies before development. In addition, provincial policy requires local governments to protect wetlands, and to develop programs to prevent development from harming wetlands and their hydrologic function.<sup>82</sup>

Prince Edward Island's provincial policy has a goal of no net loss of wetlands or wetland function. Where developments are proposed adjacent to a wetland, the developer must first try to avoid wetlands. In the rare case where avoidance is not possible, the developer must try to minimize negative impacts, and compensate for all loss of wetland area and function.<sup>83</sup>

In Nova Scotia, alteration of more than 2 hectares of private wetland must undergo an environmental assessment; for smaller alterations, permitting is governed by a provincial wetlands directive that aims to protect significant wetlands.<sup>84</sup> A wetland conservation policy is currently being considered that states goals and objects to prevent the net loss of wetlands and no loss of ecologically significant wetlands.<sup>85</sup>

New Brunswick protects all coastal wetlands, provincially significant wetlands, and all wetlands greater than one hectare. Wetlands under one hectare are protected, but proposed activities with 30 metres of a wetland require a development review that has a three-step approach to reduce wetland impacts. Impact reduction includes avoidance in the planning stage, activity minimization, and specific mitigation techniques during the construction phase.<sup>86</sup>

Burns Bog in Metro Vancouver, the largest undeveloped urban land mass in North America. Photo: Katherine Dunster



*“Our streams, lakes, and wetlands must stay healthy and function as nature intended, if water is to continue providing its riches forever.”*

Living Water Smart

## What is Being Done in British Columbia

British Columbia released its provincial water strategy, *Living Water Smart*, in 2008. Commitments<sup>87</sup> made in the plan include:

- Wetland and waterway function will be protected and rehabilitated;
- Government will provide incentives for the restoration of streams or wetlands;
- Government will also restore sections of streams or wetlands in the surrounding landscapes where practical;
- Government will provide incentives to developments that store more greenhouse gases by restoring sections of streams or wetlands.

Many local governments in BC have taken steps to protect sensitive areas like wetlands. In fact, the number of individual local initiatives is remarkable. Some local governments have legislated development-free buffers around all fish-bearing wetlands, and others have established them around all wetlands.

A number of local governments have established Development Permit Areas (DPA) and guidelines for wetlands, while others have established zoning setbacks and zoning incentives to protect wetlands. Others have developed further incentives for moving development back from wetlands, including tax incentives. Environmental Assessment procedures have been established. In a number of cases, the development of comprehensive watershed-based integrated stormwater and stream corridor planning and management are in progress.<sup>88</sup>

By incorporating Low Impact Development (LID) techniques and practices into both new and re-development plans, communities are helping prevent measurable harm to wetlands and other natural aquatic and riparian ecosystems.<sup>89</sup> Besides protecting existing wetlands, LID incorporates on-site stormwater retention using design techniques such as: rain gardens; green roofs and living walls; permeable or porous pavement; bioswales; constructed wetlands; and bioretention ponds.

# The Green Bylaws Toolkit: Practical Support for Conservation Planning

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While many local governments in BC are working to protect wetland ecosystems, few have a strategic conservation plan in place. Due to increasing development pressure in many parts of BC, local governments are often working reactively and in a site-specific manner, largely in response to development applications. Local governments also have a responsibility to implement provincial regulations.

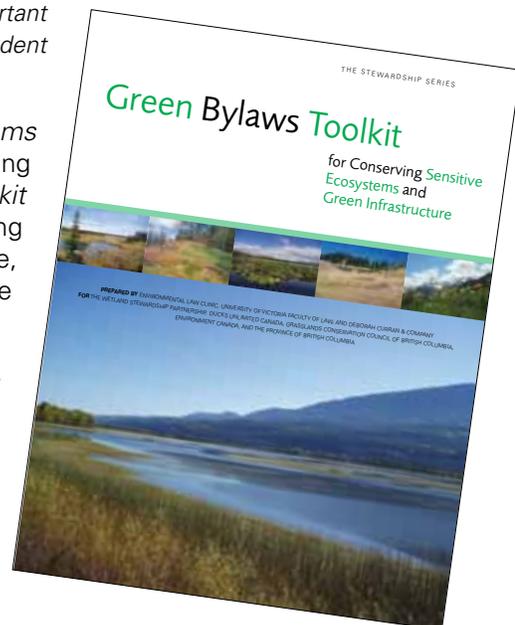
For example, many local governments are implementing the Riparian Areas Regulation (RAR), but RAR only protects wetlands that provide habitat for fish. In many cases, local governments are exceeding the RAR by enacting bylaws that provide stronger protection of wetlands than RAR (e.g., many local governments are designating 30 metre or more buffers along fish-bearing streams and wetlands to prevent and minimize impacts on fish from development in the 30 metre zone).

The US Fish and Wildlife Service has pointed out the vital importance of isolated, non-fisheries wetlands:

*The profiles of isolated wetlands...show that many of the functions and benefits (e.g., water storage, nutrient retention and cycling, sediment retention, and wildlife habitat) ascribed to non-isolated wetlands are performed by isolated wetlands. Moreover, their geographic isolation and local and regional distribution place isolated wetlands in a rather unique position to provide habitats crucial for the survival of many plant and animal species (e.g., endemism and breeding grounds for numerous amphibian and bird species). Isolated wetlands are vital natural resources, important for maintaining the Nation's biodiversity and wetland-dependent wildlife and for providing a host of other functions.<sup>90</sup>*

The *Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure* provides examples of what is being done by local governments around the province. The *Toolkit* integrates the tools and approaches that are not only being used to protect wetlands, but the entire green infrastructure, including other sensitive natural areas and systems that provide ecological services.

The key benefit of this resource is in the comprehensive approach that it advocates. This toolkit demonstrates the possibility of developing integrated tools that can protect wetlands and other community values. Local governments can get beyond reacting to specific issues, regulatory or other, by ensuring that systems are in place that enable a proactive approach to managing their entire green infrastructure.



Sustainable communities now recognize that the organizing principle of community planning should be to plan development around the green infrastructure of natural areas, instead of around an arbitrary grid of service infrastructure (e.g., roads).<sup>90</sup>

Sustainable communities:

- Examine the landscape's particular characteristics in order to determine the optimal uses for all its different parts; and
- Identify the natural systems, such as water, soil and biota, and plan development around green infrastructure.

Sustainable planning does not preclude development; it simply directs development to occur in a manner that does not negatively impact sensitive ecosystems. Planning for green infrastructure promotes ecological, economic and social health and sustainability.

## The Substantive Advantages

The *Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure* can assist you in selecting the best tools for protecting both fishery and non-fishery related wetlands, in order to maintain:

- The natural infrastructure necessary to sustain surface and groundwater supplies
- The purity of your community's water
- Natural drainage and natural flood control systems
- Crucial wetland habitat for wildlife in your community and the related recreational, tourism, and economic development opportunities.

## The Legal Advantages

The *Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure* will help you to respond proactively and effectively to environmental legislation by outlining tools and strategies that direct development away from sensitive areas.

The integrated regulatory approach in the *Green Bylaws Toolkit* will assist you to meet the requirements of the Riparian Areas Regulation. Using a combination of setbacks and development permitting, municipalities can have greater control over development in watercourse management areas. The focus is on maintaining the ecological function of all watercourses that form part of the green infrastructure, not just those that contain fish. This integrated approach will also assist municipalities in developing systems and best practices that should meet senior government regulatory requirements in the future.

This *Green Bylaws Toolkit* will also assist local governments in addressing the federal *Species at Risk Act*. Protection of natural infrastructure is a necessary component of any strategy to protect species at risk, because the majority of such species depend on either native grasslands or wetlands. Proactive local action to protect these areas will reduce the need for less effective—and more costly—recovery plans for such species. Adopting bylaws that protect green infrastructure helps communities be proactive in the face of future regulatory and legislative requirements, and helps government of all levels work toward achieving goals such as those set out in BC’s Water Plan, *Living Water Smart*, released in 2008.

In addition to the *Green Bylaws Toolkit*, other relevant resources available in the *Stewardship Series* include:

- *Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia*, a series of guidelines and best practices to avoid and minimize impacts on wetlands on both private and public lands.
- *Grasslands in BC: A Primer for Local Governments*
- *Coastal Shore Stewardship: A Guide for Planners, Builders and Developers*
- *Access Near Aquatic Areas: A Guide to Sensitive Planning, Design, and Management*.

These and other tools are available online at:

[stewardshipcentre.bc.ca](http://stewardshipcentre.bc.ca)  
[bcwetlands.ca](http://bcwetlands.ca)

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Photo: Bruce Harrison

# Endnotes

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- 2 Olewiler, N. 2004. *The Value of Natural Capital in Settled Areas of Canada*. Ducks Unlimited Canada and The Nature Conservancy of Canada, see footnote 22.
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- 18 Marshes and swamps create four times the net primary nutrient production of lakes. See Bond, W. K., K. W. Cox, T. Heberlein, E. W. Manning, D. R. Witty and D. A. Young. 1992. *Wetland Evaluation Guide: Final Report of the Wetlands are Not Wastelands Project*. Ottawa: American Wetlands Conservation Council (Canada). Wildlife Habitat Canada and Environment Canada, p. 17.
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- 22 For example, the Columbia River Wetlands – which follow the Columbia River for 180 kilometres, from Canal Flats to Donald – are also internationally important. They provide a home to Western Canada's second largest concentration of great blue herons, as well as trumpeter swans, whistling swans, loons, gulls, terns, rails, bitterns, hawks, bald eagles, ospreys, and 100 species of songbirds.
- 23 See Important Bird Area BC017, retrieved from <http://www.bsc-eoc.org/lba/site.jsp?siteID=BC017> (accessed July 2009).
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- 36 National Wetlands Working Group. 1988. *Wetlands of Canada*. Ecological Land Classification Series 24, Ottawa: Environment Canada, p. 406.
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