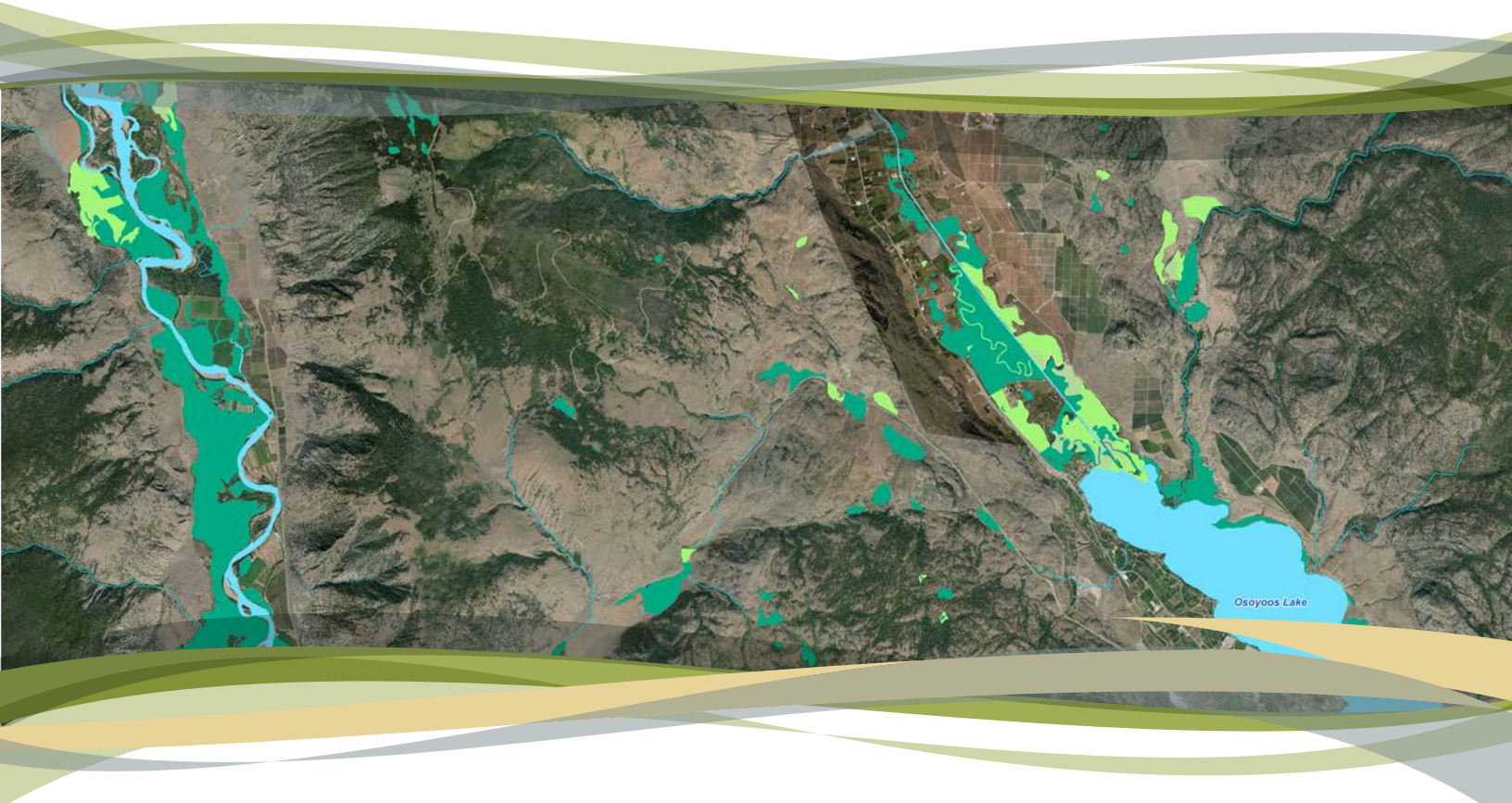




# Final Report

## Okanagan Basin Water Board



# Okanagan Wetlands Action Plan

## A Resource for Local Government and Communities

December 2019

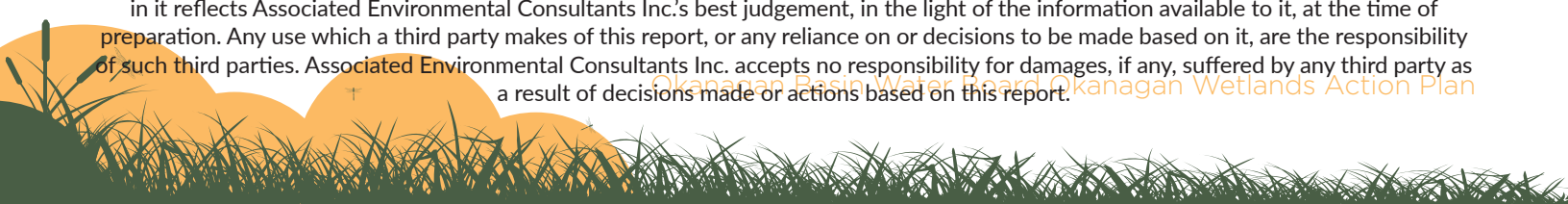


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# WHY AND HOW TO USE THIS ACTION PLAN

Wetlands are vital to the health of our ecosystems. They give us clean water, recharge groundwater resources, and protect us from flooding and drought, helping to buffer effects of climate change. In the Okanagan, wetlands are sensitive ecosystems that support many rare and endangered species, act as 'wet islands' in an otherwise dry environment, and provide critical habitat to resident wildlife and fish species.

---

## Vision for Action on Wetlands

Citizens of the Okanagan - together with respective local, regional and federal governments, organizations and businesses - work cooperatively to eliminate further loss and support wetland protection, governance, stewardship, science, and restoration.

- Draft Okanagan Wetlands Strategy Version 7.0 (Okanagan Basin Water Board)

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Wetlands have been and continue to be under pressure from land development, non-point source pollution, invasive species, and most recently climate change. The creation of this Action Plan was inspired by the need to protect our water sources, keep our water clean and accessible, minimize the effects of flooding and drought, and preserve and protect rare and endangered ecosystems in the Okanagan.

This Action Plan can be used by local government and communities to build on or start new wetland strategies and conservation programs. This Action Plan provides guiding principles and a coordinating framework to guide wetland conservation and restoration initiatives across the Okanagan Basin. The intent of this Action Plan is to provide local government and communities a common vision and path forward to increase the effectiveness of these initiatives.

This Action Plan describes wetlands in three main themes: Understanding Importance, Understanding Governance, and Actions for Improvement. Within Actions for Improvement, a **Vision for Action, Guiding Principles, five Strategic Directions** and corresponding goals, outcomes and actions are described. When implemented, the five strategic directions will increase **awareness** and **knowledge** about the importance of wetlands, help build effective wetland **policy**, encourage secure **partnerships**, increase effective **communication** and **cooperation** between government and community, help to increase **conservation and restoration of wetlands**, and slow the loss of existing wetlands **achieving our Vision**.

---

*The information provided in this Action Plan is offered as a public service. Many factors may influence wetlands. As a result, the information in this Action Plan is general in nature and should not be relied upon as specific advice for responding to particular circumstances. Action Plan users should review the particular circumstances and then determine whether the suggestions in this Action Plan are appropriate to those circumstances.*

*Action Plan users should consider the appropriateness of the suggestions in this Action Plan and adapt them to suit their specific local conditions and requirements. Plans and bylaws should not be put in place without first receiving appropriate professional and legal advice.*

*While information provided within this Action Plan is believed to be accurate at the time of publication, Associated cannot confirm its currency, accuracy, or completeness, or its applicability to, or suitability for, individual circumstances. Therefore, persons using this Action Plan should take steps to independently verify the information.*

*The Action Plan contains links to websites of other organizations. As Associated does not control those websites, we cannot confirm the information provided by them.*

# ACKNOWLEDGEMENTS

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Photographs throughout this report are credited to the authors from the first versions of this document, Carrie Nadeau and Kristen Andersen of Associated Environmental, Josie Symonds of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, and the following organizations and local government bodies: Okanagan Conservation Collaboration Program, BC Wildlife Federation, Ducks Unlimited Canada, Okanagan Similkameen Stewardship, South Okanagan Similkameen Conservation Program, City of Kelowna, Regional District of Okanagan-Similkameen, and Regional District of North Okanagan.

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# GLOSSARY

| Term                               | Meaning  |
|------------------------------------|--|
| <b>Alkaline Pond</b>               | A permanently inundated or seasonal waterbody characterized by the presence of alkaline salts deposits created when salty groundwater evaporates.  |
| <b>Blue-Listed</b>                 | Blue-listed species are those indigenous species, subspecies, or ecological communities considered to be of Special Concern in British Columbia because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.  |
| <b>Bog</b>                         | A class of wetland characterized by organic soil of predominantly poorly to moderately decomposed sphagnum moss peats and a water table at or near the surface. Waters are generally acidic and low in nutrients. Bogs are usually carpeted with sphagnum mosses and shrubs and may be treed or treeless.  |
| <b>Constructed Wetland</b>         | A water treatment system that uses natural processes involving wetland vegetation, soils, and their microbial assemblages to improve water quality.  |
| <b>Fen</b>                         | A class of wetland characterized by organic soil of mainly moderately to well-decomposed sedge and non-sphagnum moss peats and a water table at or near the surface. Waters are mainly nutrient rich with a near-neutral to slightly acid pH. The dominant vegetation includes sedges, grasses, reeds, mosses, and some shrubs. Scattered trees may be present.                            |
| <b>Flood Bench (Low and Mid)</b>   | Flood ecosystems are not technically wetlands but occur on sites that are regularly influenced by high water levels and inundation that affects the vegetation present. The low and mid flood bench sites are most frequently inundated and strongly associated with wetland transitions.  |
| <b>Gleysol</b>                     | A type of soil (soil order) that has developed in a location that undergoes prolonged saturation most years. Diagnostic properties include presence of mottles (iron stains) and grey, black, blue colouring.  |
| <b>Habitat Wetland</b>             | A designed wetland that provides ecological functions of natural wetlands, including habitat for wildlife, increased biodiversity (especially in dry landscapes), water retention and peak flow attenuation, and groundwater recharge. Designed and built primarily to restore natural wetland function that has been degraded or lost.  |
| <b>Hydrophytes</b>                 | Plants adapted to grow in waterlogged soils.   |
| <b>Marsh</b>                       | A class of wetland that typically occurs in association with shallow open water ecosystems and characterized by cattails, bulrushes, grasses, and sedges. Floating aquatic vegetation may also occur and include duckweed and water smartweed.   |
| <b>Okanagan Basin</b>              | Includes the jurisdiction of all three regional districts, North Okanagan, Central Okanagan and Okanagan Similkameen and all municipalities contained within their boundaries.   |
| <b>Okanagan low-elevation zone</b> | This zone refers to the lower elevation biogeoclimatic zones present in the Okanagan Basin. These biogeoclimatic zones include:<br>BGxh1 – Okanagan Very Dry Hot Bunchgrass Variant<br>PPxh1 – Okanagan Very Dry Hot Ponderosa Pine Variant<br>IDFxh1 - Okanagan Very Dry Hot Interior Douglas Fir Variant<br>IDHxh1a - Okanagan Very Dry Hot Interior Douglas Fir Variant Grassland Phase |
| <b>Okanagan Wetlands Strategy</b>  | OBWB's three Phase initiative to help local government, stakeholders, the public, and Indigenous Nations to stop the loss of wetlands within the Okanagan Basin to support the OBWB Okanagan Water Sustainable Management Strategy.  |
| <b>Red-Listed</b>                  | Red-listed species are those indigenous species, subspecies or ecological communities that have, or are candidates for Extirpated, Endangered, or Threatened status in British Columbia.   |

| Term                      | Meaning   |
|---------------------------|---|
| <b>Stormwater</b>         | Water that accumulates from precipitation events and snow/ice melt. Stormwater can soak into the soil (infiltrate), be held on the surface and evaporate, or runoff and end up in nearby streams, rivers, or other waterbodies (surface water). In urban settings, stormwater needs to be managed to avoid large volumes of runoff water (flooding) and discharge of potential contaminants (water pollution) into other surface water sources. |
| <b>Swamp</b>              | A class of wetland that typically occurs along the edge of other waterbodies. It is characterized by vegetation dominated by tall woody vegetation (trees and shrubs), generally over 30% cover, and wood-rich peat laid down by this vegetation.   |
| <b>Saline Meadow</b>      | Saline meadows are characterized by alkaline salts that occur within the drawdown zone of shallow or vernal ponds and are generally characterized by unique salt-tolerant vegetation.   |
| <b>Wetlands (general)</b> | Areas where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development. Wetlands have a relative abundance of hydrophytes in the vegetation community and hydric soil characteristics.   |

## LIST OF ABBREVIATIONS

| Abbreviation | Meaning   |
|--------------|---|
| <b>ALR</b>   | Agricultural Land Reserve   |
| <b>BC</b>    | British Columbia  |
| <b>BCWF</b>  | BC Wildlife Federation  |
| <b>BCWS</b>  | BC Wetland Society  |
| <b>DP</b>    | Development Permit  |
| <b>DU</b>    | Ducks Unlimited Canada  |
| <b>DFO</b>   | Fisheries and Oceans Canada   |
| <b>ESA</b>   | Environmentally Sensitive Area  |
| <b>EMBC</b>  | Emergency Management BC   |
| <b>FIM</b>   | Foreshore Inventory Mapping   |
| <b>FLNR</b>  | Ministry of Forests, Lands, Natural Resource Operations and Rural Development |
| <b>GIS</b>   | Geographic Information System   |
| <b>OBWB</b>  | Okanagan Basin Water Board  |
| <b>OCCP</b>  | Okanagan Collaborative Conservation Program                                   |

| Abbreviation | Meaning   |
|--------------|---|
| <b>OCP</b>   | Official Community Plan                         |
| <b>ONA</b>   | Okanagan Nation Alliance                        |
| <b>OSS</b>   | Okanagan Similkameen Stewardship                |
| <b>RDCO</b>  | Regional District of Central Okanagan           |
| <b>RDNO</b>  | Regional District of North Okanagan             |
| <b>RDOS</b>  | Regional District of Okanagan-Similkameen       |
| <b>SAR</b>   | Species at Risk                                 |
| <b>SEI</b>   | Sensitive Ecosystem Inventory                   |
| <b>SHIM</b>  | Sensitive Habitat Inventory Mapping             |
| <b>SOSCP</b> | South Okanagan-Similkameen Conservation Program |
| <b>WIM</b>   | Wetland Inventory and Mapping                   |
| <b>WSA</b>   | Water Sustainability Act                        |
| <b>WSP</b>   | Wetland Stewardship Partnership                 |









# WETLANDS: UNDERSTANDING IMPORTANCE

## 1 INTRODUCTION

### 1.1 HOW WE GOT HERE

The lakes, streams, and wetlands of the Okanagan Basin are critically important to the cultural, ecological, social, and economic values held by residents of the watershed (Figure 1-1). Fresh water within the basin is the source of drinking water for more than 200,000 people and is used to support agriculture, recreation, industry, and a range of other uses that depend on good quality water and a dependable water supply (Associated 2018). Wetlands, as the interface between upland areas and the Basin’s streams and lakes, play an important role in aquatic ecosystem function. However, because of urban and rural development, more than 84% of the area of low-elevation zone wetlands within the Okanagan and Similkameen Valleys have been lost (Patterson et al. 2014).

Wetlands and the functions they provide are vital to hydrological processes and water quality in the Okanagan. Wetlands are among the rarest and most sensitive ecosystems in the Okanagan, representing only about 0.2% of the regional landscape (Figure 1-2, Patterson et al. 2014).

However, wetlands provide disproportionately large biological, hydrological, and socio-economic values (MacKenzie and Banner 2001).

Since 1970, the Okanagan Basin Water Board (OBWB) has identified and addressed water management and water quality issues in the Okanagan Basin. As the population

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**OBWB Statement:**

Working Together to  
Protect a Common Resource  
One Valley  
One Water



of the Okanagan continues to grow, impacts from urban, rural, industrial and agricultural development on water quality, wildlife habitat, biodiversity and aquatic habitat have become a serious concern. Increased runoff associated with land development and extreme climate change events also play a role in flood hazard. The conservation and restoration of wetlands help to maintain water quality and contribute to the multiple-barrier approach to the protection of the Okanagan's water sources (OBWB 2019).

OBWB's **Okanagan Wetlands Strategy** project identified the need to organize and provide resources for wetland-related activities, including the need for further wetland inventory, prioritization of high value conservation wetlands, reduction of urban development pressure on wetlands, and reduction of impacts of stormwater discharge into natural wetlands. Wetland strategy recommendations included the development of comprehensive and reliable wetland information to support effective planning, law-making, and policy development in the Okanagan (Okanagan Wetlands Strategy Phase I, Patterson et al. 2014).

In BC, there is no overarching provincial wetland policy that protects wetlands (WSP 2010). Recognizing this, a *Wetland Action Plan for British Columbia* ("Action Plan") was created in 2010 by the Wetland Stewardship Partnership (WSP) of BC. The Action Plan encouraged the cooperation of government and non-government entities to protect and preserve BC's wetlands. This Action Plan embodies the intent of the Action Plan and utilizes information from toolkits that the WSP has developed over the last few years. In 2017, the *Water Sustainability Act* came into effect and wetlands are now legally considered a stream and are protected in BC.

---

The OBWB acknowledges that the Okanagan Basin lies within the territories of the Syilx Peoples (Okanagan Nation).

Many local governments in the Okanagan Basin have established protection for, or identified the value of, wetlands on the landscape. Local Okanagan governments have included protection of wetlands in their Official Community Plans, established environmentally sensitive development permit areas or environmental management areas, and require environmental assessments as part of development permitting requirements. However, wetlands continue to be lost in the Okanagan Basin. A consistent approach to conserving wetlands, identification of wetlands, and correct evaluation and delineation of wetland boundaries including wetland classification remains a challenge.

In 2014, the **Okanagan Wetlands Strategy Phase I** determined that while many reports, inventories, and action plans have been developed over the years, wetland degradation and loss continue. Losses in the Okanagan are largely driven by land development and conversion of natural environments into urban and agricultural uses, and incorrect delineation of wetland boundaries. Phase I identified a number of high priority wetlands that require immediate action to protect. The collaborative collection of wetland data and application of wetland conservation actions by local government and communities can promote stewardship and improve current wetland management policy. In 2016, **Okanagan Wetlands Strategy Phase II** was initiated and involved a number of outreach projects and small wetland restoration programs based on the recommendations from Phase I.

In 2017, the Okanagan Region Ecosystems Section of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR) hosted a Conserving Okanagan Wetlands workshop, in partnership with Ducks Unlimited, OBWB and

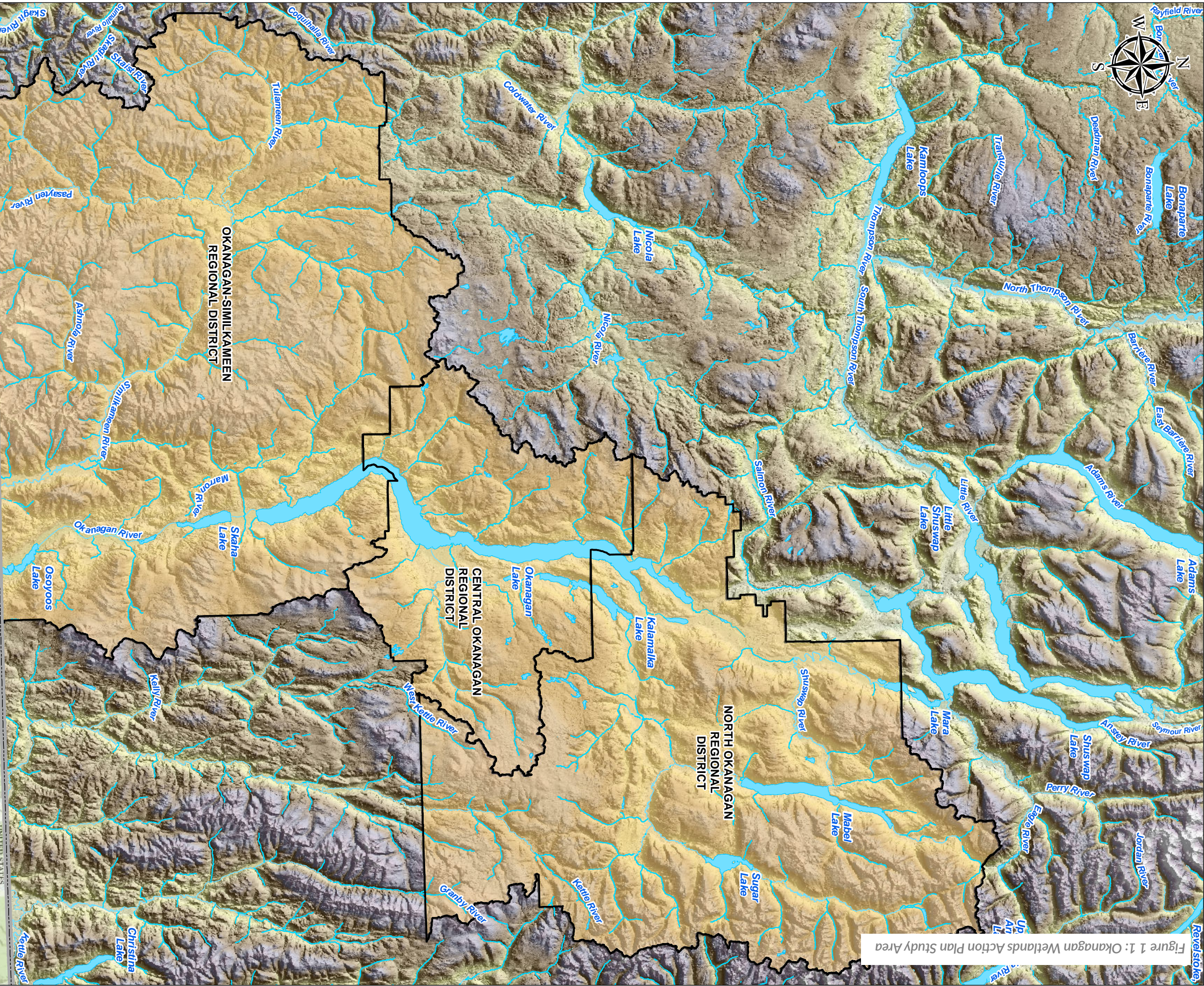



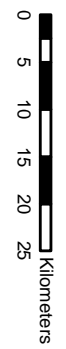
Figure 1 1: Okanagan Wetlands Action Plan Study Area



**Associated  
Environmental**

 Study area

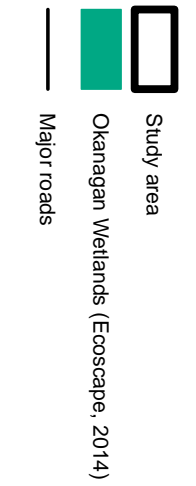
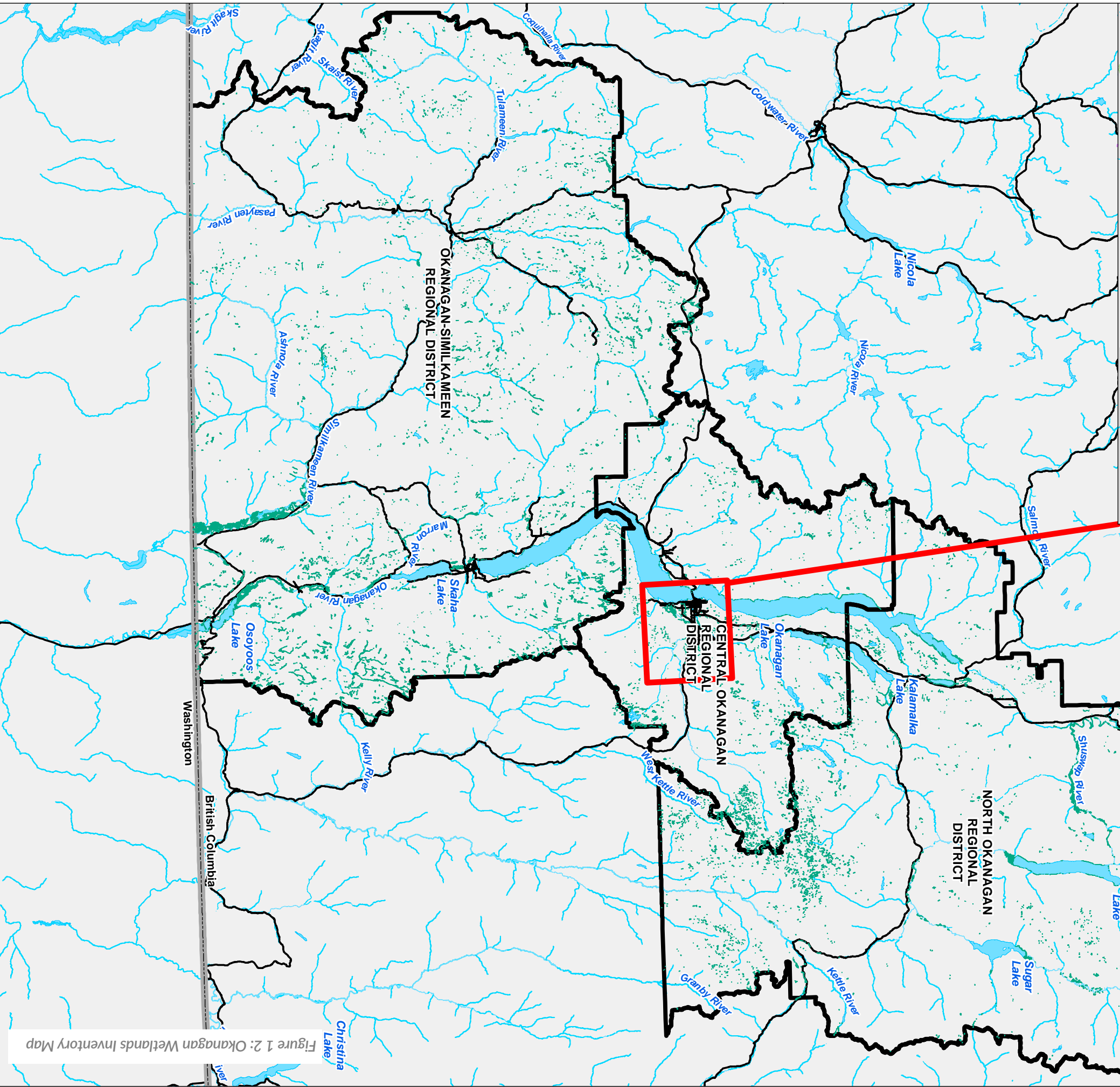
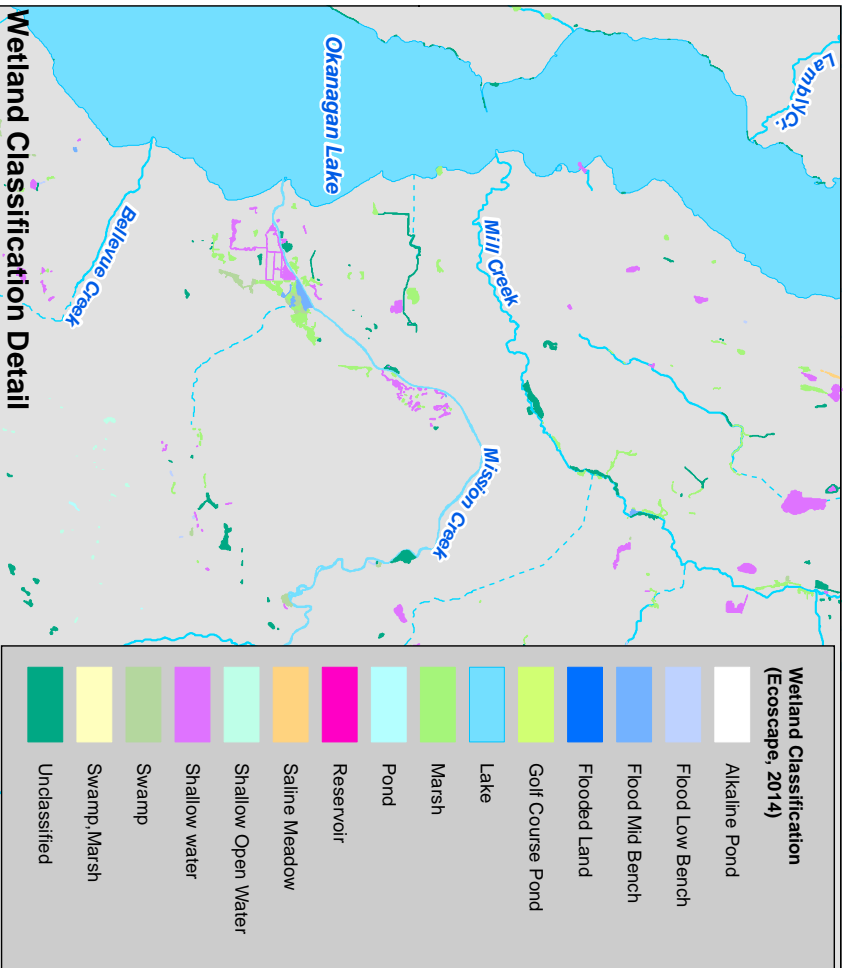
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**FIGURE 1-1: OKANAGAN BASIN STUDY AREA**

Okanagan Basin Water Board  
Okanagan Wetlands Action Plan



PROJECT NO.: 2017-8186.010.000  
 DATE: April 2019  
 DRAWN BY: BdJ

**FIGURE 1-2: OKANAGAN WETLANDS INVENTORY**  
 Okanagan Basin Water Board  
 Okanagan Wetlands Action Plan

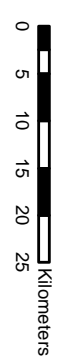


Figure 1-2: Okanagan Wetlands Inventory Map

many local community conservation organizations (FLNR 2017). Over 50 local government planners, environmental consultants and local community conservation organizations attended the one-day workshop. The outcome of the workshop was a summary report that includes many tools and key actions for enhancing wetland protection in the Okanagan.

In 2018, as part of the **Okanagan Wetlands Strategy Phase III**, the **Constructed Wetlands for Stormwater Management: An Okanagan Guidebook** was developed (Associated 2018). **The Okanagan Wetlands Action Plan: A Resource for Local Government and Communities** (the “Action Plan”) satisfies the objectives of Phase III by considering the unique biophysical and social-community characteristics of the Okanagan, understanding the importance of wetlands and their governance, applying recommendations and next steps identified in Okanagan Wetlands Strategy Phase I, and providing strategic directions and actions for wetland preservation. **This document is the Final Action Plan. The draft document was reviewed by OBWB, technical experts, members of government, and stakeholders.**

All water management decisions in the Okanagan Basin should consider the values held by the Syilx People. **The Syilx People of the Okanagan Nation** were the first human inhabitants in this area and have thousands of years of knowledge and understanding of the Okanagan Basin’s biophysical, cultural and social environment. This Action Plan addresses wetland understanding and governance and proposes actions for improvement from a local government and community perspective. Values of the Syilx People and their perspectives on wetlands are not represented in this document. Local government and communities should consult the Syilx People before implementing policy decisions, conservation projects and restoration programs. The OBWB is in continuous communication with the Syilx People and the Okanagan Nation Alliance (ONA). The ONA intends to create a parallel Okanagan Wetlands Strategy document that represents their values and culture. **This Action Plan should be used in conjunction with the Syilx Okanagan Wetlands Strategy document.**

## 1.2 WHY SHOULD LOCAL GOVERNMENT BE CONCERNED ABOUT WETLANDS?

There is solid evidence that the climate of southern B.C. is warming. A warmer climate will likely intensify some weather extremes, such as increasing the severity of heatwaves and contributing to increased drought and wildfire risks (Government of Canada 2019). Additionally, more intense rainfalls will increase urban flood risks. There is already evidence that these trends are happening. The 2017 wildfire season in BC was unprecedented and spring flooding that preceded it resulted in hardships for many BC residents. In 2018, Emergency Management BC (EMBC) reported that about 2,500 people were forced from their homes by freshet flooding (EMBC 2018). Aging infrastructure cannot adapt to the increase in extreme weather events nor to increase in flows from these events. Almost all communities in the Okanagan region experienced extreme flooding in 2017. In most cases, infrastructure failed or was unable to accommodate flooding (Figure 1-3).

EMBC has four pillars for Emergency Preparedness; the second pillar is Prevention and Mitigation. EMBC defines prevention as, “Actions taken to reduce or eliminate hazards or their impacts,” and mitigation as, “Actions taken to protect lives and property, such as dike enhancements, land-use management and public education.”

---

“OVER THE COURSE OF EIGHT MONTHS IN 2017, THE OKANAGAN EXPERIENCED THREE EXTREME WEATHER EVENTS: AN EXTREMELY COLD AND DRY WINTER FOLLOWED BY MASSIVE RAINS, PRODUCING SOME OF THE WORST FLOODING EVER SEEN IN BC, THEN SOME UNSEASONABLE RECORD DROUGHT AND HEAT CONDITIONS”.

---

Wetlands and floodplains function as holding areas for excess stormwater and freshet runoff. Wetlands and natural low-lying areas act as sources of groundwater recharge, a useful function in times of drought. Okanagan communities can help prevent and mitigate the impacts of flood and drought by restoring and conserving floodplain and wetland areas and applying land-use management strategies to retain the function of these flood-prone areas. Green infrastructure concepts (e.g., construction of urban wetlands to contain stormwater and runoff) can provide immediate

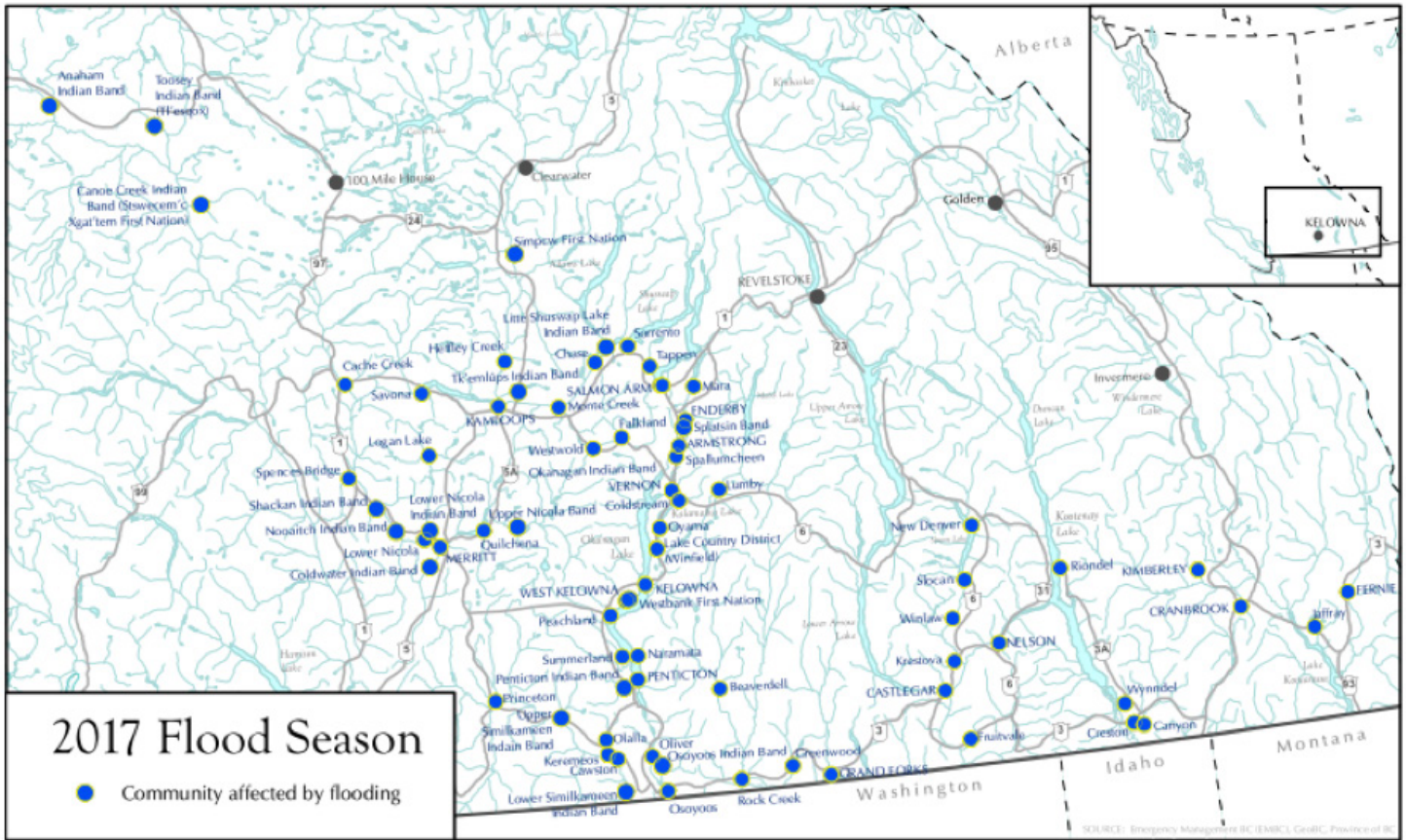


Figure 1-3  
Communities Affected by Flooding  
in 2017 (EMBC 2018)

benefits and increase community resilience to climate change. Ecosystem services provided by wetlands are discussed in more detail in the next section.

THE CONSERVATION AND RESTORATION OF WETLANDS IS AT THE CORE OF ADDRESSING FLOODING, DROUGHT, BIODIVERSITY AND ECOLOGICAL HEALTH CHALLENGES.”

*Deborah Curran, Environmental Law Centre, University of Victoria*

### 1.3 WHY SHOULD WETLANDS BE INCLUDED IN LOCAL WATER MANAGEMENT PLANNING?

#### 1.3 WHY SHOULD WETLANDS BE INCLUDED IN LOCAL WATER MANAGEMENT PLANNING?

Since the Water Sustainability Act came into effect in 2014, wetlands are legally considered a stream in B.C. In response, local government and other agencies are working to comply with this clarification in water law. Under the Act, changes within or near any stream, including wetlands, require a notification or an approval under Section 11 of the Act. This includes changes to the wetland and its surrounding land and vegetation, and to the water flow (including withdrawing water).

Wetlands provide a series of interrelated and positive economic and ecological services, important to humans and the natural world. The following text box describes the functions of wetlands that provide ecological services, and influence community resilience and sustainability on a large watershed scale.

Not every wetland provides the entire suite of ecosystem services, nor does every wetland provide equal value in terms of wildlife habitat. Therefore, inventories of wetlands within the Okanagan should include assessments of the wetland functions listed in the textbox in addition to routine indicators like area, connections to streams or lakes, and wetland class (marsh, swamp, etc.).

The path toward valuing green infrastructure is to incorporate the monetary value of ecosystem services into municipal and regional budgeting. That process is in its infancy, but several jurisdictions around B.C. and elsewhere have introduced valuation of ecosystem services, including Vancouver, Gibsons, and Grand Forks.

## 1.4 WHY SHOULD WE CARE ABOUT OKANAGAN WETLANDS?

The Okanagan Basin is ecologically unique in Canada. It is the very northern extent of the Great Basin, a biome typified by cool semi-arid conditions in the lower elevations. These conditions, coupled with diverse physiography, mild winters and a long growing season have enabled a high degree of biological diversity. That diversity is at risk, and the Okanagan-Similkameen has one of the highest concentrations of species at risk in Canada. There are 263 plant and animal species within the three regional districts that are either listed by federal or provincial governments as at risk (CDC 2019). About 115 of those species (40%) make use of wetlands for some or all of their lifecycle.

### 1.4.1 WETLAND TYPES

The nature of wetlands varies based on their position on the landscape relative to water (hydrogeomorphology). Valley bottom wetlands are commonly “riverine” or “lacustrine,” meaning they are hydrologically connected (either through aboveground flooding or a subsurface water table, or both) to an adjacent river or lake. Others are classed as “depressional” or “basin” wetlands, deriving their water both from groundwater discharge and from adjacent slopes. This Action Plan focusses on lower elevation wetlands, which are defined as wetlands located in the Bunchgrass, Ponderosa Pine, and Interior Douglas Fir biogeoclimatic zones (hereafter the low-elevation zone).

Wetlands in the Okanagan fall into one of the five classes defined by the Canadian Wetland Classification System: marsh, swamp, bog, fen, or shallow open water (National Wetlands Working Group 1997) (Appendix A provides additional class terms). MacKenize and Banner (2001) further classifies wetlands into 5 additional sub-categories. Of all classes, marshes and shallow open water are most common. Marshes, swamps, and shallow open water are minerogenous wetlands (i.e., the inflowing groundwater has been in contact with mineral soils or rocks) and the soils contain only small amounts of peat. Bogs and fens are classes of peatlands marked by significant accumulations of peat. Bogs are ombrogenous systems (i.e., water is received only from precipitation), whereas fens are primarily minerogenous.

### 1.4.2 WETLAND INVENTORY AND MAPPING

Accurate spatial and ecological data, ideally within a searchable and accessible database, are critical to development of a successful wetland strategy.

Phases I and II of the Okanagan Wetlands Strategy involved the consolidation of available wetland data sources within BC and the Okanagan. The resulting database contains 9,456 unique wetland entries housed in a Geographic Information System (GIS)





database using readily available mapping sources (i.e. Terrestrial Ecosystem Mapping, BC Fresh Water Atlas), and readily available data such as road layers, property ownership, tenures, mapped watercourses, species at risk occurrences, and others (Figure 1-2). Each source of data varies in methodology, scope, and accuracy of information. For example, the B.C. Freshwater Atlas is information based solely on aerial photo interpretation at a 1:20,000 scale and covers the entire province (Government of BC 2019). It covers the entire Okanagan but is limited to very few attributes, including location, delineated boundary, and wetland class (currently only identified as “swamp” or “marsh”). By comparison, the Kelowna Wetland Inventory Mapping Project (City of Kelowna 2009) provides improved wetland delineation because detailed field surveys were completed at many of the wetland sites. Approximately 100 attributes were documented for each wetland visited in the field, in comparison to one to two attributes per wetland from the BC Freshwater Atlas.

In 2016, OBWB commissioned a survey of 22 potential end users to determine what they would use the wetland database for, and how they would like to access it (OBWB 2016). The top three ranking applications of the database were, in order: (1) land use planning for development; (2) conservation planning, and (3) restoration planning. The top four ranking types of information that end users expressed as most important were: (1) accurate wetland polygon boundaries; (2) detailed wetland information (e.g., class, sub-class, form, riparian community); (3) ecological services (e.g., wildlife habitat, biodiversity, climate change regulation); and (4) simple wetland classification information (e.g., wetland type).

Many of the contributing data sources of the Kelowna Okanagan Wetland Inventory Database is currently available online, but from various sources (e.g., iMapBC, EcoCat, Regional Districts, BC Wetlands Atlas on the Community Mapping Network). Okanagan Wetlands Strategy Phase I GIS data is available on iMapBC in the BC Wetland data layer.



## WETLAND FUNCTIONS

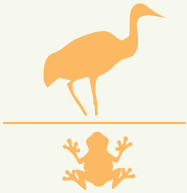


### GROUNDWATER RECHARGE

Wetlands collect and hold surface runoff, allowing time for downward movement of water through surface soil layers to connect with and recharge aquifers.

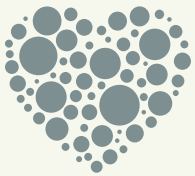
### RUNOFF RETENTION

Wetlands can capture and retain runoff from heavy rains or rain-on-snow events and provide room to hold water when adjacent streams overtop their banks. They then release the water slowly, that can be a benefit in times of flood and drought. The economic value of flood control functions performed by wetlands has been estimated to be \$2.7 billion annually across Canada (Environment Canada 1993).



### HABITAT

Wetlands provide temporary and/or permanent habitat for mammals, birds, fish, reptiles, amphibians, insects and plants. Wetlands have the highest biodiversity (i.e., number of species per hectare) of all ecosystem types. As “wet islands” in an otherwise dry environment, wetlands are particularly important for local biodiversity in the Okanagan.



### SEDIMENT TRAPPING

As water flows overland following heavy rains, flooding, or containment breaks, large amounts of sediment are suspended in the water column. Wetlands and their associated vegetation slow down water, allowing sediment to settle out. This improves water quality for humans, aquatic life, and wildlife and reduces the need for periodic cleaning of storm drains and waterways.

### NUTRIENT ABSORPTION (BIOFILTRATION)

Aquatic and riparian vegetation is adept at absorbing dissolved nutrients (particularly nitrogen and phosphorous) from agricultural and urban runoff.



### POLLUTANT BREAKDOWN

Aquatic and riparian vegetation, and associated bacteria and algae, can trap and eventually break down organic pollutants such as hydrocarbons and pesticides. However, wetland capacity for sediment trapping, nutrient absorption, and pollutant breakdown is limited and can easily be overwhelmed.

### CARBON SEQUESTRATION

The carbon stored in living and dead aquatic and riparian plant tissue represents a storehouse for atmospheric carbon. The rapid growth and turnover rate of wetland plants make them one of nature’s leaders in carbon sequestration. Under certain conditions, wetlands naturally generate methane, a greenhouse gas. Researchers are examining various wetland management techniques to maintain a positive carbon balance.



### LIVESTOCK WATER

Livestock that graze on Crown rangelands often rely on wetlands and streams as drinking water sources.



### WETLANDS AS GREEN INFRASTRUCTURE

Urban wetlands, both natural and engineered, are now recognized as ‘green infrastructure’ and are part of the growing movement to tackle urban and climatic challenges by building with nature. Urban wetlands provide all the functions listed above. Natural and constructed urban wetlands can provide these services, often at less cost than other engineered solutions.

### 1.4.3 HISTORICAL WETLAND LOSSES AND FUTURE THREATS

Between the mid-1800s and the early 2000s, approximately 85% of the natural wetlands in the South Okanagan were lost to stream channelization, agricultural drainage, and housing (Lea 2008). Phase I has estimated that approximately 84% of the area of low elevation wetlands within the Okanagan and Similkameen Valleys have been lost (Patterson et al. 2014).

Despite recent efforts at wetland conservation and restoration, and the increased protection afforded by the Water Sustainability Act, pressures on wetlands continue to be a concern. There are several on-going threats to the ecological integrity of wetlands, with multiple threats potentially affecting any given site. The Okanagan Wetlands Strategy Phase I identified five types of threats to Okanagan wetlands (details are found in Appendix A):

#### 1. Ecosystem Conversion:

- Urban development
- Agricultural development
- Water diversion

#### 2. Ecosystem Degradation:

- Fragmentation
- Water regime alteration
- Grazing
- Forestry activities
- Recreational activities
- Road building

#### 3. Invasive Species:

- Plants (e.g., purple loosestrife, yellow flag iris)
- Animals (e.g., bullfrog, yellow perch)

#### 4. Environmental Contamination:

- Pollution
- Stormwater runoff
- Sewage
- Agricultural runoff (e.g., nutrients)

#### 5. Climate change.

Recent work at the University of Victoria's Pacific Climate Impacts Consortium (PCIC) and the University of Washington's Climate Impacts Group is directly applicable to the Okanagan. PCIC has developed the 'Plan2Adapt' tool<sup>1</sup>, which provides estimates of future primary climate variables such as temperature and precipitation, as well as more complex parameters derived from these primary variables, for specified geographic areas. The PCIC Plan2Adapt tool provides outputs for the three regional districts within the Okanagan (i.e., RDNO, RDCO, and RDOS).

Regarding climate change, the climate and hydrologic trends in the Okanagan (PCIC Plan2Adapt) that have implications for wetland ecosystems are:

1 <https://www.pacificclimate.org/analysis-tools/plan2adapt>



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“Climate change is regarded as the biggest threat to wetlands in British Columbia”

*A Wetland Action Plan for BC, WSP 2010*

## FIVE MAJOR CLASSES OF WETLANDS



### MARSH

This class of wetland typically occurs in association with shallow open water ecosystems and is characterized by cattails, bulrushes, grasses, and sedges. Floating aquatic vegetation may also occur and include duckweed and water smartweed. This is the most common wetland class in the Okanagan, generally found in the valley bottom.

### SWAMP

This class of wetland typically occurs along the edge of other waterbodies. It is characterized by vegetation dominated by tall woody vegetation (trees and shrubs), generally over 30% cover, and wood-rich peat laid down by this vegetation. Swamps are scattered throughout the Okanagan but are relatively rare and generally found on floodplains or lakeside areas, or at upper elevations.

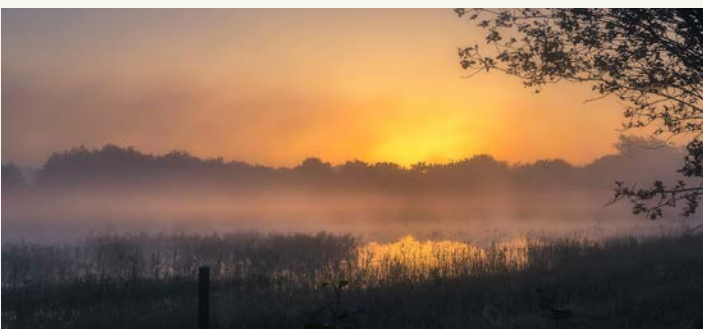


### SHALLOW OPEN WATER

This class of wetland typically occurs in association with marshes and is characterized by intermittently or permanently inundated areas with open water up to 2 m deep. Vegetation includes submerged, shallow emergent, or floating aquatic plants. This wetland class and marshes are commonly adjacent to floodplains and saline meadows. This is the second-most common wetland class in the Okanagan, found in the valley bottom and on the upland plateau.

### BOG

This class of wetland is characterized by organic soil of predominantly poorly to moderately decomposed sphagnum moss peats and a water table at or near the surface. Waters are generally acidic and low in nutrients. Bogs are usually carpeted with sphagnum mosses and shrubs and may be treed or treeless. Bogs are uncommon in the Okanagan.



### FEN

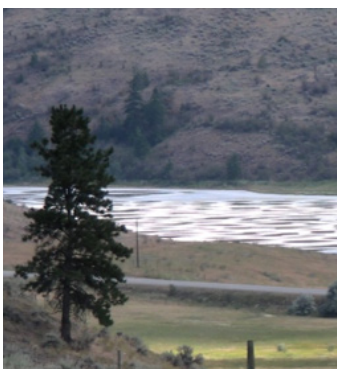
This class of wetland is characterized by organic soil of mainly moderately to well-decomposed sedge and non-sphagnum moss peats and a water table at or near the surface. Waters are mainly nutrient-rich with a near-neutral to slightly acid pH. The dominant vegetation includes sedges, grasses, reeds, mosses, and some shrubs. Scattered trees may be present. Fens are uncommon in the Okanagan, mostly found in upper elevations.



- The climate in the Okanagan is predicted to warm, and annual precipitation is predicted to increase. Summer precipitation is likely to decrease, and winter precipitation is likely to increase.
- Snow packs are projected to increase at higher elevations but decrease at lower elevations, creating uncertainty.
- Snowmelt is projected to occur earlier with meltwater runoff expected to decrease due to more winter rain.
- Late fall, winter, and early spring streamflows are projected to be greater; while late spring, summer, and early fall streamflows are projected to be smaller.
- The magnitude of extreme peak flows is projected to increase.

#### 1.4.4 WETLAND RESTORATION IN THE OKANAGAN

Case studies are presented throughout this Action Plan as “wetland stories” to provide examples of some of the existing and previous wetland initiatives completed throughout the Okanagan Basin. Many more restoration and conservation initiatives have occurred or are underway, and the examples presented here represent a small sample. Section 2.4 describes some community initiatives and programs.



### 1.5 SUPPORTING DOCUMENTS AND TECHNICAL REFERENCES

**Appendices A and B** provide a list of the key toolkits, strategies, textbooks, and technical guidance documents (including resources on OBWB’s website and the reference list in Appendix B). The Action Plan is based on the vision and guiding principles of the OBWB’s Okanagan Sustainable Water Strategy Action 1.0 (2008) and draft Action 2.0 (2019). Wetland conservation projects from Phase II Okanagan Wetlands Strategy are presented as storyboards within this Action Plan, as well as other wetland projects competed by other local initiatives.

In addition, content of this Action Plan has been adopted from two key documents: (1) FLNR Conserving Okanagan Wetlands: Local Government and Provincial Tools Workshop held on November 20, 2017<sup>2</sup>, and (2) Wetland Conservation Strategy for Ontario<sup>3</sup>. To assist the readability of this Action Plan, references within the text are kept to a minimum except where the source material is used directly.



### 1.6 COMMUNITY INITIATIVES, PROGRAMS AND FUNDING

A summary of key provincial and Okanagan-specific programs, community initiatives, and funding opportunities is provided below. Additional relevant funding sources are provided in Appendix D of the OBWB Constructed Wetlands for Stormwater Management: An Okanagan Guidebook. Case studies are presented throughout this Action Plan as wetland stories which include some of the existing and previous wetland initiatives throughout the Okanagan Basin. Some of the wetland stories have been funded by the programs described below.

2 [http://a100.gov.bc.ca/appsdata/acat/documents/r53168/OkanaganWetlandsWorkshopReport2017\\_Final\\_1516292463609\\_6290678573.pdf](http://a100.gov.bc.ca/appsdata/acat/documents/r53168/OkanaganWetlandsWorkshopReport2017_Final_1516292463609_6290678573.pdf)  
3 <https://www.ontario.ca/page/wetland-conservation-strategy>



## THE GREEN BYLAWS TOOLKIT FOR CONSERVING SENSITIVE ECOSYSTEMS AND GREEN INFRASTRUCTURE



The Green Bylaws Toolkit was developed by the Wetland Stewardship Partnership of BC, non-profit organizations, the Real Estate Foundation of BC, and provincial and federal governments. The purpose of the toolkit is to provide municipal and regional governments and the public with practical tools for protecting green infrastructure, including wetlands. It explains the various legal approaches to protection, and their benefits and drawbacks. The toolkit contains new legislation, guidelines, best practices, and bylaws that can help communities protect green infrastructure, and subsequently, sensitive ecosystems.

The approaches provided in the toolkit aim to achieve the following goals:

- Protect and maintain the integrity of sensitive ecosystems.
- Restore ecosystems when opportunities allow.
- Ensure that green infrastructure plays a role in promoting fiscally responsible local government services and programs.

### BC WILDLIFE FEDERATION



The BC Wildlife Federation (BCWF) administers the Wetlands Education Program (WEP). The purpose of the WEP is to educate individuals and groups on wetland stewardship and subsequently increase community health.

BCWF's wetland activities result in habitat restoration, enhancement and conservation. Participants learn about wetland processes and habitat restoration, and conduct the physical work required to restore wetland habitat. The WEP consistently collaborates with BCWF clubs and members, non-governmental organizations, local community groups, naturalist clubs, Indigenous Nation groups, and other interested parties, to ensure for an inclusive and highly informative program.



The following programs are part of the WEP:

**Wetland Keepers** – A 2.5-day workshop that educates participants about wetland conservation and teaches skills such as wetland mapping, plant and animal identification, soil sampling, and other wetland classification, and stewardship skills.

**Wetlands Institute** - A 7-day hands-on workshop that educates participants about wetland stewardship, restoration, and construction skills. Participants come to the Wetlands Institute with a wetland project they wish to implement in their home communities. During the workshop, participants receive support from knowledgeable experts and hands-on training to successfully implement their wetland projects.

**Map our Marshes** – A program that teaches technical and field skills for mapping smaller, unappreciated wetlands with GPS receivers, as well as how to upload these maps to an online database.

**Wetland Restoration** - The Wetlands Education Program hosts wetland restoration/ construction workshops or related events to improve wetland habitat in BC.

### DUCKS UNLIMITED CANADA

Ducks Unlimited Canada (DUC) has been involved in establishing Canada's major conservation programs. They played a key role in the development of Environment Canada's **National Wetland Conservation Fund**.

The Institute for Wetland and Waterfowl Research (IWWR) is the research arm of DUC. Their researchers focus on the relationships between wetlands, waterfowl, watershed health, and biodiversity.

DUC restores wetlands that have been degraded and improves water quality by managing invasive species. They provide online and in-person resources to industry professionals, landowners and community officials interested in learning more about wetland and waterfowl conservation. DUC offers two educational programs across Canada:

**Wetland Centres of Excellence (WCE)** are a national network of schools and community partners that engage students in wetland conservation through action projects, student-to-student mentored field trips, and outreach in their communities. Clarence Fulton Secondary School in Vernon, BC was named a WCE.

**Wetland Heroes** are young people under 25 years of age who make a difference by acting to conserve and protect Canada's wetlands. They can be individuals, classes, schools or community youth clubs or groups. Wetland heroes raise money, engage politicians, enhance wetland habitat, and increase awareness.

### NATURE TRUST OF BC



The Nature Trust of BC is a non-profit land conservation organization. They acquire and care for more than 480 conservation properties covering 71,000 hectares across BC. They primarily acquire habitats of high biodiversity values, including wetlands, and those at greatest risk of being lost.

One of the goals of the Nature Trust is to add new properties to existing ones to create larger complexes that ensure ecosystem resilience and connectivity. The Nature Trust ensures that these areas are protected for future generations of wildlife, plants, and people.



### BC WETLANDS TRENDS PROJECT: OKANAGAN VALLEY ASSESSMENT

Conservation organizations in BC have long acknowledged the lack of wetland habitat tracking as a serious deficiency in conserving wetlands at ecoregional scales in a changing climate. To help address this, in 2010 a group of partners, including the Canadian Intermountain Joint Venture (CIJV), came together on a multi-year initiative, the BC Wetland Trends Project, to assess wetland trends and develop an approach for future monitoring. One of their first steps was to commission a report to recommend opportunities for tracking wetlands in BC. Several approaches were discussed involving different combinations of data scales (spatial and temporal) at four locations. One of those options was selected for a trial in a transboundary region shared by the neighbouring Intermountain West Joint Venture (IWJV)<sup>4</sup>.



The methodology to be tested involved the use of remote sensing and existing landcover classifications to assess whether current wetland occurrence has changed in comparison to a historical baseline from approximately 20 years ago. Principal objectives were to provide a 20-year trend assessment for the chosen area, and to recommend procedures and logistics for delivering a landscape-scale operational wetland tracking project, which may be applied on either side of the international border.

### OKANAGAN COLLABORATIVE CONSERVATION PROGRAM

The Okanagan Collaborative Conservation Program (OCCP) is a partnership of organizations and government with mutual goals, including maintaining biodiversity, protecting species at risk, maintaining ecological connectivity throughout the Okanagan Basin, and balancing regional growth and conservation.



Partners in the OCCP include local, regional, provincial and federal levels of government, and non-profit organizations. These partners work together to share information, conduct research to fill knowledge gaps, and set priorities for conservation issues in the Okanagan. The OCCP holds educational events and workshops for adults and children, and their website provides numerous resources for wetland management<sup>5</sup>.

<sup>4</sup> BC Wetland Trends Project: Okanagan Valley Assessment (PDF)

<sup>5</sup> <http://okcp.ca/index.php>





Okanagan  
Similkameen  
Stewardship

### OKANAGAN SIMILKAMEEN STEWARDSHIP

Okanagan Similkameen Stewardship (OSS) works directly with local land owners to help them become stewards of natural areas on their properties while maintaining their farms, ranches, vineyards or other land uses. OSS has worked with numerous land owners who recognize the significance of wetland habitat on their property, or the potential for wetland habitat on their property. Together with OSS, landowners have created or restored wetland habitat on their properties, providing habitat for species that rely on wetlands<sup>6</sup>. OSS also promotes the practices of land and water stewardship through Landowner Contact Programs, which encourage landowners to protect biodiversity, enhance habitat for plants and wildlife, and manage lands sustainably.



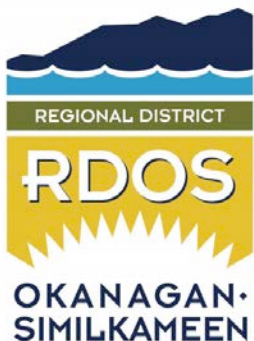
SOUTH  
OKANAGAN  
SIMILKAMEEN  
CONSERVATION  
PROGRAM

### SOUTH OKANAGAN SIMILKAMEEN CONSERVATION PROGRAM

The South Okanagan Similkameen Conservation Program (SOSCP) is a partnership of 50 organizations that work together to conserve the unique biodiversity and environment of the South Okanagan and Similkameen areas. Members include government, non-government, Indigenous Nations, and academic institutions<sup>7</sup>.

The SOSCP:

- Applies Indigenous Nations knowledge and ecological heritage
- Offers educational programs that connect people and communities to nature
- Purchases, receives, and monitors land containing valuable habitat
- Undertakes habitat restoration for enhancement of fish and wildlife populations
- Undertakes research related to wildlife and fish populations and habitat
- Acts as an advocate for policy change



### SOUTH OKANAGAN CONSERVATION FUND

The South Okanagan Conservation Fund is a dedicated source of funding for the specific purpose of undertaking environmental conservation projects. In December 2016, the Regional District of Okanagan Similkameen, with public assent, adopted a bylaw to establish the South Okanagan Conservation Fund for the communities of Summerland, Penticton, Oliver, and rural electoral areas A, C, D, E and F. The funds are in support of conservation efforts to protect, enhance and restore natural areas, water, environment, wildlife, land and habitat<sup>8</sup>.

The conservation partnership SOSCP assists with the administration of the granting process, and a Technical Advisory Committee with clearly established criteria also helps to ensure that projects proposed contribute to important conservation goals. All of the final decisions related to fund expenditures and approval of projects are made by local government elected officials.

### OKANAGAN BIODIVERSITY STRATEGY

The Okanagan Biodiversity Strategy was created in 2014 by the OCCP, the SOSCP and 80 other partners<sup>9</sup>. The strategy identifies why natural areas should be conserved, which natural areas should be conserved, how and when they can be conserved, and the role of natural areas in protecting regional biodiversity. The strategy provides tools, resources and legislative support relevant to biodiversity conservation. Ecosystems in

6 <https://www.osstewardship.ca/wetlands>

7 <http://www.soscp.org/>

8 <https://soconservationfund.ca/>

9 <http://okcp.ca/index.php/projects/current-projects/532-okanagan-biodiversity-strategy>



the Okanagan are rated on their conservation value, **wetlands are rated as one of the most important ecosystems for conservation in the Okanagan**, some wetlands are identified as biodiversity 'hot spots' in this strategy (OCCP 2014). Wetland mapping is a component of this strategy and can be used as a resource to conserve wetlands.

### **SENSITIVE ECOSYSTEM INVENTORIES (SEI) IN THE OKANAGAN**

The purpose of SEI mapping is to develop an inventory information base to support sound land management decisions and promote effective stewardship of remnant rare and fragile ecosystems. Data and information are used by all levels of government for addressing a variety of resource management issues as well as by the general public, landowners, developers, professional biologists, planning staff, non-government organizations, and others that need scientific information to support conservation efforts. SEIs have been completed for all regions of the Okanagan and are incorporated into all local government Official Community Plans and sensitive ecosystems, environment management area, or development permit mapping. Use BC's **Ecological Reports Catalogue** (EcoCat) to search all publicly available SEIs and their mapping layers<sup>10</sup>.

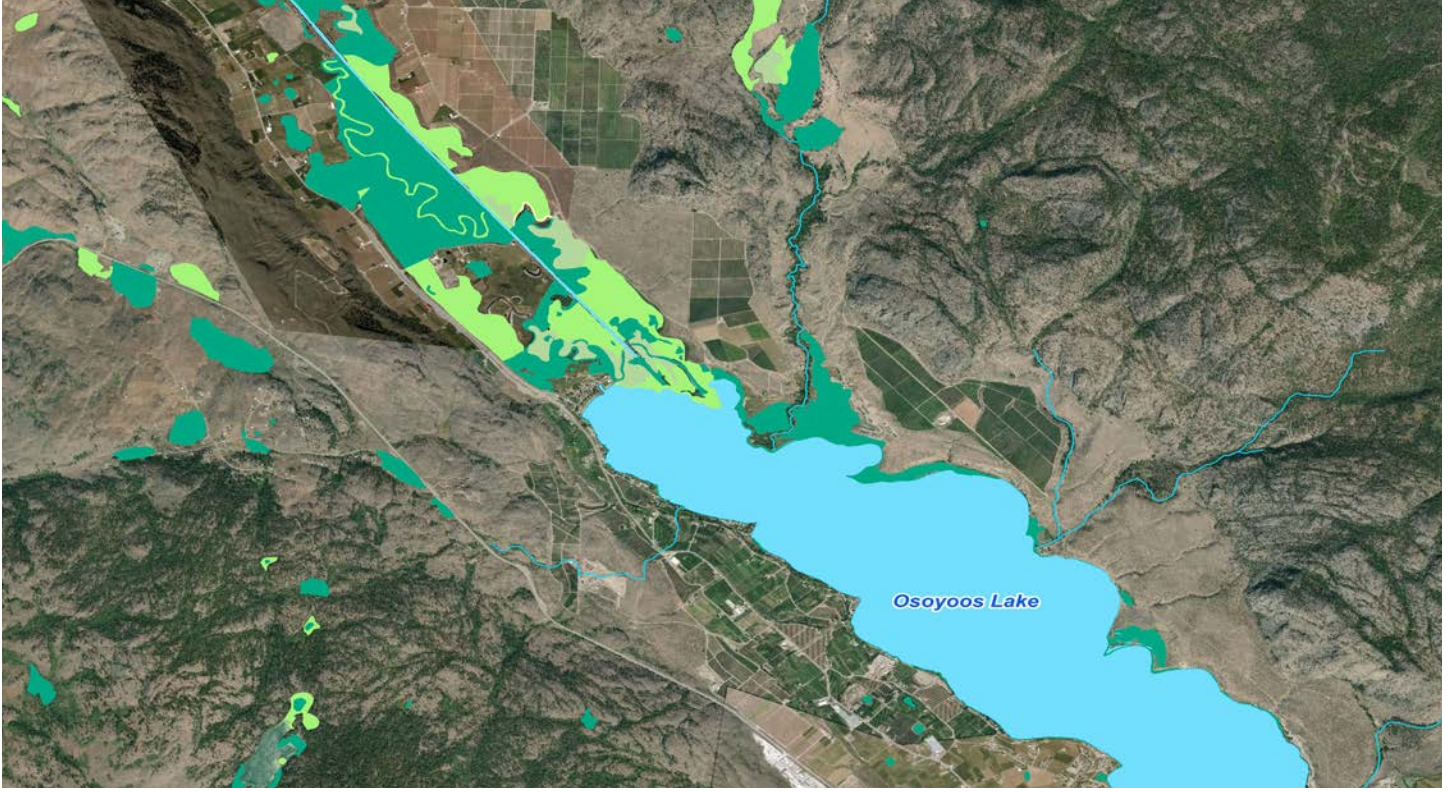
### **List of Naturalist Clubs/Non-Profit Societies/Land Trusts involved in the Conservation and Restoration of Sensitive Ecosystems and Wetlands in the Okanagan:**

- Friends of the Oxbows
- Armstrong Wetland Society
- Society for the Protection of Kalamalka Lake
- Okanagan River Restoration Initiative
- North Okanagan Parks and Natural Areas Trust
- Southern Interior Land Trust
- Nature Conservancy of Canada
- North Okanagan Naturalists' Club
- Central Okanagan Naturalists Club
- South Okanagan Naturalists Club
- Oliver Osoyoos Naturalists Club

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<sup>10</sup> <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/libraries-publication-catalogues/ecocat>





## WETLANDS: UNDERSTANDING GOVERNANCE

### 2 HOW REGULATIONS, GUIDELINES AND POLICIES APPLY TO WETLANDS

#### 2.1 FEDERAL AND PROVINCIAL REGULATIONS OF WETLANDS

Governance is the framework for jurisdiction, decision making, input and accountability. Wetlands management and protection falls to all levels of government, and successful governance relies on coordination and communication. As wetlands are at the interface of lands and waters, their governance is approached from a variety of directions. This section focuses on how main levels of government and their statutes are related to wetlands and their management.

Currently, wetlands are managed through a variety of statutes administered by provincial ministries, federal departments, municipalities, and conservation groups.

#### INTERNATIONAL LEGISLATION AND AGREEMENTS

The Canadian government is party to several international agreements that are related to wetlands. The agreements also result in provincial government responsibilities. Several key documents are:

- Convention on Biological Diversity (United Nations, 1992)
- North American Waterfowl Management Plan (NAWMP) (1986)
- Britain (Canada) - USA Migratory Birds Convention Act (1916 and 1994)



- Columbia River Treaty (1964)
- RAMSAR Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

### FEDERAL LEGISLATION

Federal statutes are primarily of relevance to the protection of wetlands in the Okanagan with respect to protected areas, species at risk, migratory birds, salmon, and Indigenous Nation reserve lands. The Federal Policy on Wetland Conservation aims to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future. The policy establishes goals, guiding principles and strategies for wetland conservation.

### PROVINCIAL LEGISLATION

The provincial government directly or indirectly controls resource management on much of the provincial land base, and many statutes affect wetland management. The provincial government is responsible for managing water resources including licensing, management, and effluent discharges into water. The Province has primary jurisdiction over wildlife, and under the federal Fisheries Act, the Province has delegated authority to manage non-salmon freshwater fisheries.

The Province also provides Best Management Practices (BMPs) for wetland management in the 2009 publication "Wetland Ways – Interim Guidelines for Wetland Protection and Conservation in British Columbia".<sup>11</sup> The Guidelines contain chapters related to general wetland management, enhancement, and monitoring, and dedicated chapters for wetland management in various sectors, including agriculture, forests, recreation, corridors, and development.

Table 2-1 outlines the applicable legislation that influence and guide wetland conservation in the Okanagan.

## 2.2 AGRICULTURAL LAND RESERVE

Outside of urban and suburban areas, agriculture is the largest land use in the low-elevation parts of the Okanagan Basin. The majority of agricultural lands are located in the Agricultural Land Reserve (ALR) and subject to the *Agricultural Land Commission Act* and its regulations. The ALR is provincially-zoned land where agriculture is the priority use, and approximately one-third of Okanagan wetlands are located within this zone. In the past, alterations of wetlands within the ALR may have been acceptable, although Agricultural Land Commission (ALC) guidelines promoted the use of setbacks from wetlands and other streams. Effective February 2019, fill cannot be placed in ALR and native soil cannot be removed from the ALR under any circumstance without prior authorization. Clearing, draining, and cultivating land remains acceptable if it is for a defined farm business. However, the ALC Act does not supersede the wetland protections contained in the *Water Sustainability Act*.

<sup>11</sup> <https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices>

## HOW FEDERAL AND PROVINCIAL REGULATIONS APPLY TO WETLANDS

| Regulatory Instrument                       | How this applies to Wetlands  |
|---|---|
| Federal                                     |   |
| <b>Species at Risk Act</b>                  | Wetlands are very productive ecosystems that support a high level of biodiversity and habitat for species at risk. The Species at Risk Act aims to conserve biodiversity in Canada, by protecting wildlife species that are threatened, endangered, or of special concern. Critical habitat for these species at risk is identified and protected.  |
| <b>Fisheries Act</b>                        | <i>The Fisheries Act</i> requires that projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans Canada. This applies to wetlands that support fish that are part of or support a commercial, recreational, or Aboriginal fishery.  |
| <b>Migratory Birds Convention Act, 1994</b> | <i>The Migratory Birds Convention Act, 1994</i> protects various species of migratory game birds, migratory insectivorous birds, and migratory non-game birds, including herons, and protects breeding birds and their nests. Wetlands provide habitat for breeding, nesting, feeding, and shelter.   |
| Provincial                                  |   |
| <b>Water Sustainability Act</b>             | Under the <i>Water Sustainability Act</i> , wetlands are included in the definition of a “stream.” Changes within or near a wetland typically require a notification or an approval under Section 11 of the Act. This includes changes to the surrounding land and vegetation, and water flow (including withdrawing water). The Act prohibits placing debris or foreign matter into a wetland without approval.  |
| <b>Riparian Areas Regulation</b>            | The <i>Riparian Areas Regulation</i> applies to commercial, industrial, and residential development. It only applies to wetlands that contain fish or wetlands that are connected with surface flow to a watercourse containing fish. The regulation is usually implemented through zoning bylaws and/or development permit areas in Official Community Plans. For most wetlands, the resulting setback is 15 m to 30 m.  |
| <b>Wildlife Act</b>                         | Wildlife Management Areas, designated under the Wildlife Act, are set aside for the primary purpose of conserving and managing important habitat of regionally or internationally significant wildlife or species at risk. For example, the South Okanagan Wildlife Management Area (SOWMA) is approx. 900 ha. and the Swan Lake Wildlife Management Area is 471.5 ha <sup>12</sup> .<br>The Wildlife Act protects wildlife in BC from human-related harm and disturbance. The Act provides protection for wildlife (such as amphibians and breeding amphibians) and birds and their nests by prohibiting the destruction or disturbance of birds, their eggs, and active nests; as well as raptor nests. |
| <b>Invasive Species Legislation</b>         | There are several pieces of legislation that control invasive species in BC:<br>The Integrated Pest Management Act regulates herbicide applications and operational practices that may be used to control invasive plant infestations (e.g. purple loosestrife in wetlands).<br>The Weed Control Act enables regional districts to manage provincial and regional noxious weeds, which are those invasive plants listed under the Weed Control Regulation.<br>The Local Government Act allows regional districts the right to regulate nuisance invasive plants.  |



## 2.3 BYLAWS, POLICIES AND STRATEGIES

### LOCAL GOVERNMENT BYLAWS SUPPORTING WETLAND CONSERVATION IN THE OKANAGAN

While there are a variety of bylaw tools available to local governments to support wetland conservation, the most widely used is the designation of environmentally sensitive development permit areas outlined in an Official Community Plan. Consistent with the recognized importance of wetland ecosystems, most local governments in the Okanagan have established a development permit area for riparian, aquatic, or sensitive ecosystem protection.

#### OBWB OKANAGAN SUSTAINABLE WATER STRATEGY



The Okanagan Sustainable Water Strategy is designed to build on the 1974 Okanagan Basin Study, which was a joint federal/provincial initiative to develop a strategy for the development and management of water resources in the Okanagan. Recognizing the need for a clear strategy to move forward, the Okanagan Water Stewardship Council released its first sustainable water strategy in 2008 (Action

1.0, OBWB 2008). The purpose of the strategy was to bring together technical information about the Okanagan Basin and highlight the most important water management issues of the time. It has inspired and guided new studies to identify emerging issues and develop scientific insights into potential solutions. The strategy was widely distributed to staff and elected officials at all levels of government, as well as to non-profit organizations and others in the Okanagan and beyond, and it quickly became the 'go-to' document for water issues and priorities in the Okanagan Basin. A great deal has been accomplished over the last decade using the strategy as a guide. In 2019, the strategy is being updated (Action 2.0), and although it is in draft stages at the time of this document production, content from the 2019 draft has been applied to this Action Plan.

A key action item of the strategy is to, "Work cooperatively to protect, restore, and enhance riparian and wetland areas." Ten Guiding Principles provide a framework for the strategy. Encourage active public engagement and learning.

#### CITY OF KELOWNA WETLAND HABITAT MANAGEMENT STRATEGY



The purpose of the Wetland Habitat Management Strategy is to provide the City of Kelowna with a definitive information base for future planning, particularly where urban development could potentially impact on natural wetland areas, and to provide policies that will enhance protection of significant wetland features.

The strategy contains an inventory of Kelowna's wetlands and a description of the criteria used to assess the habitat value of each wetland. Management strategies to be implemented by the City of Kelowna include enhancing development permit guidelines to address the protection of ecosystems and biological diversity, implementing buffer zones around wetlands, and creating and implementing a wetland protection bylaw. The strategy also provides guidelines for landowners, developers, consultants, contractors, and the City of Kelowna to use during planning, design, construction, and review of development permit applications.

## WETLAND STEWARDSHIP PARTNERSHIP OF BC



The Wetland Stewardship Partnership is a group of government and non-government organizations dedicated to the conservation of wetlands and other sensitive ecosystems. Largely guided by the Wetlands Action Plan, which outlines specific objectives, actions, and current conservation initiatives, the partners<sup>13</sup> work collaboratively to maintain, restore and protect wetland ecosystems throughout BC.

Resources produced by the Wetland Stewardship Partnership include:

- Wetlands Action Plan of BC
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in BC
- The Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure
- Wetlands in BC: A Primer for Local Government

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<sup>13</sup> <https://bcwetlands.ca/>







## WETLANDS: ACTIONS FOR IMPROVEMENT

### 3 WETLANDS ACTION PLAN

The goal of this Action Plan is to provide a set of practical actions for wetland conservation in the Okanagan Basin that will help to protect and restore wetland ecosystems, thereby achieving the benefits of the multiple functions that wetlands provide, notably protection of water resources, flood hazard mitigation, and protection of rare and endangered ecosystems and species. The intent of this Action Plan is to provide both local government and communities a common vision and path forward to increase the effectiveness of wetland conservation and restoration initiatives. This Action Plan provides guiding principles, strategic directions and a coordinated framework to guide wetland conservation and restoration initiatives across the Okanagan Basin.

This section describes a **Vision for Action**, **Guiding Principles**, and five **Strategic Directions** with corresponding goals, desired outcomes and tools. When implemented, the five strategic directions will increase **awareness** and **knowledge** about the importance of wetlands, help build effective wetland **policy**, encourage and secure **partnerships**, increase effective **communication** and **cooperation** between government and community, increase **conservation and restoration of wetlands**, and slow the loss of existing wetlands.

#### 3.1 VISION AND GUIDING PRINCIPLES ON WETLANDS

Guiding principles and strategic tools presented in this document support recommendations from the *Wetland Action Plan for British Columbia* (WSP 2010), and the *Interim Guidelines for Wetland Protection and Conservation in British Columbia* (WSP 2009). The guiding principles stem directly from OBWB's *Okanagan Sustainable Water Strategy Action 2.0*. When guiding principles and strategic tools are applied together, they will achieve the **Vision for Action on Wetlands**.

Citizens of the Okanagan - together with respective local, regional and federal governments, organizations and businesses - work cooperatively to eliminate further loss and support wetland protection, governance, stewardship, science, and restoration.

*Draft Okanagan Wetlands Strategy Version 7.0  
(Okanagan Basin Water Board )*

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The strategic tools support the guiding principles by defining clear and achievable goals, actions and outcomes, which can be directly linked back to the guiding principles. Some recommended actions have been adopted from Phase I. The relevant guiding principles to wetlands from OBWB's Okanagan Sustainable Water Strategy Action 2.0 are:

- 1. Respect water.** Water connects and sustains all life. It is our responsibility to protect water and watersheds.
- 2. Think and act as one watershed.** Local decisions will consider water and ecosystem interconnections within a broad, Okanagan-wide watershed context. Collaboration and partnerships across political boundaries are essential for informed and coordinated decision-making.
- 3. Restore aquatic ecosystems.** Natural ecosystems, especially those that are rich in biodiversity, are needed to maintain water quality and quantity. Their protection is also critical for climate change mitigation and adaptation.
- 4. Put water stewardship at the forefront in land-use planning decisions.** Land and water are interconnected. Urban and rural land-use decisions will minimize local and cumulative impacts on water resources and aquatic habitats.
- 5. Collect and share knowledge.** Technology, science, and traditional knowledge (with permission) will be used to inform decisions about water. Data will be integrated and easily accessible. Evidence-based decision-making will be implemented; however, a lack of data will not limit action to protect water.
- 6. Encourage active public engagement and learning.** Transparent and collaborative decision-making and opportunities for information sharing and communication are essential to a collective understanding and acceptance that humans are part of the environment, and our activities affect water.

### 3.2 STRATEGIC DIRECTIONS

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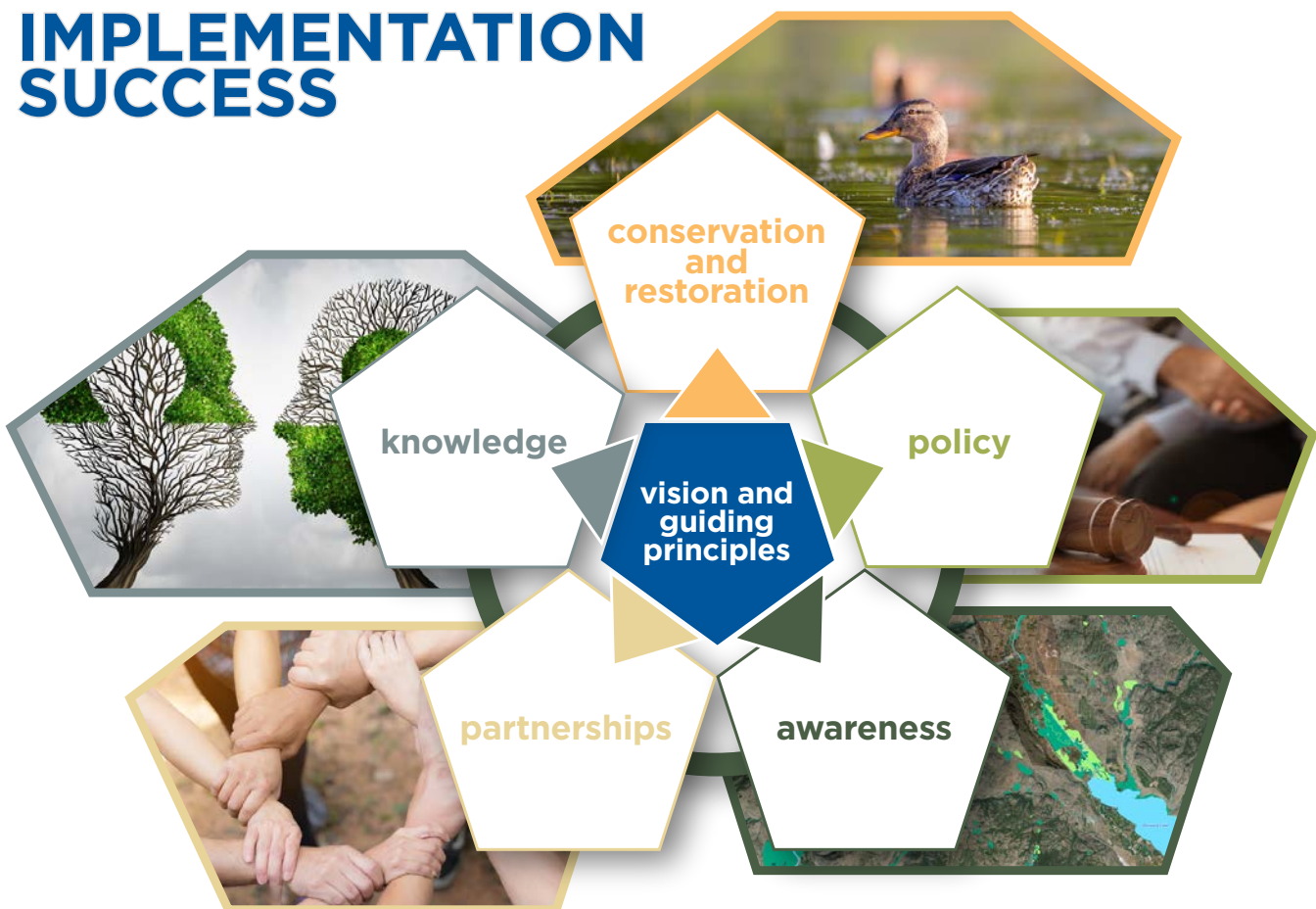
Based on the six guiding principles, strategic tools were developed to be actionable. Figure 3-1 illustrates the framework between the guiding principles and the strategic tools that support the Vision. The strategic tools are as follows.

- 1. Awareness.** Increase awareness and respect for water, wetlands and climate change implications. Wetlands are critical ecosystems that contribute significantly to biodiversity and water quality and quantity in the Okanagan Basin. This direction is directly linked to guiding principles one, three and six.
- 2. Knowledge.** The collection and distribution of knowledge of local wetlands and wetland science will help to focus policy and planning efforts, and aid implementation

of conservation and restoration initiatives. This direction is directly linked to guiding principles five and six.

- 3. **Policy.** Through changes to government policy and land-use planning decisions, we can preserve and protect wetland ecosystems in the Okanagan Basin. This direction is directly linked to guiding principles two, four, five and six.
- 4. **Partnerships.** Maintaining and creating partnerships across communities, political, and regional boundaries are essential for informed and coordinated decision-making that will result in a positive impact on the health, conservation and restoration of wetlands within the Okanagan. This direction is directly linked to guiding principles two, four, five and six.
- 5. **Conservation and Restoration.** Conservation and restoration of wetlands will increase the ecological and human health of the Okanagan Basin, and help maintain our unique biodiversity. This direction is directly linked to guiding principles one, three and four.

Figure 3 1: Strategic Directions



### 3.2.1 STRATEGIC DIRECTION 1 - AWARENESS

Historically, wetlands were considered waste land, unfit for cultivation or land development and a source of mosquitos and possibly disease. For over a century, settlers drained, ditched and filled wetlands to create useable land to produce crops or dry land to develop settlements. Awareness and understanding of why wetland functions are important, how wetlands influence our landscape, and how they improve water quality and quantity in the Okanagan will increase the success of wetland conservation and restoration.

#### GOAL

To increase wetland awareness so the public, government officials, businesses, private land owners, and stakeholders place value on ecological and socio-economic functions of wetlands in the Okanagan Basin.

#### OUTCOME

People and government are inspired and empowered to value and conserve Okanagan wetlands.

#### TOOLS AND ACTIONS TO INCREASE WETLAND AWARENESS [OBWB/WAC]

- Initiate a basin-wide Okanagan Wetland Advisory Committee (WAC) made up of existing groups/committees dedicated to wetland conservation and, stakeholders, NGOs, Indigenous Nations and technical advisors to address identified gaps and drive awareness initiatives.
- Expand, update and promote the existing Okanagan Wetlands website (<http://okanaganwetlands.ca/>).
- Create and provide outreach and practical examples about when and how the Water Sustainability Act applies.
- Compile and evaluate existing resources and community initiatives and community outreach about wetlands and assess gaps.
- Generate easy to use and relevant resources like maps and guidance documents that are accessible to the public, NGOs and local government. Make these resources available on the Okanagan Wetlands website.
- Include relevant links on the website including a database resources and practical tools (e.g. wetland inventory and restoration manuals, guidance on constructed wetlands for stormwater management).
- Help local governments create educational documents for land owners (RDOS Building Resilience Guidebook<sup>14</sup>).
- Communicate Okanagan wetland conservation progress and report regularly to the community via traditional and social media and the wetlands website.
- Work with communities to create, promote, and host educational programs and field trips for youth, including assisting school districts and teachers to incorporate wetlands into their school curriculum.
- Create and post wetland educational signage at high value wetlands sites, working with local government and land owners. Develop a Basin-wide wetland-signage program that builds on successes already in place.

#### TOOLS AND ACTIONS TO INCREASE WETLAND AWARENESS [LOCAL GOVERNMENT]

- Promote conservation and host educational sessions for landowners, emphasizing the farming community and rural landowners.
- Partner with provincial government, universities and colleges, and professional bodies to host wetland workshops for Qualified Professionals in the Okanagan (e.g. biologists, engineers, geoscientists, and agrologists), including education on standardized protocols for wetland identification, delineation, and functional assessment (expanding on Phase I Appendix B Wetland Data Sheet).
- Create and support a culture of conservation with community outreach in key public areas such as parks (e.g. Okanagan Rail Trail) or adjacent to commercial areas.
- Create and encourage volunteer stewardship opportunities through local and national organizations (e.g. Ducks Unlimited) and community initiatives (e.g. Wetlandkeepers).

14 [http://www.rdosmaps.bc.ca/min\\_bylaws/PublicWorks/Building\\_resilience\\_Guidebook/SOREBRDOS.pdf](http://www.rdosmaps.bc.ca/min_bylaws/PublicWorks/Building_resilience_Guidebook/SOREBRDOS.pdf)

## PARTNERSHIPS: LAKE FORESHORE INVENTORY AND MAPPING (FIM) PROJECTS

Two Lake Foreshore Inventory and Mapping (FIM) Projects have been completed in the Okanagan due to partnerships between local government and regional stewardship groups. In 2010, the Kalamalka and Wood Lakes FIM project was a collaborative research project between the Okanagan Collaborative Conservation Program, Regional District North Okanagan, District of Lake Country, District of Coldstream, and Okanagan Basin Water Board. Funded by Community Mapping Network (CMN), Department of Fisheries and Oceans, and Ministry of Environment.

In 2016, Okanagan Lake FIM project was initiated by the Regional District of Central Okanagan and facilitated through a partnership with the Okanagan Collaborative Conservation Program through the support of Environment and Climate Change Canada, the South Okanagan Collaborative Conservation Program, the Okanagan Basin Water Board, and the City of Vernon.

FIM is a method of collecting information on the current state of the foreshore, or shoreline, of a lake, including riparian areas and wetlands. The FIM survey report provides a summary of the condition of the lake shoreline at the time of survey and compares the landscape with earlier data to measure the environmental impacts that have accumulated from lakeshore development over time. FIM can be used by local government resource managers and planners in decision-making processes, to promote and implement better shoreline management through collaborative action, create shoreline management plans, and encourage more support and engagement for education and outreach. Using information from the FIM projects, historical or existing wetlands within the foreshore of these lakes can be identified and protected or restored.

**Source:**

Okanagan Collaborative Conservation Program. *Foreshore Inventory Mapping (FIM) update in Okanagan Lake.* <http://okcp.ca/index.php/projects/current-projects/554-foreshore-inventory-mapping-fim-update-in-okanagan-lake>



Okanagan Lake 2017. Photo credit Associated Environmental.



Kalamalka Lake 2009. Photo credit Associated Environmental.

### 3.2.2 STRATEGIC DIRECTION 2 - KNOWLEDGE

Research and technical studies have been completed in the Okanagan since the 1970s, which have increased our understanding of the importance of wetland function in our landscape. However, gaps remain and additional research is needed to improve, among other things, our understanding of the interaction between wetlands and groundwater, habitat connectivity, the role of buffers, and water quality improvement processes. The role wetlands play in ecosystem services related to climate change, such as flood and drought attenuation, also needs to be better understood.

Monitoring and assessment will determine the success of applied actions within this Action Plan. Lessons learned, and adaptive management will increase the effectiveness of wetland management in the Okanagan.

#### GOAL

To expand our knowledge wetland functions and values and vulnerability in the Okanagan landscape.

#### OUTCOME

Application of this knowledge in land-use decisions by government, stakeholders and land owners to improve wetland conservation, increase source water protection, attenuate flood and drought, and provide important habitat.

#### TOOLS AND ACTIONS TO EXPAND WETLAND KNOWLEDGE [OBWB/WAC]

- Increase understanding of wetland area, function, vulnerability and status by updating and confirming results from the 2014 Phase I Okanagan Wetland Inventory.
- Share the Phase I Okanagan Wetlands Inventory and create a wetland GIS database with local government planners and organizations for wetland conservation and restoration initiatives (see Appendix A for details).
- Work with partners to analyse available updated imagery (LiDAR) to update the wetlands GIS database.
- Work with partners to address GIS data gaps identified in Phase I, provide updated data layers to local government for application in planning, collect additional field data to supplement gaps in the database.
- Work with partners to update and use the BC Wetlands Atlas .
- Work with partners to use information gained in the Okanagan Biodiversity Strategy and apply to wetland mapping.
- Work with partners to update wetland conservation ranking established in the Okanagan Biodiversity Strategy.
- WAC assist partners and local government to create a standardized Okanagan wetland evaluation tool (i.e. **Wetland Evaluation Protocol**, see Section 4.1) to determine what wetlands are **ecologically significant** and map their boundaries (expanding Phase I Wetland Evaluation Template). Protection of important nesting, staging, breeding, and migration habitats for wildlife, such as amphibians, waterfowl, and other wildlife should be included as priorities when determining ecologically significant wetlands. Example evaluation tools and guides can be found at:
  - <https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-planning-strategies/wetlands-in-bc>
  - <https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources>
  - <https://fortress.wa.gov/ecy/publications/summarypages/0506008.html>
- WAC assist partners and all local government to create a standardized protocol for wetland assessment to include wetland identification, delineation, classification and functions and values assessment (Wetland Evaluation Protocol, listed in Awareness). This standardized protocol will ensure consistency amongst wetland science practitioners and ensure proper wetland identification occurs early in project planning. Wetlands have surface and groundwater connections to drinking water supplies and inadequate identification or project planning could have catastrophic results.

#### TOOLS AND ACTIONS TO EXPAND WETLAND KNOWLEDGE [OBWB/WAC]

- Fund and encourage research into the role that wetlands (e.g., existing, restored and constructed stormwater) can play in improving water quality and managing water quantity.
- Fund and encourage research to address existing knowledge gaps in wetland function and how they interact with the landscape and climate change (e.g., changes to hydrologic function, flood and drought attenuation, ground water recharge and discharge).
- Complete updates to the existing Sensitive Ecosystem Inventory studies completed in the Okanagan, fill data gaps, include wetland surveys.

- Monitor existing wetland conservation/restoration projects including wetland function and total area and share lessons learned and adaptive management strategies.
- Apply monitoring results to targets and evaluate the success of the Okanagan Wetlands Strategy and the actions outlined in this document.
- Use reference wetlands from Phase I to undertake detailed assessment, long term monitoring, and restoration activities, as applicable.

- Support Indigenous Nations communities in managing important wildlife species and collecting local and traditional ecological knowledge related to wetlands.
- Evaluate effectiveness of wetland conservation and restoration annually basin-wide.
- Train bylaw officers to identify wetlands using the Okanagan wetland evaluation protocol.
- Advocate for the development of a BC Wetland Policy and support development by sharing wetlands knowledge gained in the Okanagan.

## WETLAND STORIES

### MISSION CREEK: SENSITIVE HABITAT INVENTORY AND MAPPING

The Okanagan Collaborative Conservation Program (OCCP) completed the Sensitive Habitat Inventory and Mapping (SHIM) of Mission Creek. This project was facilitated through a collaboration between the OCCP, Regional District of Central Okanagan, Okanagan Basin Water Board, and the City of Kelowna. The mapping information included GPS and photo survey data for fish spawning areas, wetlands, features and attributes such as retaining walls, bridges, culverts, side channels, tributaries, points of erosion, agricultural runoff, wildlife trees, and fish presence. Mapping was completed in spring 2017 prior to the 2017 flooding, which made this a valuable tool in assessing the changes that have occurred because of the flooding.

Mission Creek provides critical habitat and corridors for fish and wildlife, such as spawning, rearing and overwintering and feeding habitats. SHIM will be used by community planners, environmental organizations, and government agencies to guide management and land use decisions for habitat restoration projects and assist in the design of floodplain management plans.

Source:

Okanagan Collaborative Conservation Program. Mission Creek: Sensitive Habitat Inventory and Mapping. <http://okcp.ca/index.php/projects/current-projects/649-kalamalka-and-wood-lake-boat-impact-study-2>



## CITY OF KELOWNA WETLAND MANAGEMENT AND INVENTORIES:

The City of Kelowna created the Wetland Habitat Management Strategy in 1998. The strategy was developed to provide the City with an information base for future planning in areas where urban development could impact natural wetland areas, and to provide policies that will enhance protection of significant wetland features. In 2001, the Sensitive Ecosystem Inventory completed within the RDCO reported that wetlands were severely impacted. In 2009 and 2011, the City conducted a Wetland Inventory, Classification, Evaluation, and Mapping (WIM) project, which identified over 300 wetlands in the city. The project resulted in a comprehensive inventory of wetland communities

for improving integrated resource management and planning. The City has incorporated information about why wetlands are important into their Official Community Plans. The WIM information was used identify and create Environmentally Sensitive Development Permit Areas, and bylaws protecting wetlands from development. The City has also created parks to protect wetlands and initiated restoration projects to benefit wildlife species ( i.e. painted turtle habitat at Chinchester Wetland Park).

*Sources:*

*Wetland Habitat Management Strategy, November 1998*  
*Okanagan Wetlands Strategy: Phase 1. May 2014*

*Photo credit: Associated Environmental*





### 3.2.3 STRATEGIC DIRECTION 3 - POLICY

Effective wetland conservation and management relies on front-line implementation at the local government level, because municipalities have primary responsibility for land use under the Community Charter and the Local Government Act. Through the Community Charter, local governments share responsibility for protection of the natural environment, including wetlands. Municipalities therefore have the authority develop Official Community Plans (OCPs) and bylaws that can protect wetland ecosystems within their jurisdictions. However, OCPs and bylaws are tools that best flow from establishment of an overall wetland policy developed with public and stakeholder input. Good wetland policy also informs other local government responsibilities including water supply, parks and recreation, wastewater treatment, stormwater management, flood risk management, and urban design. A key purpose of wetland policy is to promote sound land use decisions and establish a framework for mitigation (avoidance, minimization, and compensation) because loss of wetland functions and values on the landscape will have economic and environmental impacts. Governments can evaluate wetlands as a natural asset and include wetland function in their asset evaluation process. Furthermore, local government elected officials and staff are most familiar with the ecosystem services that wetlands provide such as flood and drought risk reduction, water quality improvement, and aesthetics, and are well-qualified to develop the approach that will work best in their communities. Ideally, a consistent approach to wetlands would be implemented throughout Okanagan to optimize fairness for the landowners who may be affected by policies, plan and bylaws that protect wetlands.

#### GOAL

To sustain and enhance wetland ecological and socio-economic functions, municipal and regional governments in the Okanagan Basin will create, integrate or improve their framework for wetland conservation, mitigation (avoidance, minimization, and compensation) and restoration into land-use development and environmental policy, management practices, and bylaws.

#### OUTCOME

Creation/improvement and implementation of wetland management policies and practices by all local governments and regional districts of the Okanagan.

#### TOOLS AND ACTIONS TO INTEGRATE WETLAND POLICY [OBWB/AWC]

- Initiate the formation of a basin-wide Okanagan Wetland Advisory Committee (WAC) made up of stakeholders and technical advisors to provide continuity through the process.
- Support local and regional governments in wetland policy development, providing strategic advice and scientific direction to encourage basin-wide participation in wetland conservation. Scientific direction should include establishment of consistent methods for wetland inventory, evaluation, delineation, and functional assessment (expand and implement recommendations from Phase I).
- Promote the goal that all local governments will have wetland policies with consistent general goals (i.e. awareness, conservation, protection, and restoration), terminology, and implementation measures.
- OBWB/WAC and local government engage the general public, Indigenous Nations, and stakeholders when developing or revising local wetland policies, including but not limited to conservation groups, the development industry, and senior government scientists.

#### TOOLS AND ACTIONS TO INTEGRATE WETLAND POLICY [LOCAL GOVERNMENT]

- Policies incorporate and use existing strategies and toolkits such as the Green Bylaws Toolkit, Wetlands Action Plan for BC, Wetlands Mitigation Policy, the Okanagan Biodiversity Strategy, and the Okanagan Sustainable Water Strategy where applicable to wetlands.
- Local government policy considerations of the requirements of the Water Sustainability Act and Regulations with respect to wetlands, notably that wetlands are provided that same protection as streams under the Act.

- Utilize and improve the wetland evaluation protocol from Phase I, and establish a wetland delineation method to improve bylaw mapping and bylaw development. Utilize Phase I mapping that identified wetlands not protected by current bylaws, or are outside designated development permit areas.
- Local Government update and evaluate the effectiveness of their planning strategies and bylaws on wetland protection and include wetlands among the natural features that are defined as environmental Development Permit Areas (DPAs) and within high value Environmental Management Areas. Consider restricting the ability to obtain variances that would adversely affect wetland area and function.
- Continue to promote the use of Sensitive Ecosystem Inventory mapping in bylaws and planning documents.
- Promote use and refinement of wetland protection bylaws to enable enforcement. OBWB assist local governments to develop effective bylaws that establish similar standards throughout the Okanagan Basin.
- Implement a wetland environmental assessment process that would be required for wetland DP applications (or development on or near wetlands if wetland DPAs have not been established).
- Consider wetland DP applications based on this hierarchical order: 1) Protect - retain area and functions of existing wetlands, 2) Mitigate - minimize any further damage to wetlands, and 3) Replace the wetland area and re-establish function, preferably in nearby areas.
- Incorporate No Net Loss mandate and develop compensatory mitigation requirements for wetlands that are disturbed or degraded.
- Consider compliance enforcement actions if wetlands are damaged by development.
- Encourage the use of constructed wetlands for stormwater management.
- Encourage the development of Integrated Stormwater Management Plans in the Okanagan to include provisions to ensure protection of natural wetlands and to incorporate constructed wetlands into the stormwater retention and treatment system.
- Consider wetland conservation and restoration as components of flood/drought risk management plans and climate change adaptation and mitigation strategies.
- Complete a Natural Asset evaluation, and recognize wetland function as a valuable asset that increases water quality from stormwater runoff, and attenuates surface flows. The Municipal Natural Assets Initiative is a resource for government, they offer tools to incorporate key ecosystems (wetlands) and resources into planning.
- Incorporate wetland conservation into parkland planning policy and when setting priorities for park land acquisition plans and separate recreation areas from sensitive wetland areas within parks.
- Target land acquisition for mapped high value wetlands and use conservation covenants to prevent future loss of high value wetlands.
- Consider the use of financial, property tax, local conservation fund, or other incentives to promote wetland conservation.
- Develop consistent and clear management objectives across the entire region with similar rules and requirements to private landowners (e.g., DP areas and setback requirements).
- Clear language should be used for local government documents to guide and inform developers, land managers, planners, and environmental consultants to ensure there is a common understanding of what is expected and required in terms of wetland conservation, development limitations, development permit requirements, compensation or restoration requirements, and wetland/sensitive area buffer establishment.



Photo credit: Associated Environmental

## OKANAGAN BIODIVERSITY STRATEGY

In 2014, the Okanagan Collaborative Conservation Program (OCCP) and South Okanagan Similkameen Conservation Program (SOSCP) created a Biodiversity Conservation Strategy for the Okanagan Region (the Strategy). The strategy is an environmental policy framework that identifies priorities for identifying, preserving and restoring important natural areas. The strategy identified key areas for protection/action by evaluating analysis included four components: conservation ranking of ecosystems, assessment of relative biodiversity (or locations of 'hotspot' priorities for conservation), identification of connections between natural areas (to support animal movement), and assessment of land ownership (to help identify tools for conservation). Wetlands were identified within this strategy as high value priority areas for conservation, protection and restoration.

The OCCP, SOSCP and their partners are committed to implementing and monitoring the success of the strategy. High-priority tasks identified in the Biodiversity Strategy align very closely and overlap with guiding principles and

strategic tools outlined in Sections 3.0 and 4.0 Wetlands Toolkit Guide. Given this overlap, future implementation of the Biodiversity Strategy and the Okanagan Wetlands Strategy could benefit from a coordinated effort. Biodiversity Strategy high-priority actions and their relation to the Wetlands Action Plan include:

**Knowledge:** Engage the community including targeted outreach and education and disseminating decision support tools.

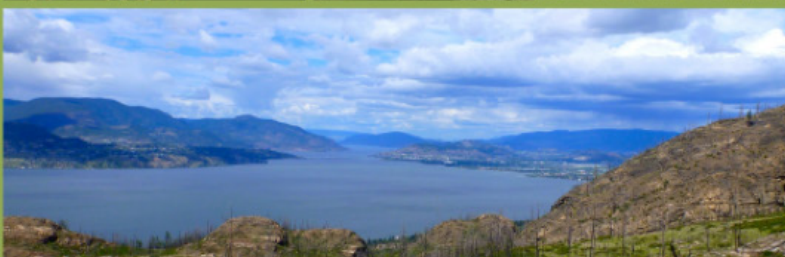
**Policy:** Adopt a governance structure for implementation Okanagan Basin wide.

**Partnerships:** Coordination across the Okanagan region for land-use planning and management initiatives.

**Steps Forward:** Create an Action or Implementation Plan and measure, evaluate and report success.

**Source:**

Okanagan Collaborative Conservation Program and South Okanagan Similkameen Conservation Program. 2014. A Biodiversity Conservation Strategy for the Okanagan Region. <http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=42389>.



### A Biodiversity Conservation Strategy for the Okanagan Region

(including parts of the Shuswap, North/Central/South Okanagan and Similkameen Valleys)

Okanagan Collaborative Conservation Program  
South Okanagan Similkameen Conservation Program

### 3.2.4 STRATEGIC DIRECTION 4 - PARTNERSHIPS

Within the Okanagan, many organizations, including Indigenous Nations and local governments, are dedicated to the conservation and restoration of critical ecosystems, including wetland habitat. Despite these efforts, which have slowed wetland degradation, the Okanagan is still losing wetlands. A coordinated approach among these groups is key, and integration and cooperation to create lasting partnerships is encouraged. Working together, with a better understanding of roles and responsibilities, improved communication and collaboration will improve the effectiveness of wetland conservation.

#### GOAL

Establish new and enhance existing partnerships to increase collaboration to conserve and restore of wetlands in the Okanagan.

#### OUTCOME

Increased collaboration among communities, people, Indigenous Nations, stakeholder organizations and all levels of government has led to demonstrable progress in achieving no net loss of wetlands.

#### TOOLS AND ACTIONS TO BUILD WETLAND PARTNERSHIPS [OBWB/AWC]

- Initiate a basin-wide Wetland Advisory Committee (WAC) made up of Indigenous Nations, stakeholders and technical advisors to provide continuity and accountability for wetland conservation efforts, and to work with local government to apply actions recommended in this Action Plan.
- Partners help to secure funding and hire an Executive Director, potentially under the OBWB, to manage the Wetland Advisory Committee (WAC) to coordinate, plan, report and measure wetland restoration and conservation efforts Basin wide.
- WAC Work with or be a direct part of existing local advisory committees and councils to achieve common goals (e.g. Source Water Protection Advisory Committee, Okanagan Water Stewardship Council).
- WAC coordinate and clarify roles and responsibilities related to basin-wide wetland conservation efforts among the existing OBWB, OCCP, SOSCP and the OSS partnerships. When complete, establish a governance framework to achieve common goals and improve collaboration.
- WAC coordinate grant funding applications within the partnerships and use the Okanagan Sustainable Water Strategy, the Okanagan Biodiversity Strategy, the Okanagan Wetlands Strategy (including the Constructed Wetlands for Stormwater Management Guidebook and this Wetlands Action Plan) as backing for grant applications.

#### TOOLS AND ACTIONS TO BUILD WETLAND PARTNERSHIPS [LOCAL GOVERNMENT]

- Work with the Canadian and US governments such as the Canadian Intermountain Joint Venture: BC Wetlands Trends Project, and Environment and Climate Change Canada to secure funding and coordinate wetland initiatives
- Local government and WAC cooperate with ongoing BC conservation initiatives (Living Water Smart, Biodiversity BC, the BC Climate Action Plan, and the BC Conservation Framework.)
- Involve BC government and industrial organizations in partnerships that have an active role in shaping our landscape (e.g. BC Ministry of Transportation and Infrastructure, Agricultural Land Commission, Real Estate Foundation of BC, Real Estate Board, Urban Development Institute, and BC Hydro).
- Encourage Indigenous Nations and citizen involvement and investment in local partnerships to develop local ownership of wetlands and wetland initiatives.
- Encourage inter-departmental partnerships in local government to facilitate collaboration for green infrastructure and stormwater wetland planning.
- All partners establish clearer roles and responsibilities among federal, provincial and local government to support wetland initiatives including collaboration on permitting applications (streamline permitting for wetland projects).
- Through partnerships, create funding opportunities (i.e. Conservation Funds).
- Work with agencies responsible for Crown land management to help ensure that wetlands are high priority for protection (e.g. in Forest Stewardship Plans).

## OKANAGAN WETLANDS STRATEGY PHASE II

As part of the directive of the OBWB Okanagan Wetlands Strategy Phase II, the OBWB has undertaken many wetland protection and restoration projects, in collaboration with other organizations. This is a brief overview of the wetland projects completed in 2015 and 2016. These projects required regulatory approvals and environmental management planning to reduce potential impacts on the surrounding environment. Constructing these wetlands required professional knowledge and the guidance of experienced project managers and operators, refer to Section 1.6 and 2.0 in the Action Plan to learn.

### McLachlan Lake Fencing Project

McLachlan Lake is a 2.4-hectare mid-elevation slough located at the north end of the Garnet Valley watershed, near Peachland. It had been degraded by livestock and ATV abuse. Volunteers erected a fence around the perimeter of McLachlan Lake.



McLachlan Lake prior to fencing



Fence installation

### Osoyoos Oxbows Russian Olive Control Project

The Osoyoos Oxbows comprise a combination of cutoff oxbow ponds, marshland and mesic upland. It is an important area for waterfowl, amphibians and turtles. The marshlands and uplands had become infested with the invasive Russian olive tree (*Eleagnus angustifolia*). Workers under the supervision of OBWB treated several hundred individual stems using a 'cut and paint' method, which involved cutting the tree right at the base and then immediately applying herbicide paste to the cut stem, to prevent this vigorously rhizomatous species from re-sprouting. Application of herbicide is appropriate only in particular situations, it must follow applicable regulations, environmental setbacks and be applied by certified pesticide applicators.



Painting concentrated herbicide on cut stem



Cutting Russian olive using a brush saw

### Lakers Park Planting and Signage Project

A low-lying area with scattered wetlands forms part of Lakers Park in Vernon. The City of Vernon developed the dryland portions of the area into a low-impact frisbee golf course. The OBWB helped to design interpretative signage that describes the species at risk inhabiting the wetlands, and purchased native plants for installation along the perimeter of the riparian areas.



Native shrub planting adjacent to a wetland. Landscape fabric controls aggressive quackgrass. Frisbee golf course is to the right which may be removed once native vegetation is established.

### Turtle Basking Logs Project

Western Painted Turtle (*Chrysemis picta*) is a provincially endangered species, found only in ponds and slow-moving waterways in southern British Columbia. Turtles have a metabolic requirement to bask for several hours per day, but the absence of coarse woody debris in basking sites is often limiting. The OBWB installed basking logs in seven wetland locations in the Okanagan, where turtles had been previously observed. Turtles were observed at one basking site less than a week after installation of the logs.

Basking log with turtles, five days after installation



Source: OBWB. Okanagan Wetlands Strategy Phase II report. April 2017

### 3.2.5 STRATEGIC DIRECTION 5 - CONSERVATION AND RESTORATION

Wetlands are one of the most important and impacted ecosystems within the Okanagan. Further loss of these ecosystems will lead to unacceptable effects on biodiversity and potentially translate to significant adverse effects on our communities when faced with climate change, water supply issues, and during flood and drought events. The Okanagan Basin is unique, and water is essential to the survival of plants and animals, the well-being of residents and visitors, the health of the economy, and the beauty of the natural landscapes.

Large lakes can give the illusion of water abundance; however, the Okanagan is one of the most water-stressed regions in Canada. With a semi-arid climate, the lowest average annual precipitation in southern Canada, high evaporation rates, hotter summers and milder winters, the Basin's growing population and the effects of climate change place more and more pressure on water quality and supply. Wetland conservation and restoration initiatives will ensure access to clean and available water for future generations.

#### GOAL

To identify high value wetlands and areas where wetland loss has been high and/or has resulted in significant impacts and conserve/restore these areas.

#### OUTCOME

Decrease direct and indirect impacts on wetland area and function, conserve and restore high value wetlands, and increase restoration of wetland area in the Okanagan.

#### TOOLS AND ACTIONS TO BUILD WETLAND CONSERVATION AND RESTORATION [OBWB/AWC]

- Develop an Implementation Plan for basin-wide wetland restoration within the OBWB Okanagan Wetlands Strategy by applying the recommendations from Phase I, based on mapped high priority areas for conservation and restoration.
- Secure funding for the restoration plan and work with partners to implement wetland initiatives.
- Work with groups like the Nature Conservancy of Canada (B.C.) to identify opportunities to acquire high-value wetlands for long-term protection.
- Identify opportunities and support volunteer stewardship from residents Indigenous Nations, and community groups.
- WAC develop an Implementation Plan for basin-wide wetland restoration within the OBWB Okanagan Wetlands Strategy by applying the recommendations from Phase I, based on mapped high priority areas for conservation and restoration.
- WAC secure funding for the restoration plan and work with partners to implement wetland initiatives.

#### TOOLS AND ACTIONS TO BUILD WETLAND CONSERVATION AND RESTORATION [LOCAL GOVERNMENT]

- Protect and install green infrastructure and stormwater wetlands. Integrate these approaches into land-use, parks, and restoration planning. Use planning documents for funding applications.
- Protect and preserve natural wetland processes to maintain wetland functions. Maintain beaver activity, flooding, seasonal drawdown, and groundwater recharge and discharge.
- Restrict the use of pesticides and fertilizers in or near wetlands.
- Prevent the direct release of stormwater and other untreated sources of pollution to natural wetlands.
- Encourage the use of constructed wetlands for treatment prior to discharge to natural wetlands.
- Use the standardized wetland evaluation protocol and wetland delineation and wetland assessment method to establish protection/conservation areas around ecologically significant wetland ecosystems in the Okanagan.
- Prioritize the restoration of high value wetland areas identified as historically ecologically significant.
- Use provincial and local government area-based conservation tools (i.e. parks, ecological reserves, management areas) to protect wetlands.

## OKANAGAN SIMILKAMEEN STEWARDSHIP – LANDOWNER WETLAND PROJECTS

Okanagan Similkameen Stewardship (OSS) works cooperatively with landowners to support them in protecting, restoring and enhancing wildlife habitat their properties. OSS works with over 100 landowners throughout the Okanagan and Similkameen Valleys. Three of their restoration projects are summarized below.

### **Radies Wetland, Vernon**

The Radies, the BC Wildlife Federation’s Wetlands Institute and OSS worked together to convert a wide, weed-infested ditch (i.e. common comfrey) on the Radies’ property into an ephemeral wetland to create habitat for birds, amphibians and other wildlife. Upstream this wetland connects to a wetland complex and a small spring called Hog’s Gulch which has been altered and ditched through an agricultural hay field. Western Painted turtles (*Chrysemys picta*) and Great Blue-herons (*Ardea herodias herodias*) have been sighted upstream of the wetland by neighbourhood residents.

Wetland restoration included scraping back the topsoil and creating a compressed clay liner out of clay that was present onsite (a “bioliner”). Once the bioliner was built

topsoil was applied, nearly 700 native trees and shrubs were planted, including local transplanted sedges salvaged from the site during excavation and replaced at the new high-water mark once work was complete. Native riparian grass seed was mixed with fall rye (25lbs) for the establishment of a quick rooting cover to reduce erosion of exposed topsoil into the wetland.

The fall rye established very well and grew to a height of 3 to 4 feet by the following spring. The tall rye grass competed with the planted native trees and shrubs for light and nutrients. Additionally, fall rye seed supported a bountiful vole population which browsed on the native plants the following winter.

Four years after construction, OSS planted an additional 430 native trees and shrubs and installed vole guards in order to better protect plantings. Weed management is ongoing, common comfrey is particularly problematic. The latest attempt to eradicate the comfrey involved cutting it off at ground level and covering it with weed barrier fabric for at least one growing season. Once the comfrey is dead additional native plants and grass seed will be planted.



*The ditch prior to construction*



*The constructed clay liner*



*The wetland following planting*



*The completed wetland*

## OKANAGAN SIMILKAMEEN STEWARDSHIP – LANDOWNER WETLAND PROJECTS (CONTINUED)

### Casa del Mell Wetland, Osoyoos

Ken and Mellhina Thibault worked with OSS to restore valuable stream and wetland habitat on their property to provide habitat for amphibians. The existing wetland area on the property was filled with garbage and pruning waste, did not hold surface water, and supported few native plants.

Together OSS and the Thibault's cleaned up the refuse out of the depression, re-dug a small pond, and restored native wetland vegetation. Unfortunately, the pond area did not hold surface water for long enough to allow Great basin spadefoots to breed. A few years later an artificial liner was added to the pond and spadefoots were found using the wetland within a day of it being filled. Sandbar willow and cattails have colonized the site, providing shade for many riparian bird species who in turn help to keep the mosquito numbers down. This small pond project illustrates that open water habitats and riparian ecosystems, where as much as 85% of these habitats have been lost in the Okanagan, have very high value, and species will colonize and use these habitats within days of being created.



Spreading cattail seeds



Great Basin spadefoot

### Bullock Wetland, Kelowna

Arion Therapeutic Farm realized that the creek running through their property needed a little help as it didn't have many native plants and some of the livestock had access to the creek. The landowners and OSS partnered to fence the riparian area. Alternate water sources were made available for the llamas, horses and goats so that they no longer needed to access to the creek for drinking water. Over 150 native trees and shrubs were added to the riparian area with the help of volunteers from the community.

After fencing the riparian area, there were no longer grazers to help keep the weeds down so invasive plant management has become an important part of this project and will need to be continued for the next few years until the native plants are large enough to compete with the weeds.



Source: Okanagan Similkameen Stewardship Projects. <https://www.osstewardship.ca/projects>



## PARTNERSHIP AND STEWARDSHIP SUCCESS: SWAN LAKE NATURE RESERVE

Swan Lake Nature Reserve is a 122.7-acre property, split in 2, part is owned by the Regional District of North Okanagan (RDNO) and the second by Ducks Unlimited Canada. The reserve contains forested, riparian, and wetland areas with high biodiversity, the mouth of BX Creek, and a section of foreshore along Swan Lake. This reserve has conservation, education (e.g., interpretative signage) and recreation (e.g., bird watching, trail walking) values. Provincial government and many organizations partnered together to purchase and manage this property. Without a coordinated effort this property purchase would not have been a reality. Partners include: North Okanagan Naturalists' Club (NONC), Bishop Wild Bird Trust, Ministry of Environment and Nature Trust of BC.

Ducks Unlimited Canada manages and operates the reserve, and the RDNO is responsible for maintaining the reserve. In 2011, RDNO prepared a master plan and restoration design. The North Okanagan Naturalists' Club are the stewards and participate in wildlife inventory, wetland construction, native vegetation restoration, weed control, and other stewardship initiatives.

In 2017, Ducks Unlimited Canada was contracted to compensate for 2,500 m<sup>2</sup> of wetland at a 3 to 1 ratio for the Ministry of Transportation to fill in a wetland for the Stickle Road extension. In 2018, Ducks Unlimited constructed one wetland within an agricultural field within the reserve, as well as restored sections of the BX Creek channel that experienced negative impacts from flooding in previous years. Partnership between Ministry of Transportation, Ducks Unlimited, RDNO, NONC and the other partners enabled the completion of this new compensation wetland which will replace habitat lost for wildlife and fish species residing in BX Creek and Swan Lake.

**Source:**

*Swan Lake Nature Reserve Park Master Plan, RDNO March 2011*  
*Ducks Unlimited Canada 2017. [https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/okanagan-valley-corridor/stickle/duc\\_swan\\_lake\\_revised\\_design\\_20170801.pdf](https://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/okanagan-valley-corridor/stickle/duc_swan_lake_revised_design_20170801.pdf)*

Photos credit: The North Okanagan Naturalists' Club. <http://www.nonc.ca/styled-4/index.html>







## WETLANDS: ACTIONS FOR IMPROVEMENT

### 4 WHERE WE GO FROM HERE

#### 4.1 HOW TO IMPLEMENT THE STRATEGIC TOOLS FOR ACTION

Application of the strategic directions for action will need to start with the creation of an Okanagan Wetlands Strategy Implementation Plan. This first Implementation Plan will have a 5-year timespan, with the intent of updating the plan every 5 years. Monitoring and reporting should be part of this Implementation Plan, including updating the list of actions to be completed in the targeted time. The Vision for Action on Wetlands should be at the forefront of the Implementation Plan, including a no-net-loss target and the guiding principles and framework outlined in this Action Plan. To achieve the best success, an annual review should be completed and adjustments to actions should be applied as the plan evolves.

The key actions to achieve the Vision for Action on Wetlands are described below, working within the guiding principles and strategic directions outlined in Sections 3.1 and 3.2. The OBWB, based on its current mandate, will be the coordinating partner in initiating this work. Success will be achieved through the coordinated efforts of the OBWB, partners, local governments, Indigenous Nations, local stakeholder organizations, and communities. Four key actions and related sub-actions from Section 3.0 are summarized below.



### **KEY ACTION 1: ESTABLISH PARTNERSHIPS BY CREATING A WETLAND STRATEGY ADVISORY COMMITTEE TO SERVE AS THE “ACTION TEAM”:**

- OBWB and partners help to secure funding and hire an Executive Director to run the Wetland Advisory Committee (WAC) to coordinate, plan, report and measure wetland restoration and conservation efforts Basin wide.
- Establish partnerships by including Indigenous Nations, local government, stakeholders and technical advisors in the committee to provide continuity and accountability for wetland conservation efforts, and apply actions recommended in this Action Plan.
- Secure funding for the Implementation Plan and work with the partners.

### **KEY ACTION 2: DESIGN THE IMPLEMENTATION PLAN**

- Design the Implementation Plan from the information presented in this Action Plan, build the Strategic Direction tools and actions, and applicable protocols and evaluation methods, update every 5 years.
- WAC to lead the design the Implementation Plan to meet the goals of the OBWB Okanagan Wetlands Strategy.
- WAC work with additional partners to identify priority actions from this Action Plan and establish the outline of the Implementation Plan.
- WAC include trend monitoring in the Implementation Plan. For example, increase the accuracy of the Phase I wetland inventory and repeat it at a regular intervals to gain an understanding of wetland loss over time. Trends monitoring could ensure that information is collected on recent and historical changes in wetland type and acreage.
- Local government and communities incorporate wetland awareness and education initiatives.
- Local government use wetlands inventory data from Phase I to identify several ecologically significant wetlands incorporating values of the Syilx People.
- Local government, communities and with the assistance of the Syilx People, use, interpret and apply wetland information and knowledge from the Okanagan Nation Alliance: Okanagan Wetlands Strategy document.
- Local government and WAC set priorities and targets (Section 4.2) for restoration/conservation based on wetland inventory information.
- Local government and WAC initiate grant applications and secure funding for action based on identified priorities.
- Local government and WAC create the monitoring program to assess progress and success.

### **KEY ACTION 3**

#### **Create a standardized Okanagan Wetland Evaluation Protocol**

- OBWB will support the development of an Okanagan Wetland Evaluation Protocol, utilizing previous work (Phase I: Wetland Evaluation Template) and current wetland science under the WAC and their partners. This protocol will be designed to systematically identify and evaluate wetlands (wetland function and values assessment) to prioritize action in the Implementation Plan and help guide policy (prioritize wetlands to be conserved, outline wetland replacement ratios, define buffer widths).
- These evaluation protocol assessments will help to differentiate among wetlands based on their sensitivity to disturbance, their significance, their rarity, their ability to be replaced, and the functions they provide.

- The following components should be included in the standardized evaluation protocol:
  - **Ecological Component**  
Wetland classification, delineation of wetland boundaries, , presence of invasive species, and description of wetland vegetation and associated riparian and upland vegetation communities.
  - **Social Component**  
Measure direct human uses of the wetland, such as Indigenous cultural values, recreational activities, educational activity, and proximity to communities.
  - **Hydrological Component**  
Characterize catchment area, natural storage capacity, connectivity to waterbodies, protection against erosion, contribution to groundwater recharge, and water quality.
  - **Biodiversity Component**  
Assess the ecological value of the wetland by incorporating the Okanagan Biodiversity Strategy, Okanagan Connectivity, and Sensitive Ecosystems Inventory mapping information. Determine potential presence of species at risk, rarity of the feature in a micro-landscape context, habitat quality, presence of fish, and quality of adjacent habitat.

#### KEY ACTION 4: DEVELOP THE CAPACITY OF LOCAL COMMUNITIES FOR FRONT-LINE ACTION

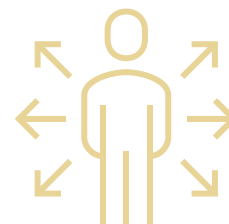
- OBWB will share the updated Okanagan Wetlands Inventory and GIS data with local government planning and engineering staff, and with local conservation organizations.
- OBWB will work with the WAC and local government to build community awareness through the Okanagan Wetlands Strategy website and provide easy access to resources for local governments including “Green” bylaw development toolkits, information on funding opportunities, educational resources, wetland creation/ restoration design manuals, and scientific studies.
- WAC will engage with local governments and community partners during development of the first Okanagan Basin-wide wetlands strategy implementation plan. Engagement will be focussed on sharing of experiences (both successes and challenges) and in determining what local agencies need from OBWB and senior government in order to move forward on their wetland conservation initiatives.
- Local government and WAC will reach out to volunteer stewardship organizations already active in wetland conservation and identify opportunities.

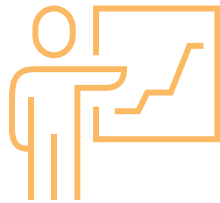
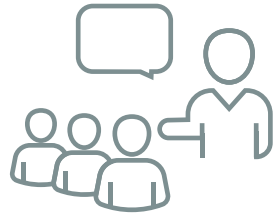
## 4.2 HOW TO MEASURE SUCCESS

To monitor and measure the success of the Okanagan Wetlands Strategy, two overarching targets are as below:

- 1) By 2025, achieve no net loss of total wetland area, computed as the average of the preceding five years.
- 2) By 2030, achieve a net gain in wetland area within areas rated as high value for biodiversity and habitat connectivity within low-elevation zones of the Okanagan Basin.

These targets are intended in areas that have experienced the most loss, in the developed low-elevation areas, and in highly developed agricultural land. Many





organizations are already tracking restoration efforts within the Okanagan Valley (OSS, SOSCP, OCCP). A coordinated formal effort to monitor, assess, track and report wetland successes, and the success of applying actions in this Action Plan as part of the Okanagan Wetlands Strategy is needed.

Baseline data for these targets have been established from the OBWB Okanagan Wetlands Strategy Phase I Wetlands Inventory report (Patterson et. al 2014) and the Biodiversity Conservation Strategy for the Okanagan Region (OCCP and SOSCP 2014). In 2018, the Province obtained LiDAR imagery of the Okanagan Valley, which could be added to the current GIS wetland database and analysed to further identify wetlands to supplement the available baseline data.

Monitoring and assessment must be completed in a standardized manner to be able to effectively measure success of these two broad targets. Total area, function, condition, type, and value of each wetland will need to be recorded. An effective tracking database should be created to collate all data in one central location. Application of the standardized wetland evaluation protocol and targeting wetlands identified as significant should take priority. Long-term monitoring (i.e., measuring wetland function over time) will determine the success of restoration efforts and ensure the success for future initiatives. Results from long term monitoring will inform the effectiveness of the Okanagan Wetlands Strategy and determine whether the Vision is achieved. Indications from monitoring can help inform the Implementation Plan and update the actions within this Action Plan.

#### 4.3 INTERESTED IN LEARNING MORE?

Appendices A and B include supplemental information about wetlands, conservation, governance, regulations, and many more details relating to the topics discussed in this Action Plan. The OBWB Okanagan Wetlands Strategy <https://www.obwb.ca/wetlands/> website will be updated regularly as new information becomes publicly available and will also post any news and reporting associated with application of the Strategic Directions and Actions included within this document. Workshops and training sessions for local government and community members may occur as part of the next phase of the Okanagan Wetlands Strategy.



## 5 FINAL THOUGHTS

The OBWB is committed to wetland conservation and the Okanagan Wetlands Strategy. Continued action is required to secure the many beneficial functions of Okanagan wetlands for the future. Partnerships with local organizations and government will be critical to the success of the Okanagan Wetlands Strategy. Many initiatives and programs have been completed or are currently ongoing, and continued coordination and collaboration on these initiatives will help optimize resources and maximize results.

OBWB acknowledges all the hard work completed by communities and local governments within the Okanagan to date on wetland conservation and research and encourage everyone to work together to on this important issue, so the community can continue to benefit from the ecosystem services that wetlands provide.



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# APPENDIX A ADDITIONAL INFORMATION

A Resource for Local Government and Communities



## REGULATORY AND GOVERNANCE TOOLS APPLICABLE TO WETLANDS

Environmental Law Centre, University of Victoria  
Debra Curran, Acting Executive Director

|   |   |  |
|---|---|--|
| Regional Growth Strategies (RGS)  | Local Government Act Part 25 (RGS)  | Local Government Act Part 25 (RGS)   |
| Official Community Plans (OCP) (including Local Area & Watershed Plans) | Local Government Act ss.875-879, 882, 884, 941 (OCP)<br>Community Charter s.69 (drainage)   | Local Government Act ss.875-879, 882, 864, 941 (OCP)<br>Local Government Act ss.540-542 (drainage) |
| Zoning  | Local Government Act s.903  | Local Government Act s.903   |
| Density Bonus / Amenity Zoning  | Local Government Act s.904  | Local Government Act s.904   |
| Parking   | Local Government Act s.906  | Local Government Act s.906   |
| Runoff Control & Impermeable Surfaces                                   | Local Government Act s.907  | Local Government Act s.907   |
| Development Permit Areas  | Local Government Act ss.919.1-920   | Local Government Act ss.919.1-920  |
| Riparian Tax Exemption  | Community Charter s.225   | Local Government Act ss.811-811.1  |
| Impact Assessment   | Local Government Act ss.919-920.01  | Local Government Act ss.919-920.01   |
| Development Approval Information Areas                                  | Local Government Act s.895  | Local Government Act s.895   |
| Development Process   |   |  |
| Watercourse Protection Bylaw  | Community Charter ss.8(3)(j) & 9(3)(a)<br>Spheres of Concurrent Jurisdiction - Environment and Wildlife Regulation s.2(1)(a)  |  |
| Rainwater Management Bylaw  | Local Government Act s.907 (impermeable surfaces)<br>Community Charter s.69 (drainage)  | Local Government Act s.907 (impermeable surfaces)<br>Community Charter s.69 (drainage)             |
| Landscaping Bylaw   | Local Government Act s.909  | Local Government Act s.909   |
| Tree Protection Bylaw   | Community Charter ss.8(3)(c) & 50   | Local Government Act s.923   |
| Soil Removal & Deposit Bylaw  | Community Charter ss.8(3)(m) & 9(1)(e)  | Local Government Act s.723   |
| Pesticide Use Bylaw   | Community Charter ss.8(3)(j) & 9(3)(a)<br>Spheres of Concurrent Jurisdiction - Environment and Wildlife Regulation s.2(1)(b)(ii)                                    |  |
| Invasive Species Bylaw  | Community Charter ss.8(3)(j), 8(3)(k) & 9(3)(a)<br>Spheres of Concurrent Jurisdiction - Environment and Wildlife Regulation s.2(1)(b)(ii) (control and eradication) |  |
| Security  | Community Charter ss.8(8)(c). 17 & 19<br>Local Government Act s.925   | Local Government Act s.925   |
| Subdivision Servicing Bylaw   | Local Government Act s.938<br>Land Title Act ss. 83, 86   | Local Government Act s.938<br>Land Title Act ss. 83, 86  |
| Development Cost Charges Bylaw  | Local Government Act s.933  | Local Government Act s.933   |

## ADDITIONAL THREATS TO WETLANDS:

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**Loss of connectivity:** To remain viable over the long term, all organisms require occasional genetic exchanges (“gene flow”) between separate populations. This is particularly important for organisms like amphibians, which have specific habitats and limited range of travel. Draining and filling of wetlands reduces habitat connectivity and the opportunity for gene flow.

**Sedimentation, nutrient pollution and other forms of water pollution:** Runoff from agricultural fields and urban streets can change wetland nutrient balance, leading to eutrophication. Other pollutants, such as pesticides, petroleum products and human pharmaceuticals can be directly toxic to wetland biota or have accumulating effects. Excess waterborne sediments entering wetlands have negative effects and over time can cause shallow wetlands to fill in.

**Invasive species:** Alien plants such as Eurasian milfoil and purple loosestrife, fish such as carp and goldfish and amphibians and reptiles such as bullfrogs and red-eared sliders have had substantial negative effects on our wetlands. Reed canarygrass is invasive and has already changed some shallow water ponds into marshes. The yellow flag iris is another wetland species that has made inroads in the Okanagan. Other invasive plant and animal species are waiting in the wings. The potential advent of the zebra and quagga mussels would be catastrophic to lakes in the Okanagan chain. The introduction of game fish or goldfish into previous fishless wetlands can have a devastating impact on native amphibian populations.

**Livestock grazing:** Range livestock have access to most wetland and riparian areas on Crown lands. Overgrazing in these areas causes the loss of dense shrubs and tall herbaceous vegetation, which normally act as nutrient/sediment traps, provide habitat, provide shade to the adjacent waterbody, and keep streambanks intact. Livestock manure and urine can add to aquatic nutrient loading directly. Soil disturbance, soil compaction and pugging can degrade shoreline communities and encourage invasive plants.

**Golf courses:** There are approximately 30 golf courses in the Okanagan Basin, and all are situated on low elevation, relatively level terrain, some of which were former wetland. The per-hectare application of fertilizer and pesticides on golf courses is much higher than agricultural use. Most golf courses include water hazards, which are repositories for chemical runoff from fairways and greens.

**ATV damage:** 4wd truck, all-terrain vehicle and dirt bike users favour shallow wetlands for mud-bogging. The results are intensive soil disturbance leading to destruction of habitat, nutrient and sediment pollution, and invasive plant colonization. It can be difficult to regulate this activity.

## ADDITIONAL WETLAND CLASSIFICATIONS

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It is important to recognize that wetland terminology is somewhat imprecise, and various other terms, beyond those listed in Section 1.4.3, are commonly used, such as:

**Ephemeral ponds:** ponds that typically fill in spring and dry out in summer. Ephemeral ponds are challenging to identify as they may not have all the characteristic wetland features year-round. They are some of the most threatened wetlands in the Okanagan. However, these sites are very important to wetland species including breeding amphibians and migrating waterfowl. Some species thrive at these sites due to a lack of predation from fish and other species that require more permanent waterbodies.

**Oxbow or Cutoff Oxbow:** a stream or river meander that has been cut off from the main channel. These sites may develop into shallow water wetlands, marshes, or ephemeral wetlands. They may or may not have water connections to the stream or river.



**Wet meadows** are considered more transitional between wetland and terrestrial sites. Soils may be very moist to moist (hygric as opposed to hydric) where water table and mottling of the soils is below the rooting zone for most of growing season. See also Alkaline Meadows listed above.

**Flood Associations** are unique features from wetlands. Flood Associations are distinct from wetlands, as they are adjacent to a lake, pond, stream or river, whose vegetation and soil is influenced by flooding events and thus subject to erosional and depositional activities. However, the soil is not saturated long enough to form true wetland soils or plant communities.

**Novel or constructed wetlands** are created either for restoration, infrastructure, water treatment or by unintended accident resulting from changes to the hydrology of an area. They may or may not achieve full ecological function or be intended to.

## WETLAND DATABASE IMPROVEMENTS

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There is value in accessing the whole database (that includes these various sources for wetlands, and the additional analysis embedded within it by Ecoscape) from a single access point. The Ecoscape wetland data survey found that most respondents would prefer to access data from an online map viewer, followed by receiving GIS shapefiles/geodatabase (ranked second) or KML/KMZ files (ranked third). Phase 2 project coordinator, Jillian Tamblin, conducted a review of various options to host the database as part of the development of a Project Charter for the data management. Through this process Tamblin identified: (1) the Community Mapping Network – BC Wetland Atlas; (2) Government of BC's Operational Data Sets (which could potentially enable viewability on Habitat Wizard); and (3) Government of BC's Corporate Data Warehouse (which could potentially enable viewability on iMapBC). As part of this process pros and cons were weighted for each option.

The current database is most likely best suited for viewing online from the Community Mapping Network since the fields that may be used for updates are not finalized (Note: The Okanagan Wetland Database is currently viewable on CMN's Wetlands Atlas). The Okanagan Wetland Database is composed of 229 fields, which are essentially a quiltwork from various sources, and as such a number of these fields only contain records from a subset of the data sources (e.g., the Kelowna Inventory or Terrestrial Ecosystem Mapping Products). Some fields appear to include redundant information about a wetland entry (e.g., wetland class is entered in three fields). However, there are real challenges to further refine the database and merge such fields, especially if there is a difference in the methodology based on data source or a discrepancy in the data that was entered among the similar fields. Both BC Government options both require fairly strict data fields. As a static file, EcoCat may be the most suitable location to host the database with downloadable Excel, shape files, and possibly kml files. It would also be a good location to include additional documentation that was part of the Okanagan Wetlands Strategy. This would make it available to users who are able to operate their own mapping software programs. EcoCat currently contains datasets that are amalgamations of various projects, such as the Okanagan Wetland Database.

Moving forward, there is value in updating wetland information in the Okanagan and building upon the information gathered through the Okanagan Wetland Database project. Certainly, there are wetlands within the Okanagan Basin that were not recorded due to their small size, ephemeral nature, changes in the landscape, human/technical error, or difficulties in delineation (e.g., forested wetlands). Furthermore, due to the age of some of these datasets, some may have been impacted or changed since data were collected. For future iterations, tracking wetlands over time provides useful information for decision makers on effectiveness of various management interventions as well as for monitoring threats.

There is a desire to update the Okanagan Wetland Database, and modifications to the database structure could help streamline future data entry. Some fields would likely need to be archived while others would be kept 'live.' It's possible that new fields may need to be introduced that would, for instance, stay consistent with emerging provincial methodology or support new techniques for subsequent analysis and enhancing decision support tools. The main issue is to find an electronic 'home' for the database, so it can be accessed and used by local government officials, land developers and consultants. A secondary issue is to develop a common format for future data entry. The BC Wildlife Federation Wetland Coordinator is currently tasked with that project.



# APPENDIX B SUPPORTING DOCUMENTS





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