

# Wetland Ways



10

## Interim Guidelines for Wetland Protection and Conservation in British Columbia

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### Chapter Ten

## LAND DEVELOPMENT

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These interim guidelines will be updated using experience from pilot testing and feedback from user groups. If you would like to comment on these guidelines, please send your comments to [wsp@gov.bc.ca](mailto:wsp@gov.bc.ca)

Cover photos: Judith Cullington



## CHAPTER 10: LAND DEVELOPMENT

### 10.1. INTRODUCTION

This section provides guidelines for the protection and management of wetlands that are on or near to development sites. This section is intended to be read in conjunction with [CHAPTER 2: GENERAL GUIDELINES](#).

Land development activities can have many impacts on wetlands.

- ♦ **Wetland loss:** Roads, buildings, and landscaping, if improperly sited, can directly affect all or part of wetland ecosystems.
- ♦ **Habitat fragmentation:** Wetlands are important feeding and breeding areas for many species, and if wetlands become isolated and fragmented from each other, there will be a reduction in biodiversity and species survival.
- ♦ **Changes to hydrology:** development activities that result in changes to water quantity—including changing a seasonal wetland into a year-round water feature—can affect the wetland habitats and the species that it supports.
- ♦ **Sedimentation:** Soil disturbance from site preparation and road construction exposes soil and makes it more susceptible to erosion. This is more severe where roads are on steeper slopes, soils are easily erodible, and where activities are carried out during wet periods. Sedimentation in wetlands can reduce biological productivity, impair feeding behaviour, increase physiological stress, and potentially affect downstream habitats.
- ♦ **Water quality:** Use of fertilizers and pesticides in or near wetlands and riparian areas can cause *eutrophication*<sup>1</sup> and oxygen depletion, species mortality and longer term sub-lethal impacts at the species and community level.

Developers are finding that proximity to natural areas—such as wetlands—can enhance property values by 15–30%. (Curran, 2001)

#### INCENTIVES FOR DEVELOPERS

The Islands Trust offer tax exemptions to landowners who register a covenant for the protection of ecologically and culturally significant features. This approach was piloted in the southern Gulf Islands, and is now being expanded to more northern islands (<http://www.islandstrustfund.bc.ca/napterp.cfm>). Some local governments (e.g., Burnaby, Victoria, and Highlands) offer density bonuses to developers in return for setting aside environmentally sensitive areas such as wetlands. For more examples see the [Green Bylaws Toolkit](#).

<sup>1</sup> *Definitions* can be found in the [GLOSSARY](#).



All B.C. legislation can be found at <http://www.bclaws.ca/>. Federal legislation can be found at <http://laws.justice.gc.ca/>.

## 10.2. LEGISLATION

See [CHAPTER 2](#) for legislation that applies to all land managers. Some of the legislation and regulations of importance to land developers include the following.

- ♦ [\*Community Charter\*](#): Allows councils to make bylaws that regulate, prohibit, and impose requirements in relation to the “protection of the natural environment”.
- ♦ [\*Local Government Act\*](#): Addresses a variety of planning and land use authorities that empower local governments to make environment-friendly decisions; encourages the development of sustainable communities; allows for the creation of [regional growth strategies](#).
- ♦ [\*Water Act\*](#): Part 9 of the *Water Act* governs all works in or about a stream. (‘Stream’ includes wetlands.) Works need an approval or notification, depending on the type of work being carried out and risk to the stream. Specifies routine activities (e.g., installation of clear-span bridges, installation or repair of a wharf or pier, replacement and maintenance of culverts and outfalls, temporary diversions around worksites, and minor maintenance of municipal utilities [water works]) that can be carried out without the need for a formal approval under the *Water Act* so long as the work is carried out in compliance with the regulations, and notification is provided to the Ministry of Environment. Major works such as erosion protection, bridges with support structures, relocating streams, etc. require approvals. For more information see “[Approval Application or Notification for Changes In and About a Stream](#)” Under Section 9 of the *Water Act* and Part 7 of the *Water Act Regulations*”. Note that some works may also require approvals from Fisheries and Oceans Canada.
- ♦ [\*Fish Protection Act\*](#) and [\*Riparian Areas Regulation\*](#): Regulates setbacks from streams and other watercourses. The *Riparian Areas Regulation* applies to the Georgia Basin and Southern Interior of B.C. Other communities may adopt this methodology if they choose. Note that the *Riparian Areas Regulation* does not apply to the marine foreshore (including estuaries).
- ♦ [\*Weed Control Act\*](#): Imposes a duty on all land occupiers to control designated noxious plants. This includes species such as purple loosestrife, which is an aggressive wetland invader and has been declared a noxious weed in the Comox Regional District.
- ♦ [\*Wildlife Act\*](#): Section 34 protects birds and their eggs, and their nests while occupied. In addition, the nests of certain birds (Eagle,



Work in or about a stream requires approval under the *Water Act*.  
PHOTO: JUDITH CULLINGTON



Peregrine Falcon, Gyrfalcon, Osprey, Heron, or Burrowing Owl) are protected whether or not the nest is occupied.

- ♦ Canada [\*Fisheries Act\*](#): Protects fish and fish habitat; regulates the release of deleterious substances into fish-bearing waters; and prohibits any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat (s. 35).
- ♦ Canada [\*Migratory Bird Conservation Act\*](#): Protects and conserves migratory birds—as populations and individual birds—and their nests.

### 10.3. OBJECTIVES

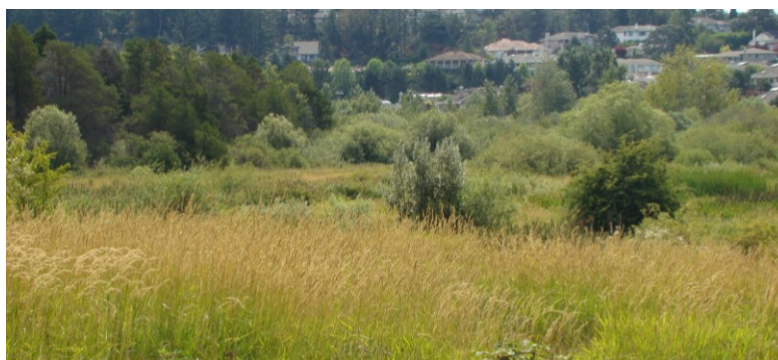
As outlined in [CHAPTER 2](#), there are three major objectives for the protection and management of wetlands:

- ♦ Protect and maintain water quantity;
- ♦ Protect and maintain water quality; and,
- ♦ Protect and maintain habitats and species.

This can be achieved by:

- ♦ Knowing what you have (inventory and mapping) (see [CHAPTER 2](#));
- ♦ Protecting wetlands with buffer zones; and,
- ♦ Minimizing impacts from land development activities.

Following the guidelines in this document will help landowners and land managers demonstrate that they have applied due diligence. Monitoring the impacts of activities will assist in meeting the objectives. For more information, see [CHAPTER 12: MONITORING AND REPORTING](#).



Protect and maintain habitats and species. PHOTO: JUDITH CULLINGTON



## 10.4. GUIDELINES

The Ministry of Environment documents [\*Develop with Care: Environmental Guidelines for Urban and Rural Land Development\*](#) and [\*Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia\*](#) provide extensive guidelines for land development where *environmentally valuable resources* (such as wetlands and amphibians) are present. This chapter summarizes some of the key guidelines for protection of wetland values.

### 10.4.1. Site Inventory

Wetland protection should be considered from the outset of land development, even before designing the development. [CHAPTER 2](#) provides detailed information on the suggested inventory process to assess wetland values.

Local governments should look at site-specific developments that may affect wetlands in the context of the broader neighbourhood and watershed implications, and will hopefully have addressed wetland protection in their official community plans and regional growth strategies. For more information on ways that local governments can protect environmentally valuable resources during land development, see [\*Develop with Care\*](#) (especially [Chapter 2](#)).

The **Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure** is a comprehensive document that provides local governments with practical tools for protecting green infrastructure within their jurisdictions, and includes many case studies and examples. For more information see <http://www.greenbylaws.ca/>

#### IDENTIFY AND ASSESS WETLAND VALUES

- ☐ If there is a wetland on or near the development site, conduct a detailed bio-inventory to identify wetland values. See [CHAPTER 2](#) for information on the:
  - ◇ Preliminary site survey;
  - ◇ Detailed bio-inventory; and,
  - ◇ Site assessment and conservation evaluation.

#### IDENTIFY WILDLIFE MOVEMENT PATTERNS

Wetlands can provide important feeding and breeding areas for a range of wildlife, ranging from large mammals, to waterfowl and to small amphibians.

- ☐ Hire an *appropriately qualified professional* to identify wildlife movement patterns. The [Association of Professional Biologists of B.C. website](#) lists Registered Professional Biologists by expertise and location.





The **Green Shores** project promotes sustainable use of coastal ecosystems through planning and design that recognizes the ecological function of coastal systems.

Developers working near estuaries, lagoons and other coastal ecosystems can be "Green Shores Certified."

<http://www.greenshores.ca/>

- ☐ Refer to *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia* for guidelines for identifying amphibian needs, including travel corridors.

#### IDENTIFY SURFACE WATER AND GROUNDWATER FLOWS AND QUALITY

- ☐ Collect information on the pre-development hydrology. *Hydroperiods* (patterns of drying and filling), sedimentation loads, flow volumes and peak flows are important as baseline information so these can be compared to post-development conditions.
- ☐ Gather pre-development information on water quality in the wetland.

#### AVOID DRILLING NEAR WETLANDS

Test sites for wells, geothermal developments and other survey purposes often include the use of heavy equipment, water, bentonite clay, and related by-products. As a result, drilling operations may generate solids, which are referred to as suspended solids when transported by water movement, or discharged directly to a wetland or surface water. When not properly contained, the generated solids may adversely impact wetlands and surface waters.

- ☐ Drill sites should be located outside of wetlands and their buffer area.
- ☐ Drilling sites should be contained during and after well installation. This includes having the ability to dig a containment pit on-site, adding a temporary well cap, installing hay bales and silt fencing, and pumping overflow off site or to a poly-lined dumpster when necessary.



Refer to *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia* for guidelines for identifying amphibian needs.

PHOTO: SARMA LIEPENS



Urban ponds and wetlands may not support a full complement of species, however amphibians that require relatively little upland habitat and can tolerate some human disturbances can persist and even thrive in such habitats. [Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia](#)

## 10.4.2. Wetland Buffers

A no-disturbance, no-development buffer zone around the wetland can be an effective way of protecting wetland values. See [CHAPTER 2](#) for more information on buffers.

### DETERMINE THE BUFFER WIDTH

Buffer widths will vary according to their purpose, for example if they are to prevent disturbance to nesting birds or to prevent seepage of contaminants from a road into the wetland. Buffers will likely serve more than one purpose.

Buffer widths may also vary according to circumstance. In more densely developed urban areas, buffers may of necessity be much narrower than in rural environments. The Ministry of Environment identifies target buffer distances between the development and wetlands of 30 m in urban areas, 100 m in rural areas, and 150 m in undeveloped areas. They also recommend larger buffers for larger wetlands (over 0.4 ha) than for smaller wetlands.<sup>2</sup>

- ☐ Work with an appropriately qualified professional since conditions vary on a site-by-site basis. The appropriate buffer width will depend on its purpose and the sensitivity of the habitat that is to be protected.
- ☐ Identify an appropriate buffer around the wetland. A no-development, no-disturbance buffer zone of 30 m or more will benefit a variety of species. For very small wetlands, a 3:1 ratio of undisturbed upland habitat to water is recommended.<sup>3</sup> (For example, a pond 1/3 ha in size should have a surrounding buffer area of 1 ha). Sites that are isolated from other wetlands and surrounded by urban development will need large buffer zones to be viable.
- ☐ When establishing wetland buffers, consider the needs of all species and not just fish. For example, buffer widths determined using the [Riparian Areas Regulation](#) methodology focus on the needs of salmon and trout and may not be wide enough to protect other species such as amphibians, birds, and small mammals.



Consider the needs of all species.  
PHOTO: JUDITH CULLINGTON

<sup>2</sup> *Develop with Care*, [Table 4-2](#).

<sup>3</sup> Canadian Wildlife Service, Ontario Region, 2000




### SET ASIDE BUFFER ZONES AS A PROTECTED AREA

- ☐ Consider long-term legal protection for the buffer areas. Work with your local government and appropriately qualified professionals to identify ways to avoid development on those parts of development sites where environmentally valuable resources have been identified. Options may include
  - ◇ conservation covenants,
  - ◇ parkland dedication,
  - ◇ management agreements,
  - ◇ acquisition by the local government or a land trust, and
  - ◇ density transfer or bonusing.
- ☐ Take advantage of tax incentives that encourage the protection of environmentally valuable resources. For more information, see *Develop with Care* [Appendix E](#).

### 10.4.3. Site Design

#### DESIGN THE DEVELOPMENT SITE TO RETAIN AND ENHANCE WETLAND FEATURES AND FUNCTIONS

-  Avoid habitat fragmentation. One option can be to cluster development in less environmentally-sensitive portions of the site, leaving wetlands and the buffer zone undisturbed.
- ☐ Place buildings well away from floodplains and allow natural flooding cycles to occur so that flood-dependent ecosystems can persist. Many species depend on the ecosystems that develop in response to natural flooding.
- ☐ Maintain natural contours and edges of streams and wetlands. Retain natural vegetation in the buffer area, including trees, shrubs, and ground cover.
- ☐ Maintain wetland and riparian vegetation cover. *Emergent aquatic vegetation*, such as cattails and bulrushes, reduce wave energy and resulting erosion of lake and pond shorelines. The roots of shrubby

**Ecosystem features** are physical attributes that create many different types of habitat for different species. Examples include snags (standing dead trees), ground cover, and large woody debris in streams.

**Ecosystem functions** are processes that keep an ecosystem operating. Examples include infiltration of surface water, evapo-transpiration and nutrient cycling.

#### A LIVING BUILDING

The Robert Bateman Art and Environmental Education Centre to be build at Royal Roads University will be “designed as a ‘Living Building’ – a standard that goes beyond the LEED (Leadership in Energy and Environmental Design) standards, in that it will create zero greenhouse gas emissions and have a positive impact on the environment.... This project will also include restoration of the wetland that was on the centre’s site 100 years ago before the family of James Dunsmuir drained the land to graze livestock.” <http://campaign.royalroads.ca/bateman-centre/the-building/the-robert-bateman-art-and-environmental-education-centre>





### BEST PRACTICES FOR REPTILES AND AMPHIBIANS

Although often highly modified, urban and rural habitats can still provide important habitat for reptile species and amphibians. *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia* provides guidelines to help maintain the viability of native amphibian and reptile populations in areas subject to land development activities. Its primary purpose is to provide developers, consultants, landscape architects, local and regional governments, urban planners, land use managers and the public with the practical, cost-effective tools and supporting scientific information necessary for mitigating development activity impacts on amphibian and reptile populations in the province. [http://www.env.gov.bc.ca/wld/BMP/herptile/HerptileBMP\\_final.pdf](http://www.env.gov.bc.ca/wld/BMP/herptile/HerptileBMP_final.pdf)

vegetation such as willows, red-osier dogwood, and hardhack help stabilize banks and prevent bank erosion.

**STOP** Avoid draining wetlands, regardless of their size, depth or duration. These are important breeding habitat for amphibians. Further guidelines on maintaining amphibian habitat are found in [\*Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia\*](#).

**STOP** Do not turn vernal pools into year-round water features. This will change the chemistry of the pool and alter the ecosystem by allowing new species, such as bullfrogs, to invade.

☐ Consider using engineered wetlands to treat rainwater prior to discharge to local streams (note that this may require approval under the Canada [\*Fisheries Act\*](#)). Storm drain systems can carry significant pollution loads from such things as car washing, runoff from fertilised lawns, pesticide use, and improper disposal of solvents and oils. However, avoid creating ponds that are potential 'sink' habitats (i.e., they attract amphibians and reptiles but result in their reduced survival). Deep, permanent water bodies, especially those where the shallow shoreline areas have been lost, are unsuitable to most native amphibian species. Steep-sided embankments (resulting from dredging to make ponds deeper or to channelize streams) are also undesirable.

☐ Minimize outdoor lighting near wetlands and riparian areas. Outdoor lighting can affect some wildlife by altering their diurnal behaviours and feeding and hunting activities.

**STOP** Do not install services (e.g., water, sewer, gas, power) in areas where they might impact the adjacent wetlands.

### RETAIN AND CREATE WILDLIFE TRAVEL CORRIDORS

☐ Provide ways for wildlife to continue to travel through your development. This may involve leaving a vegetated strip for the passage of small mammals, or retaining small clumps of trees that

Roads can be a major barrier to amphibian movement for many different reasons, including changes to drainage patterns, the addition of contaminants and sediments from run-off, and invasions by exotic species.




### TOAD TUNNELS

“Toad tunnels” consist of fencing or walls to prevent animals entering the road, a guiding system to direct them to road underpasses, and tunnels placed at intervals where roads interrupt an amphibian migration route. On Vancouver Island, amphibian tunnel systems are used near Piercy Creek, west of Courtenay, where the Inland Island Highway intersects a wetland, and near Qualicum, where it intercepts a migration route to Hamilton Marsh and other smaller, breeding ponds.

birds can use as resting areas. Ensure movement corridors are of sufficient width and contain habitat attributes that are attractive to amphibians and reptiles as well as larger species.

- ☐ Install ‘toad tunnels’ under roads so that amphibians can travel safely between ponds. Roadkill is one of the leading causes of reptile and amphibian mortality. For information on road crossing structures for reptiles and amphibians, see [\*Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia\*](#).

### DESIGN THE DEVELOPMENT SITE TO MAINTAIN THE NATURAL HYDROLOGY

- ☐ Ensure that the natural (pre-development) hydrological cycle will be maintained after development. Changes in drainage patterns may impact nearby wetlands, for example by changing a seasonal wetland into a year-round water feature, which can alter plant species composition and eliminate species that are adapted to summer droughts. Follow the guidelines set out in [\*Stormwater Planning: A Guidebook for British Columbia\*](#) (Chapters 6 and 7) and the [\*Water Balance Model\*](#).
- ☐ Ensure that wells will not affect wetlands by depleting groundwater levels.
-  Do not use local streams or wetlands for unmanaged stormwater discharge. The increased flows can significantly increase erosion and damage wildlife habitats. Avoid channelling water onto impermeable surfaces; this leads to rapid run-off and contamination of wetlands.

### DESIGN TO ALLOW GROUNDWATER RECHARGE

Groundwater serves as the water source for a large number of British Columbians. Groundwater is also an integral part of the hydrologic cycle and is essential to the maintenance of the ecological health of many ecosystems and the species they support. Groundwater contributes to the year-round flow of water in streams and rivers, and to wetland water levels, especially during dry periods.

The Water Balance Model is a web-based decision tool. It is designed to communities create neighbourhoods that integrate good planning and innovative engineering designs.

<http://bc.waterbalance.ca>



- ☐ Encourage groundwater recharge by using vegetated swales, infiltration basins, and absorbent vegetation, and by disconnecting downspouts from buildings (where the terrain and local government bylaws permit this).
- ☐ Minimize the amount of impervious surface by using pervious paving instead of asphalt in parking lots, laneways, driveways, walkways, patios, etc. Build narrower roads that create less impervious area.
- ☐ Hire a professional groundwater consultant when dealing with fractured bedrock aquifers, community well systems, and complex hydro-geological conditions.
- ☐ Use the [Water Balance Model](#) to design rainwater systems that maximize the infiltration of uncontaminated stormwater.
- ☐ Create detention ponds to reduce the amount of silt and pollutants that enter streams and groundwater.

#### PLAN WETLAND CROSSINGS CAREFULLY

- ☐ Avoid or reduce the number of wetland crossings to minimize impacts on aquatic habitats.
- ☐ Where wetland crossings are required, ensure that they continue to provide passage for fish and wildlife and that they are located where there will be the least impact to streambanks and riparian vegetation. For more information on designing aquatic crossings, refer to the [Fish-stream Crossing Guidebook](#).
- ☐ Overlay utility crossings on existing access-crossing locations or use directional drilling where possible to minimize the extent of disturbances to riparian vegetation and stream beds.



Prevent the movement of sediment into wetlands. PHOTO: JUDITH CULLINGTON

### 10.4.4. Construction

#### CHECK AND COMPLY WITH REGULATORY REQUIREMENTS

- ☐ Obtain all necessary *Water Act* [Approvals and Notifications](#) before working in or around water, and check local government bylaws and permitting processes for additional local restrictions and requirements.
- ☐ Prevent the movement of sediment and other deleterious substances into riparian areas and/or aquatic ecosystems. Failure to do so may result in legal charges or an Inspector's Order under the [Fisheries Act](#) and the [Environmental Management Act](#). For more information, see the [Water Quality Municipal Guidelines for Construction Design](#) website.



- ☐ Check for and adhere to any local government bylaws regarding erosion and sediment control.

#### PROTECT SENSITIVE HABITATS

- ☐ Ensure that sensitive habitats are off-limits to construction personnel; storage of equipment and materials, and parking of vehicles.
- ☐ Fence the buffer area to discourage access by people and pets, both during and after construction.

#### CONTROL EROSION AND SEDIMENT DURING CONSTRUCTION



- ☐ Develop a plan for erosion and sediment control with the assistance of an appropriately qualified professional before construction begins. The plan should include:
  - ◇ Methods to minimize the extent of area cleared at any one time and to promptly revegetate disturbance areas;
  - ◇ Guidelines for source control and removal of contaminants from site runoff;
  - ◇ Detailed directions to contractors to ensure that no erosion or sediment movement occurs and no silt is released to wetlands or riparian areas during the construction and post-construction phases; and
  - ◇ Plantings of appropriate native plant species that will quickly re-establish vegetation cover.
- ☐ Ensure that an appropriately qualified professional:
  - ◇ Provides monitoring to ensure that the plan is properly implemented during the course of clearing and construction;
  - ◇ Ensures that construction does not harm habitat; and,
  - ◇ Provides long-term monitoring of disturbed sites until green-up is established and soils at the site are stable.<sup>4</sup>
- ☐ Control erosion and sediment generation at the source rather than trying to treat sediment-laden water.
- ☐ Establish vegetated swales or other features to prevent the movement of road salts and other contaminants into sensitive habitats.
- ☐ Construct and stabilize runoff management systems at the beginning of site disturbance and construction activities.





Develop a plan for erosion and sediment. PHOTO: MARLENE CASKEY

<sup>4</sup> The Ministry of Environment is developing policies for monitoring disturbed sites. Contact Ministry staff for more information.



- ☐ Minimize disturbed areas and stripping of vegetation and soils, particularly on steep slopes, and stabilise denuded soils as soon as possible. Clear areas only as they are needed, and re-vegetate promptly once foundation work has been completed.
- ☐ Use temporary coverings (e.g., plastic sheets) for soil stockpiles, and cover bare slopes and exposed surfaces with mulch, including leaves or straw, to provide erosion control from raindrop erosion.
-  Avoid the collection, concentration, and conveyance of surface water. Instead, encourage surface water to seep into the soil.
-  Do not allow fill or construction material to encroach into wetland or riparian areas.
- ☐ Inspect the construction site regularly to determine if compliance with control measures has been achieved.

#### PROTECT WATER QUALITY DURING CONSTRUCTION

- ☐ Maintain equipment to reduce potential contaminant releases during construction. Ensure that pollutants such as oil and other hydrocarbons are removed by oil/water separators before they enter the groundwater or streams.
- ☐ Use hydraulic disconnects with engineered wetlands to filter pollutants before they enter streams or creeks (note that this will require Canada *Fisheries Act* approval).
- ☐ Wash fresh concrete and concrete equipment well away from wetlands and their riparian areas, and keep the contaminated runoff out of stormwater systems that connect to these areas.
- ☐ Design and construct sewage and septic systems to prevent leaks and ensure proper functioning condition.
- ☐ Have an emergency response plan in place to contain and clean up accidental spills safely and quickly.
-  Do not use pesticides or other toxins in or near riparian areas. Amphibians and reptiles are especially sensitive to these chemicals.
-  Avoid damage to habitats and accidental mortality of animals due to activities of construction personnel and machinery.

#### TIMING AND LOCATION OF CONSTRUCTION


- ☐ Undertake construction only during identified timing windows or 'least risk' windows so that impacts on local plants and wildlife are minimised. The [Ministry of Environment regional offices](#) provide information on timing windows.

For more information, see [Standards and Best Practices for Instream Works](#) (Section 7.9: Standards and Best Practices for Other Types of Works Requiring [Water Act](#) Approval).


B.C. Ministry of Environment offices: see <http://www.env.gov.bc.ca/main/regions.html>





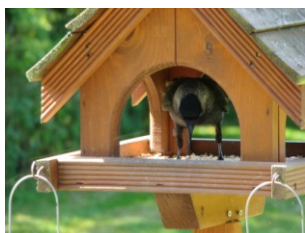
-  Avoid construction activities during periods when amphibians and reptiles are congregated for breeding, nesting, or seasonal migrations; migrations could involve movements of snakes near hibernacula and mating areas in the spring and autumn, migrations of juvenile frogs, toads, and salamanders to foraging habitats in late summer, or movements of turtles to terrestrial nesting sites.

#### MANAGE INVASIVE PLANTS

- ☐ Minimize the extent of bare soil on the development site to prevent invasive plant species from establishing. Mowing and/or establishing a grassy ground cover can also prevent invasive plants from establishing or setting seed.
- ☐ Work with appropriately qualified professionals to remove invasive species from the construction site, but be careful not to damage the native vegetation.
-  Never use invasive species (such as purple loosestrife) in landscaping as these could spread into nearby wetlands and displace native vegetation and wildlife.

#### MONITOR ENVIRONMENTAL IMPACTS

- ☐ If wetlands on or near the development site could be at risk during the land clearing and construction stages, hire an appropriately qualified professional to assist in planning and monitoring. Environmental consultants and monitors should be given the authority to halt all work if they believe on-site conditions could create impacts on sensitive habitats.
- ☐ Before land clearing and construction begin, determine who will be responsible for site monitoring after the development has been completed and for how long it needs to continue.



Encourage homeowners to be stewards.

PHOTO: JUDITH CULLINGTON

### 10.4.5. After Construction

#### ENCOURAGE HOMEOWNERS TO BE WETLAND STEWARDS

- ☐ Encourage local residents to use [Naturescaping](#) techniques such as establishing nest boxes, bat boxes, and other habitat features on their property. Some wildlife will use backyard habitats as connecting corridors.
- ☐ Provide copies of [Living by Water](#) materials to new homeowners.



For information on facilitating movement for reptiles and amphibians, see [Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia](#).

### MANAGE ACCESS TO WETLANDS

- ☐ Design trails and other accesses to avoid sensitive features such as critical habitats, nesting sites, shoreline areas, reptile denning and basking sites, and wildlife corridors. Ensure that trails do not fragment wildlife habitats. For more information, see [Access near Aquatic Areas: A guide to sensitive planning, design, and management](#).
- ☐ Keep hiking trails and walkways narrow so they do not present a barrier to wildlife movements, and use elevated boardwalks or install 'toad tunnels' to cross wildlife travel corridors. Boardwalks can be helpful in crossing wetlands and damp areas and keeping people and pets on the trail, but these boardwalks should be kept to a minimum as they also shade the ground beneath and prevent wetland plants from growing. .
- ☐ Limit access to aquatic and riparian habitats. Discourage pet access to sensitive habitats by constructing fencing or maintaining dense shrubby vegetation. Simple split rail fencing can define environmentally sensitive features and inhibit human and dog access.

See [CHAPTER 8: RECREATIONAL ACTIVITIES](#) for more information on designing trails near wetlands.

### PREVENT CONTAMINANTS FROM ENTERING WETLANDS

- ☐ Reduce the content of ferrocyanide in road salt formulations, using products alternative to road salts, appropriate location and containment of run-off from patrol yards, and attention to disposal of snow piles. In urban areas with high road density, road salts can contribute significantly to contamination of aquatic water bodies and reduce their quality as amphibian habitat.
- ☐ Use vegetation buffers to filter out and reduce levels of contaminants before they enter water bodies.
- ☐ Contain contaminants through appropriate stormwater and sewage management.
- ☐ Restrict the use of chemicals near pools, ponds, streams, and ditches to safeguard amphibian breeding habitats.
- ☐ Eliminate the use of chemicals near pools, ponds, streams, and ditches to safeguard aquatic amphibian breeding habitats. Chemicals that should be restricted near water bodies include herbicides and growth retardants to control vegetation, road salts, fire retardants, and insecticides.



Safeguard amphibian breeding habitats.

PHOTO: SARMA LIEPENS



## 10.5. REFERENCES AND FURTHER READING

### *Government Offices*

B.C. Ministry of Environment regional offices.

<http://www.env.gov.bc.ca/main/regions.html>

Fisheries and Oceans Canada offices. [http://www.pac.dfo-mpo.gc.ca/pages/default\\_e.htm](http://www.pac.dfo-mpo.gc.ca/pages/default_e.htm)

### *Websites*

B.C. legislation. <http://www.bclaws.ca/>

Federal legislation. <http://laws.justice.gc.ca/>

Association of Professional Biologists of B.C. <http://www.apbbc.bc.ca>

B.C. Lake Stewardship Society. <http://www.bclss.org/>

B.C. Ministry of Environment Guidelines and Best Practices website.  
<http://www.env.gov.bc.ca/wld/BMP/bmpintro.html>

Ducks Unlimited BC. <http://www.ducks.ca/province/bc/index.html>

Living by Water project. [www.livingbywater.ca/](http://www.livingbywater.ca/)

Green Shores project. <http://www.greenshores.ca/>

Naturescape. <http://www.hctf.ca/nature.htm>

Washington State Department of Ecology. 1996. Water Quality  
Guidelines for Wetlands: Using the Surface Water Quality  
Standards for Activities Involving Wetlands.  
<http://www.ecy.wa.gov/pubs/9606.pdf>

*Water Act* Approval Application or Notification for Changes in and  
About a Stream.  
[http://www.agf.gov.bc.ca/resmgmt/EnviroFarmPlanning/EFP  
Drainage\\_Mgmt\\_Guide/LWBC\\_WLAP\\_Approval\\_Application  
or\\_Notification.pdf](http://www.agf.gov.bc.ca/resmgmt/EnviroFarmPlanning/EFP_Drainage_Mgmt_Guide/LWBC_WLAP_Approval_Application_or_Notification.pdf)

Water Balance Model. <http://bc.waterbalance.ca>

Water Quality Municipal Guidelines for Construction Design.  
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nicipal/Urban\\_Runoff/Source\\_Control/Construction\\_Design.ht  
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