

# Wetland Ways



5

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

March 2008

### Chapter Five

## FORESTRY

5.1.	Introduction .....	1
5.2.	Legislation.....	2
5.3.	Objectives.....	4
5.4.	Guidelines.....	5
5.4.1.	Inventory.....	5
5.4.2.	Planning.....	5
5.4.3.	Roads and Trails.....	6
	Road Planning and Design.....	6
	Construction.....	7
	Drainage.....	8
	Operation and Maintenance.....	10
	Road Deactivation/Rehabilitation .....	10
5.4.4.	Timber Harvesting.....	11
	Riparian Areas .....	11
	Falling and Yarding .....	12
	Maintenance .....	13
	Silviculture .....	13
	Pesticides and Fertilizers .....	14
5.5.	References and Further Reading.....	15

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Government Offices .....	15
Websites .....	15
References.....	15

**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 5: FORESTRY

### 5.1. INTRODUCTION

This chapter provides guidelines for the protection and management of wetlands when forestry activities take place nearby. It is intended to be read in conjunction with [CHAPTER 2: GENERAL GUIDELINES](#).

Many operators will already be meeting or exceeding the following guidelines. These guidelines are however, intended to provide a baseline for ongoing improvement in wetland protection and conservation as well as providing guidance to forest operators who may not have wide experience in managing activities around wetlands.

Forestry activities can have many impacts on wetlands.

- ♦ **Direct loss and or fragmentation:** Road and trail access and associated drainage, if improperly sited and installed (e.g., poor culvert installation), can cause infilling and/or dewatering of wetlands and fragmentation leading to impacts to animal breeding, feeding and movement. Over the long-term, these impacts lead to a conversion from a wetland to an upland habitat.
- ♦ **Sedimentation:** Soil disturbance from site preparation and road construction exposes soil and makes it more susceptible to erosion. Ongoing erosion and sedimentation can occur from road surfaces, ditches, and road crossings. Sedimentation in wetlands can reduce primary productivity, impair feeding behaviour, increase physiological stress, and potentially affect downstream habitats.



PHOTO: JUDITH CULLINGTON



**Physical impacts:** Harvesting impacts can include machine caused soil compaction and rutting, removal of riparian vegetation and riparian impacts from falling and yarding. These activities can cause soil erosion and sedimentation, loss of riparian functions such as filtration, shading and impacts to habitat supply and functionality.

- ♦ **Water quality:** Use of fertilizers and pesticides in or near wetlands and riparian areas can cause eutrophication and oxygen depletion, species mortality, and longer term sub-lethal impacts at the species and community level.
- ♦ **Other impacts:** Once in place, roads act as vectors for the distribution of non-native species (by humans and vehicles) and provide opportunities for recreational impacts to spread (e.g., boating and ATV use on wetlands).

## 5.2. LEGISLATION

As over 90% of lands in B.C. are owned by the Province, most timber harvesting activities occur on Crown lands and are subject to the *Forest and Range Practices Act* (FRPA) and regulations. FRPA replaced the B.C. Forest Practices Code in 2004. However, in certain areas of the province (e.g., Vancouver Island and the East Kootenays) large tracts of land are privately owned and have been voluntarily included in the private managed forest land base. Harvesting activities are regulated under the *Private Managed Forest Land Act*. Forest harvesting from other privately owned lands (e.g., for commercial, urban development) would be primarily managed under local government legislation such as the *Local Government Act* and the *Community Charter*.

See [CHAPTER 2](#) for legislation that applies to all land managers. Legislation that applies to forestry land use and activities includes the following.

- ♦ [\*Forest and Range Practices Act\*](#): The Act and its regulations govern the activities of forest and range licensees in B.C. The statute sets the requirements for planning, road building, logging, reforestation, and grazing. FRPA maintains high levels of protection for forest values including watersheds and wildlife habitat, and creates efficiencies for both government and industry through streamlined planning processes. (See box over for more details on FRPA requirements related to wetlands.)

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



### FOREST AND RANGE PRACTICES ACT

The *Forest and Range Practices Act* (FRPA) and its regulations took effect on Jan. 31, 2004. The FRPA and its regulations govern the activities of forest and range licensees in B.C. The statute sets the requirements for planning, road building, logging, reforestation, and grazing. FRPA is intended to maintain high levels of protection for forest values including watersheds and wildlife habitat, and create efficiencies for government and industry through streamlined planning processes. FRPA encourages innovation by skilled resource professionals and holds industry responsible for outcomes.

Holders of licences or agreements must prepare a Forest Stewardship Plan (FSP) prior to road construction or timber harvest. Along with maps, a FSP must specify intended *results or strategies* in relation to *objectives set by government*. Government may set objectives in regard to 11 areas including water, fish, wildlife and biodiversity.

While the legislation is intended to take a primarily results based approach to forest management, some default provisions have been brought forward from the *Forest Practices Code of BC Act*. One of these default provisions regards wetland riparian management areas. Based on classification (W1 to W4) riparian management and reserve zones are specified in the regulation.

<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section48>

- ♦ *[Private Managed Forest Lands Act](#)*: This Act was established to protect key public environmental values during forestry operations on private land. These values include fish habitat, water quality, critical wildlife habitat, soil conservation and reforestation. The [Private Managed Forest Land Council](#) is responsible for administration of the legislation including enforcing standards and conducting audits. A minimum parcel size of 25 hectares is required to operate under the legislation.
- ♦ *[Water Act](#)*: This is the primary provincial statute regulating water resources in B.C. It establishes licensing requirements including fees, and through regulation manages changes in and about a stream through regulation. ('Stream' includes wetlands.)
- ♦ *[Integrated Pest Management Act](#)*: Establishes conditions for the sale and use of pesticides, pesticide classification, licensing, certification and permitting as well as the development of Pest Management Plans.
- ♦ *[Canada Fisheries Act](#)*: Protects fish and fish habitat. The Act regulates the release of deleterious substances into fish bearing waters and prohibits the harmful alteration, disruption and destruction of fish habitat.



### 5.3. OBJECTIVES

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

- ♦ Protect and maintain water quantities;
- ♦ Protect and maintain water qualities; and,
- ♦ Protect and maintain habitats and species.

This can be achieved by:

- ♦ Knowing what you have (inventory and mapping) (see [CHAPTER 2](#));
- ♦ Protecting wetlands within riparian management areas;
- ♦ Placing roads and other facilities away from wetlands; and,
- ♦ Ensuring that riparian features and functions are protected during and after harvesting.

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](#).



PHOTO: SARMA LIEPENS



## 5.4. GUIDELINES



### 5.4.1. Inventory

See [CHAPTER 2](#) for information on inventorying wetlands.



Carry out field assessments.  
PHOTO: DAVE POLSTER

#### AVOID SENSITIVE HABITATS

- Identify the location, type, and size of wetlands from topographic maps (e.g., NTS, TRIM), aerial photos, and other available information.
- Carry out field assessments to supplement this information. Wetland areas tend to have multiple stream channels, oxbow lakes, vernal pools, sloughs, and other unique features that may not show on aerial photos or topographic maps.
- Consult with federal and provincial agencies or other professionals to determine if your land is or could be home to species at risk. Wetlands provide habitat to many endangered or threatened species. Be aware that these areas are very important for amphibians and other species and ensure that you incorporate elements of preserving critical habitat during the planning stage.
-  Avoid activities on or near sensitive areas, such as wetlands and important riparian habitats for wildlife. If this is not possible, choose harvest practices that minimize impacts or arrange schedules to avoid these areas during critical time periods (e.g., nesting or breeding seasons).
-  Avoid activities on or near seeps and springs. Ensure that any activity around seeps and springs does not affect adjacent wetland vegetation or interrupt natural drainage flows.

### 5.4.2. Planning

Effective planning for forestry operations in and around can help maintain wetland features and functions. Special attention should be paid to identifying wetland locations, types and sensitivities prior to beginning operations. Roads and structures should be located to avoid wetlands where possible and minimize potential impacts from erosion and sediment. Harvesting and silviculture activities should be carried out to minimize impacts to riparian vegetation, bank stability and wildlife disturbance during critical breeding and rearing seasons. Careful planning



can save time and money while maintaining wetland features and functions.

#### **DETERMINE APPROPRIATE BUFFERS**

See [CHAPTER 2](#) for more information on determining appropriate buffers.

- Identify riparian areas on the plan that will provide for the maintenance of riparian features and functions.
- Determine wetland buffers considering the following factors:
  - ◇ sensitivity of the wetland habitat and other critical areas
  - ◇ erosiveness of the soil
  - ◇ steepness of the bank slopes

#### **CONSIDER TIMING OF OPERATIONS**

Construction and harvest operations should be timed to take advantage of seasonal conditions. The driest months are generally the best times for road construction and to avoid runoff and drainage problems.

Construction during heavy rains or freeze/thaw conditions increases the potential for runoff and erosion.


- Develop a pre-harvest plan that outlines the best management practices to be followed before, during and after the harvest

### **5.4.3. Roads and Trails**

Road and trail construction and use can be a major cause of wetland drainage and source of sediment delivery to wetlands. Roads in or close to wetlands can cause habitat loss through infilling or dewatering (by intercepting and re-directing flows). Roads and crossings can also lead to habitat fragmentation. Once in place, roads can also facilitate the distribution of non-native species (by humans and vehicles) and provide opportunities for increased recreational impacts.

#### ***Road Planning and Design***

##### **DESIGN FOREST ROADS TO MINIMIZE WETLAND DISTURBANCE**

- Ensure that road designs are developed by a qualified engineer or forester.
-  Avoid constructing roads through wetlands unless there are no reasonable alternatives. Avoid constructing roads and landings in areas where the soil is prone to erosion and compaction (e.g., fine and wet soils) can lead to soil erosion, wetland pollution, and

For information on minimizing impacts from road and trail building, see [CHAPTER 9: ROADS AND CORRIDORS](#).





destruction of wildlife habitat. Building roads in or near wetlands is difficult and expensive.

- If wetlands must be crossed, minimize the total wetland road mileage. Existing roads are generally preferred but make sure their use does not cause additional impacts.
- Minimize the changes in the natural stability of the land. Place roads on high ground, keep out of streamside management zones and wet areas, and keep off the toe of banks and slopes.
- Where possible, design the road to follow the natural contour of the land. This will avoid the need for extensive cut and fill.

#### MINIMIZE CROSSING IMPACTS

- Determine the type and depth of wetland subsoil to ensure proper design and construction.
- Minimize the width of roads consistent with maintaining safety and road design considerations.
- Limit disturbances by keeping roads outside riparian areas except at designated stream or wetland crossings
- Lay out skid trails so as to minimize the number of trails.
- Design approaches to wetlands so that surface runoff carrying sediment is diverted and sediment removed before entering the wetland.



Consider timing of construction.  
PHOTO: SARMA LIEPENS

### *Construction*


#### TIME CONSTRUCTION ACTIVITIES APPROPRIATELY

- Carry out construction activities during periods of least risk windows to minimise impacts to wildlife during critical periods (migration, breeding, etc.).
- Suspend or limit operations when soils become saturated. Check weather forecasts make sure operations are not at a critical stage when wet weather arrives.

#### USE CLEAN MATERIAL

- Construct road fills in wetlands only when absolutely necessary. Large size clean gravel or crushed rock that is placed on geo-textile fabric should be used as fill to allow unrestricted water movement from one side of the road to the other.



- Use only clean snow to construct winter snow roads across wetlands. Ensure surface is clean and free of any debris when road use is finished or prior to thaw.
-  Do not sidecast road construction material into riparian areas. Place sidecast or fill material above the ordinary high water mark of any wetland. Use fill from upland sources to minimize impacts on wetland habitat.

## *Drainage*

### **MINIMIZE EROSION**

- Where roads are constructed across wetlands, provide additional cross drainage by installing culverts every 20 m to maintain natural surface and subsurface flow.
- Ensure that drainage systems are functional during construction.
- Install and maintain erosion control measures if exposed soils would deliver sediment to wetlands through drainage systems.
- Build small depressions in front of culverts to trap sediments.
- Apply clean wheat straw, mulch, or fibre mats on exposed soils until the area can be vegetated to prevent erosion. This protects and holds soil particles from the erosive effects of rainfall and also prevents the spread of noxious weeds.



Logging roads are constructed through or adjacent to wetlands  
PHOTO: ROBERT COX



- Direct ditch waters onto undisturbed forest floor at frequent intervals prior to reaching wetlands to allow water to infiltrate and sediment to settle out. Never drain road side ditches directly into wetlands or streams.

#### MAINTAIN NATURAL FLOWS

- Maintain the natural hydrograph. Ensure that drainage structures maintain an adequate flow of water into and out of the wetland to sustain water levels and drainage patterns.
- Construct ditches in wetland crossings, where necessary, to intercept and carry surface and subsurface water to, through, and away from culverts.
- STOP** Do not create ditches with outlets that will result in drainage of the wetland.
- STOP** Do not concentrate flow into a reduced number of culverts or dig ditches leading into or out of culverts. Clear span bridges are the preferred option to cross wetlands.
- STOP** Never constrict wetland drainage (inlets or outlets) with undersized culverts. Place culverts at the low points of the wetland to pass surface water flows through road embankments.
- Maintain aquatic organism passage and wetland water levels by not placing culverts at an elevation lower than the existing elevation of the ground surface in the wetland.

#### AVOID OR MINIMIZE IMPACTS FROM CROSSINGS

- Ensure you have all necessary permits and authorizations prior to working in or about wetland areas. Crossings for private forest operations are regulated under Part 9 of the [Water Act](#).
- Correctly design, install and maintain wetland road crossings to provide for passage of fish and other aquatic organisms.
- Place wetland crossings parallel to the direction of water flow where possible.
- Use existing crossings whenever possible, unless their rehabilitation and use would be more damaging than establishing a new crossing.
- Design upland road approaches to wetlands so that surface runoff carrying potential sediment is diverted before entering the wetland. Avoid steep downhill approaches to prevent erosion from high velocity runoff.



### MANAGE ACCESS

- Manage entry to operational areas during and after forest activities where unauthorized use is impacting wetland species and habitat (e.g., mud bogging).

### *Operation and Maintenance*

#### OPERATE ON APPROVED ROADS

- Operate vehicles only on established roads and trails.
- Minimize traffic on roads during wet conditions. Consider using geomat or rock to reduce road damage.

#### RE-VEGETATE DISTURBED SITES

- Establish a vegetative cover planting on erodible areas that will be left bare over the fall/winter, and where natural vegetation is not sufficient to stabilize the soil.
- Re-vegetate bare erodible riparian soils with native grasses or other plant species. Avoid introduction of invasive non-native plants.

#### MAINTAIN ROADS AND DRAINAGE

- Inspect wetland crossings frequently during operations to determine if erosion is being controlled. Banks should be stable and soil movement into the wetland should be minimal.
- Maintain road running surfaces, ditches, and cross drains to minimize erosion and sediment delivery. Correct any problems immediately.

### *Road Deactivation/Rehabilitation*

- Reshape the roadbed once forestry activities are completed. Open all drainage systems and stabilize erosion-prone areas.
- Remove temporary fills and structures in wetlands to the extent practical when use is complete.
- Where roads crossed previously existing wetlands or impacted adjacent wetlands during construction or operation, restore wetland functions as part of road rehabilitation activities.
- Look for opportunities to build small wetlands in road right of way areas with clay soils or high groundwater levels, where practical and legal obligations permit. These can benefit amphibians, reptiles, bats, and other species.



Geomat textile.  
IMAGE FROM [HTTP://WWW.ECPLAZA.NET/](http://www.ecplaza.net/)



## 5.4.4. Timber Harvesting

Impacts to wetlands from forest harvesting operations include physical damage to riparian vegetation through yarding or skidding to riparian areas, rutting, and soil compaction and removal of vegetation.

If forestry operations near wetlands are unavoidable, their negative impact may be reduced by using single tree and group selection harvesting techniques, by using equipment with wide flotation tires, and harvesting selected trees when the wetland is frozen.

### *Riparian Areas*

A riparian area provides a natural zone between the wetland and fields, pastures and wooded areas. The riparian area helps to protect the wetland from damage. This natural vegetation reduces erosion, shades streams, provides food for invertebrates and provides habitat for many insects required by fish for food. Buffer zones are areas that may be added to the riparian area to provide further protection.

#### **GIVE SPECIAL ATTENTION TO RIPARIAN AREAS**

- Identify the location of wetland and riparian adjacent areas on the ground with flagging. Do not use paint as it cannot be removed if boundary changes are required and may cause confusion.
- Leave an undisturbed riparian area around wetlands. Wetlands identified as sensitive during the planning period may require enhanced riparian buffers depending on the nature of the wetlands and the type and level of activity adjacent to the wetland. Maintain healthy functioning buffers around all wetlands.
- Timber harvesting in the riparian area should be done only selectively if at all, and with special care. Retain at least 50% of the basal area or 50% of the crown cover. Removing trees from a wetland area alters the wetland and the species living in it. Removing trees leads to a decrease in the amount of water absorbed by tree roots and evaporated into the atmosphere. This decrease in water evaporation increases the water level in the wetland which in turn leads to different wetland vegetation.
- Protect and retain trees and shrubs and snags especially bank edge trees that are below harvest quality. These provide wildlife habitat, stabilize soils and banks and provide shade.
- Retain the appropriate diversity and size of tree and shrub species and maintain sufficient ground cover to trap sediment.

The **Forest and Range Practices Act regulations** (Forest Planning and Practices and Woodlot Licence Planning and Practices) stipulate minimum riparian area widths for management and reserve zones based on the wetland classification.

<http://www.for.gov.bc.ca/ta/sb/legsregs/frpa/frparegs/frparegs.htm>



Feller/buncher. PHOTO: ROBERT COX

- Maintain the natural contour of the site and ensure that forestry activities do not immediately or gradually convert the wetland to dry land.
- Leave as many snags and fallen trees as possible as these can provide critical habitat for many species. Retained trees also help to stabilize banks and shorelines.


### ***Falling and Yarding***

- Fell trees away from wetlands and keep debris out of the wetland whenever possible. If a tree is accidentally felled into a wetland, protect the banks during tree removal.
- Be particularly careful with falling and skidding around vernal pools and springs.
- Remove trees in a manner that minimizes disturbance to the forest floor, exposure of mineral soil or reduction of wetland bank stability.
- Use low ground pressure equipment when working in and around wetlands to minimise soil compaction and erosion.

### **MINIMIZE SURFACE RUTTING**

- Schedule the harvest during the drier seasons of the year or during time when the ground is frozen.



- During summer operate equipment only when soils are dry enough to support equipment. Operations should be suspended or limited when soils become saturated.
- Compact snow to promote frost penetration on frozen running surfaces.
- Consider using corduroy, wood, or rubber mats to improve the soils capacity to support traffic or use low ground pressure equipment.
- Operate equipment on a day-to-day basis depending on weather conditions. Consider ceasing operations in areas where rutting becomes excessive.
-  Avoid making ruts deeper than 15 cm within 60 m of a vernal pool. These can represent barriers to amphibian migration.

#### **USE THE RIGHT EQUIPMENT**

- Use the most appropriate harvesting system to remove the timber. The choice should minimize equipment entry into and disturbance of wetland areas.

#### **OPERATE OUTSIDE WET AREAS**

- Maintain an equipment exclusion area adjacent to wetland banks. Where equipment entry into wetlands is unavoidable, minimize the area disturbed and practice dispersed skidding.
- Locate landings outside of wetlands on well drained areas with gentle slopes. Divert surface water away from the site.

### ***Maintenance***

#### **PROTECT AGAINST SPILLS**

- Fuel and service equipment away from wetlands and outside riparian areas. Provide containers to collect fluids when breakdowns in these areas require repairs to be made on-site.
- Locate maintenance areas to avoid spills of fuels, lubricants and other hazardous materials from being transported to wetlands.

### ***Silviculture***

Silviculture is the practice of managing the establishment, composition growth and health of new forests after harvesting. Forest re-establishment can involve either natural or artificial regeneration of commercially desirable species. Ongoing management, particularly for young forests, can involve the use of pesticides (mostly herbicides) and

A literature review published by the B.C. Ministry of Environment summarizes information on the impacts of glyphosate on amphibians. (Govindarajulu, 2008)



fertilizers. These chemicals can cause kill or harm amphibians and other wildlife.

#### STAY NATURAL WHEN REPLANTING



- Replant a mix of native species that retain the natural site complexity that existed prior to harvesting. A monoculture will not provide the habitat diversity that is a hallmark of wetland areas and supports species diversity.

#### REPLANT CAREFULLY

- Minimize further impacts to wetland soils and remaining vegetation when planting seedlings or broadcast seeding by keeping support equipment and machinery off sensitive sites.

### *Pesticides and Fertilizers*

#### PROTECT SENSITIVE AREAS

- Maintain pesticide- and fertilizer-free zones around wetlands. The width of the zone will vary with the sensitivity of the wetland (species present, rarity, sensitivity) but should be a minimum of 15 m.
- Monitor weather conditions such as rain, wind speed, temperature and humidity during application to prevent drift and surface water runoff.
-  Do not use aerial applications of forest chemicals to riparian areas unless labelled for open water application. Only apply fertilizer directly to water bodies (streams, lakes, and wetlands) if specifically prescribed and approved for aquatic management.
-  Do not apply chemicals when water contamination is likely to occur from physical spray drift. Chemicals should not be applied immediately before precipitation, or after a rain if runoff is still occurring. Consider upcoming storm predictions to time chemical application.

#### HANDLE CHEMICALS SAFELY

- Conduct all on-site pesticide handling, such as mixing and loading, away from wetlands, streams, ponds, wells, and roadside ditches.
- Transportation, handling, storage, application and disposal of pesticides, fire retardants, and fertilizers must comply with applicable local, provincial and federal regulations.
- Develop a spill contingency plan which identifies all actions to be taken in the event of a chemical spill including phone numbers for federal, provincial, and local agencies which must be notified.

For information on application of forest fertilizers see the Forest Fertilization Guidebook (<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/fert/ferttoc.htm>) and Fertilization in Forested Watersheds ([http://www.forrex.org/publications/streamline/ISS30/streamline\\_Vol9\\_No1\\_art3.pdf](http://www.forrex.org/publications/streamline/ISS30/streamline_Vol9_No1_art3.pdf)).





## 5.5. 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-](http://www.pac.dfo-mpo.gc.ca/pages/default_e.htm)

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

### *Websites*

B.C. legislation can be found at <http://www.bclaws.ca/>

Federal legislation can be found at <http://laws.justice.gc.ca/>

Southern Region Extension Forestry.

<http://www.sref.info/search?SearchableText=bmp&Type=Print+Publication>

### *References*

Arkansas Forestry Commission. 2002. Arkansas forestry best management practices for water quality.

[http://www.forestry.state.ar.us/bmp/bmp\\_final.pdf](http://www.forestry.state.ar.us/bmp/bmp_final.pdf)

B.C. Ministry of Forests. 1995. Riparian management area guidebook. Victoria, B.C.

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/riparian/rip-toc.htm>

B.C. Ministry of Forests. 2002. Fish stream crossing guidebook. Victoria, B.C.

<http://www.for.gov.bc.ca/tasb/legsregs/FPC/fpcguide/FishStreamCrossing/FSCGdBk.pdf>

B.C. Ministry of Forests. 1999. Watershed assessment procedure guidebook. 2nd Ed. Ver. 2.1. Victoria, B.C.

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/coastal/CWAPTOC.HTM>

Boyd, David R. 2003. Unnatural Law: Rethinking Canadian Environmental Law and Policy. UBC Press.

[http://books.google.ca/books?id=FGJ0D2uRosC&dq=forest+practices+code&source=gbs\\_summary\\_s&cad=0](http://books.google.ca/books?id=FGJ0D2uRosC&dq=forest+practices+code&source=gbs_summary_s&cad=0)

Florida Division of Forestry. 2003. Silviculture best management practices. [http://www.fl-](http://www.fl-dof.com/forest_management/bmp/index.html)

[dof.com/forest\\_management/bmp/index.html](http://www.fl-dof.com/forest_management/bmp/index.html)

The Forestry Corp., Watertight Solutions. January, 2004. Review of forest management practices for protection of water related resources in



the boreal and taiga plain western Canada. Prepared for Ducks Unlimited Canada, Western Boreal Office.

- Goviddarajulu, Purnima P. 2008. Literature review of impacts of glyphosate herbicide on amphibians: What risks can the silvicultural use of this herbicide pose for amphibians in B.C. B.C. Ministry of Environment. Wildlife Report No. R:28.  
<http://aardvark.gov.bc.ca/apps/eirs/viewDocumentDetail.do?fromStatic=true&repository=BDP&documentId=7884>
- Holaday, Steve and Jeff Martin. 1995. Forestry Facts #11, Wisconsin's forestry best management practices for water quality. University of Wisconsin.  
<http://forest.wisc.edu/extension/Publications/11.pdf>
- Kittredge, David B. and Michael Parker. 1999. Massachusetts forestry best management practices manual. Massachusetts Department of Environmental Protection.  
<http://www.mass.gov/dep/water/drinking/forstbmp.pdf>
- Louisiana Department of Agriculture and Forestry. Recommended forestry BMPs for Louisiana.  
<http://www.ldaf.state.la.us/multimedia/forestry/publications/BMPTOCmay2000.pdf>
- NCASI. 2007. Synthesis of technical information on forest wetlands in Canada. Technical Bulletin 0938.  
<http://www.ncasi.org//Publications/Detail.aspx?id=3002>
- Pike, Robin and Chris Perrin. 2005. Fertilization in forested watersheds. Streamline. Watershed Management Bulletin Vol. 9/No. 1 Fall 2005.
- Shaffer, Robert M. 1998 A logger's guide to forest planning. Virginia Tech. <http://www.ext.vt.edu/pubs/forestry/420-088/420-088.html>
- Sly, Kristin. 2005. Wisconsin's forestry best management practices for water quality, 1995-2005. Wisconsin Department of Natural Resources. Madison WI.  
<http://dnr.wi.gov/forestry/publications/pdf/FR-349.pdf>
- South Carolina Forestry Commission. Best management practices for forestry. <http://www.state.sc.us/forest/bmpmanual.pdf>
- Texas Forest Service. 2004. Texas forestry best management practices. <http://txforestservicetamu.edu/uploadedfiles/sustainable/bmp/bmpbookindd.pdf>
- Turton, Donald et al. Best management practices for forest road construction and harvesting operations in Oklahoma. Forestry Extension Report #5. Oklahoma State University.  
<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2502/FER%20#5pod.pdf>



- USDA, Forest Service. Forestry best management practices. Wetlands. [http://www.na.fs.fed.us/spfo/pubs/n\\_resource/wetlands/wetlands11\\_access%20systems.htm](http://www.na.fs.fed.us/spfo/pubs/n_resource/wetlands/wetlands11_access%20systems.htm)
- USEPA. Forestry best management practices in forested watersheds. Watershed Academy Web. <http://www.epa.gov/watertrain/pdf/Forestry.pdf>
- Virginia Department of Forestry. 2002 Virginia's forestry best management practices for water quality. <http://www.dof.virginia.gov/wq/index-BMP-Guide.shtml>
- Washington State Department of Natural Resources. 2000. Forestry practices manual. Olympia. WA. [http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesRules/Pages/fp\\_board\\_manual.aspx](http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesRules/Pages/fp_board_manual.aspx)
- Washington Department of Natural Resources. 2000. Forest practices board manual. Section 8. Guidelines for wetlands delineation. Olympia. WA. [http://www.dnr.wa.gov/Publications/fp\\_board\\_manual\\_section\\_08.pdf](http://www.dnr.wa.gov/Publications/fp_board_manual_section_08.pdf)
- Washington Department of Natural Resources. 2000. Forest practices board manual. Section 12. Guidance for application of forest chemicals. Olympia. WA. [http://www.dnr.wa.gov/Publications/fp\\_board\\_manual\\_section\\_12.pdf](http://www.dnr.wa.gov/Publications/fp_board_manual_section_12.pdf)
- Washington Department of Fish and Wildlife. Aquatic habitat guidelines: an integrated approach to marine, freshwater and riparian habitat protection and restoration. <http://wdfw.wa.gov/hab/ahg/>