

Standards and Best Practices for Instream Works



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Ministry of Water, Land and Air Protection
Ecosystem Standards and Planning
Biodiversity Branch

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Preface

British Columbia is recognized globally for its exceptional wildlife, diversity of ecosystems, and rich natural resources. The Ministry of Water, Land and Air Protection (WLAP) works to maintain these valuable natural assets, which lie at the heart of many recreational and economic activities enjoyed by British Columbians in all regions of the province.



The Ministry has responsibility for the protection and stewardship of British Columbia's environment. To fulfil this responsibility, it develops policy and legislation, regulations, codes of practice, environmental contracts and covenants (legal agreements). It also monitors and reports on selected species and habitats, as well as acquires information on habitat and species health. It sets science- and results-based objectives and standards and provides best practices for activities that affect our environment.

Together, clear goals and objectives, meaningful performance measures and science-based tools guide Ministry actions in improving environmental management. Regulatory frameworks allow headquarters and regional staff to set and report on standards for and protecting environmental quality, limiting discharges and emissions to air, land and water. Regulatory compliance is addressed through policy development, enforcement and the public reporting of the results of compliance monitoring.

An Increasing Role for Stewardship

While the Ministry takes a leading role in the protection of British Columbia's natural resources, species, and habitats, environmental protection and stewardship are ultimately the responsibility of all British Columbians. Stewardship of natural resources is key to maintaining and restoring the province's natural diversity, and achieving the Ministry's important environmental mandate. A stewardship approach involves all British Columbians taking responsibility for the well being of the environment by acting to protect or restore a healthy environment.

The Ministry is actively pursuing opportunities for sharing the responsibility of protecting the environment. To this end, it is establishing partnerships with other governments, First Nations, communities, academic institutions, industries, volunteer organizations, and citizens. The involvement of these partners in the shared environmental protection and stewardship of the province's resources is essential because of their local knowledge, resources, and expertise. With the assistance of these partners, the Ministry can work to increase the awareness of ecosystem needs, to incorporate environmental stewardship ethics and to create immediate and long-term improvements to our environment.

A Changing Process

Over the next several years, the Ministry will be making strategic shifts in its business practices, moving towards:

- Developing shared stewardship between the Ministry and other stakeholders;
- Establishing clear roles for gathering environmental information and achieving environmental objectives;
- Designing an integrated system of program delivery that is based on the best available science and an ecosystem-based approach; and
- Setting clear, reasonable environmental outcomes, with discretion as to how to achieve these outcomes.

This document will be updated in the future as these strategic changes take place, and will move in delivery format towards greater Internet-based access.

What Will This Document Do For Me?

This document is designed to help you act as a steward of the environment. The information provided here will guide you in planning and carrying out your proposed development activities so that they:

- comply with applicable legislation, regulations, and policies; and
- meet provincial standards of performance.

Knowing what these legal obligations and standards are will assist you in choosing the “best practices” for conducting your activities.

Information about the Ministry’s Notification and Approval processes – key application forms through which the province (under the *Water Act*) administers permitting for instream works – is also presented here. For many types of proposed works, all the guidance you need to submit a notification or apply for a formal Approval is provided here. Both processes require you to review this document, incorporate the appropriate standards and best practices into your work plan, and submit the appropriate form and accompanying documents.

If you already have experience working in and around water and are familiar with this document and the Notification and Approval processes, you may opt to turn directly to Sections 6 and 7 for information about the standards and best practices that apply to your type of work. If your instream works are related to forest, range, oil and gas or mining practices, you are not required to submit a Notification or Approval under the *Water Act* Regulation.

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1 Introduction

The British Columbia Ministry of Water, Land and Air Protection (WLAP) is committed to protecting and enhancing the quality of British Columbia's environment. Over the years, the Ministry's staff have made significant progress in implementing strategic changes in the delivery of environmental protection responsibilities in the province. This document further supports the Ministry's objectives of promoting shared stewardship and establishing provincial standards and best practices that can serve as the basis for ongoing monitoring of environmental protection and management efforts.

The Ministry has developed this document through consultation with its staff from all regions of the province. Fisheries and Oceans Canada (DFO) staff in the Pacific Region and other stakeholders have also had the opportunity to review it and provide input.

User's Tip:

Select terms used throughout the text are defined in the glossary, which may be found in Section 11.

Information about the Ministry's Notification and Approval processes – key applications through which the province (under the *Water Act*) administers permitting for instream works – is presented here. For many types of proposed works, most or all the guidance you need to submit a Notification or apply for a formal Approval is provided here. Both processes require you to review this document, incorporate the appropriate standards and best practices into your work plan, and submit the appropriate form and accompanying documents.

If your instream works are related to forest, range, oil and gas, or mining practices, you are **not** required to submit a notification or seek an approval under the *Water Act* Regulation. Rather, works can be conducted under the authority of the *Forest and Ranges Practices Act*, *Forest Practices Code of British Columbia Act*, or the *Mines Act*, or a regulation made under any of those Acts.

2 Purpose and Scope

This document sets out provincial standards and recommended best practices for the planning, design and construction of instream projects in keeping with the British Columbia *Water Act*.

This document has been developed to assist you in appropriately addressing fish and wildlife populations and habitat protection in the proposal, design and implementation of your instream works. **Note that other legislation and regulations (e.g., federal, municipal) may also apply to such activities.**

Some of the information provided in this document is referenced from legislation. However, this document should not be considered an official copy of legislation. If a discrepancy arises between this document and legislation, the legislation takes precedence. The Province of British Columbia does not guarantee the accuracy or completeness of the information referenced here from legislation, and in no event is the Province liable or responsible for damages of any kind arising out of its use.

3 Background

The geography of British Columbia offers a great diversity of aquatic habitats that supports a rich variety of flora and fauna. Water flows from glaciers and mountaintops to small headwater streams, and from there into lakes, rivers, wetlands, estuaries, and finally the ocean. Each of these habitats plays a critical role in the survival of the many species that depend on the aquatic environment during their life cycles.

Over the past 150 years, aquatic ecosystems and habitats have been negatively affected by human activities such as urban, agricultural and industrial development. To ensure the health and sustainability of our aquatic resources, we need to balance the demand on critical habitats with conservation activities.

3.1 What Is a Stream?

Streams are complex ecosystems supporting a range of aquatic habitats and species. Streams often support rare and endangered species and may or may not support fish habitat. A “stream” as defined in the *Water Act* is “a natural watercourse or source of water supply, whether usually containing water or not, ground water, and a lake, river, creek, spring, ravine, swamp and gulch.”

Consistent with the definition in the *Act* and in support of the federal *Fisheries Act*, channelized streams and some constructed ditches, such as those in floodplain areas, which provide fish habitat would also be considered streams.

3.2 What Are Fish and Wildlife Habitats?

Any proposed works in or about a stream must protect fish and wildlife habitat. The *Water Act* Regulation defines “habitat” as “the areas in and about a stream, including (a) the quantity and quality of water on which fish or wildlife depend directly or indirectly in order to carry out their life processes, and (b) spawning grounds and the nursery, rearing, food supply, and migration areas.

Remember:

- Not only the watercourse itself but also the vegetated streamside areas that provide nutrients and shade to the stream are considered fish and wildlife habitat.
- Fish habitat includes watercourses, streams, ditches, ponds and wetlands that provide water, food, or nutrients into a fish-bearing stream even if they do not contain fish or if they only have temporary or seasonal flows.

- The *Water Act* also applies to those streams that may have no fish habitat, yet still meet the definition of a stream. These streams are important for the complex ecosystem functions they provide, which could include the support of amphibians and rare and endangered species.

3.3 What Are Works In or About a Stream?

Works in or about a stream are defined under Section 9 of the *Water Act* as all works proposed in or about a stream, ravine or active floodplain of a stream or its riparian or streamside area.

Such works may include:

Stream Crossings

- installation, maintenance, or removal of stream culverts for the purpose of a road, trail, or footpath;
- construction, maintenance, or removal of clear-span bridges;
- construction or maintenance of pipeline crossings;
- construction, maintenance, or removal of ice bridges or winter fords; and
- construction, maintenance, or removal of temporary, seasonal fords.

Stream Channel Maintenance

- restoration or maintenance of stream channels by the provincial government or a municipality;
- cutting of annual vegetation; and
- control of Eurasian water milfoil and other aquatic vegetation.

Stream Bank and Lakeshore Stabilization

- repair or maintenance of existing dykes or erosion protection works.

Urban Stormwater Management

- construction or maintenance of storm sewer outfalls; and
- installation or repair of drainage tile outlets.

Habitat Enhancement and Restoration

- restoration or maintenance of fish habitat by the provincial or Canadian governments.

Beaver and Beaver Dam Management

- modification or removal of beaver dams.

For More

Information:

The publication *Water Management - A Users Guide to Working In and Around Water* (referred to as the “Users Guide”) will provide you with more information on the WLAP’s and Land and Water British Columbia (LWBC) requirements for working in and about streams and will guide you through the Ministry’s regulatory instream work requirements.

<http://www.lwbc.bc.ca/03water/licencing/index.html>

Miscellaneous Works

- repairs to bridge superstructures excluding foundations;
- construction, maintenance, or removal of temporary diversions;
- construction, maintenance, or removal of docks, wharves, or piers;
- routine maintenance of public utility works;
- construction, maintenance or removal of flow or water measuring devices;
- construction or removal of fish fences, screens, or fish or game guards; and
- installation, removal, or repair of fences outside the stream channel.

Emergency Works

- construction of emergency flood protection and erosion protection works as designated under the Emergency Program Act; and
- removal of bridge obstructions during flood conditions by the provincial government or municipal staff.

Other Types of Instream Works Requiring an Approval Application Under the *Water Act*

- culvert installation for reasons other than those listed under the “Stream Crossings” section above;
- watercourse or channel realignment;
- retaining wall or bank protection installation;
- dam construction;
- dredging;
- weir construction;
- construction of a sediment sump;
- pond or lake creation;
- permanent flow diversions; and
- other significant works.

4 Why Protect Fish and Wildlife Habitats and Water Quality?

4.1 Background

Remember:

The term “stream” is used here to refer to all watercourses including lakes, ponds, rivers, wetlands, creeks, springs, swamps, ravines, and some ditches.

Do you know what effects your proposed works may have on a stream ecosystem? This section addresses the range of potential impacts your proposed works may have on riparian and aquatic ecosystems. It provides additional context for the reasons why standards and best practices apply to your works, and for why you must consider those standards and best practices before you undertake works in or around water.

An ecosystem is the dynamic and interrelated complex of plant and animal communities and their non-living environment. All parts of an ecosystem, including physical, chemical, and biological components, are interconnected – that is, they affect and are affected by all other parts. Habitat refers to the natural home of a plant or animal within an ecosystem. Aquatic habitats are those areas associated with water that provide food and shelter and other elements critical to an organism’s health and survival.

4.2 Potential Impacts of Instream Works

Healthy aquatic ecosystems are dynamic – they are always changing. Instream work carries a high risk of affecting water quality and quantity, fish and wildlife species, and riparian and aquatic habitats by altering streams and streamside (i.e., riparian) areas (Figure 1). All instream works are potentially very intrusive to aquatic and riparian ecosystems. Such works can disrupt the continuity of riparian corridors, increase flows and stream power, cause temporary or permanent loss or alteration of aquatic habitats, and result in temporary or permanent loss of riparian vegetation.

With the potential for such significant impacts on fish and wildlife populations and habitats, instream works should be avoided.



Figure 1. Works near water can significantly impact aquatic and riparian species and habitats.

4.2.1 Physical Impacts: Impacts on Stream Processes

Streams are balanced dynamic systems in which the extent and frequency of change can be easily affected by human activities. Streams need space to move and good supporting structures (i.e., stable banks) to maintain their balance (Figure 2).

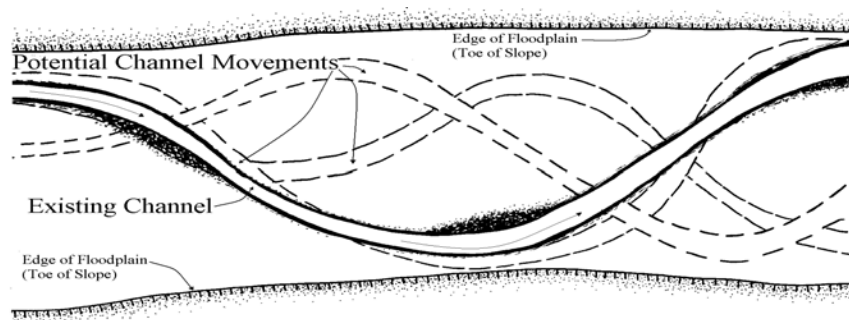


Figure 2: Natural channel migration within the active and historic floodplain of a stream

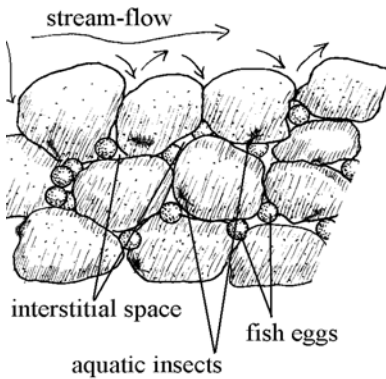
Works that damage or change the stream channel or encroach into the floodplain of a stream destroy habitats, reduce the stream capacity, and affect natural floodplain processes. Alterations made to a site's natural drainage pattern can have severe impacts on streams and nearby wetlands, causing destruction or dewatering of habitats. In addition, human development activities within the upper areas of watersheds can increase the flow and energy of surface runoff, further destroying in-channel habitats and increasing the need for erosion and flood protection works downstream.

4.2.2 Physical and Chemical Impacts: Impacts to Habitats and Water Quality

Stream water quality can be impacted by changes made to the streambed. The porous streambed (the streambed's hyporheic zone) plays a critical role in:

- the exchange and cycling of stream waters;
- the maintenance of stream temperature regimes;
- the moderation of flow or temperature changes; and
- the provision of important habitat for stream invertebrates, juvenile fish and other aquatic life, especially during incubation, and periods of low summer or high flood flows.

Clean Streambed Gravels



Works within a stream often result in the release of fine sediments and other deleterious substances. Fish, aquatic wildlife, other aquatic organisms and the food they depend on, are very sensitive to habitat quality and environmental cues such as high turbidity (i.e., cloudiness in the water). They can be killed, seriously injured, or affected by changes to water chemistry and high suspended sediment levels; and, like most other animals, they prefer the most hospitable habitat available to them.

Studies have shown that the introduction of fine sediments directly from digging activity in the stream and indirectly from run-off from exposed soils has severe negative impacts on all life stages of fish and other aquatic life and their habitats. These effects include:

- Reduction of the availability and quality of aquatic habitats through the in-filling of critical types of habitats (e.g., pools and riffles, spawning habitats);
- Loss of the spaces between spawning gravels used to shelter eggs, alevin, juvenile fish, and other aquatic organisms (Figure 3);
- Impairment of the health of fish and other aquatic organisms through the clogging and abrasion of gills and smothering of eggs and juveniles;
- Reduction of water clarity and visibility which impairs the ability of aquatic life to find food, mate, and escape predators;
- Elimination of critical food items such as insects and aquatic invertebrates through smothering and loss of habitat; and
- Death of fish, amphibian, insect, and other aquatic organisms.

Streambed Gravels In filled with Fine Sediments

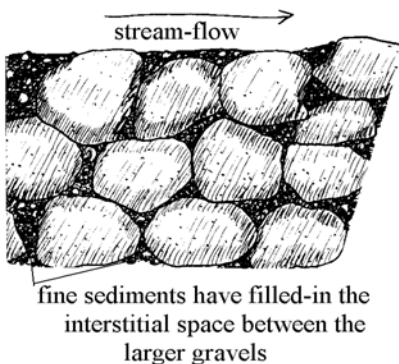


Figure 3. The impact of sediment deposition on stream flow through streambed materials.

Discharges or spills to streams of toxic or deleterious substances like concrete or cement products, equipment oils and fuels, wood waste, chlorinated drinking water, herbicides, pesticides and even sediment can kill fish, frogs, salamanders, insects, and all other aquatic organisms outright, or alter the stream's water chemistry so severely that they eventually die. Spills in streams can be devastating. In some cases, entire

stream ecosystems are destroyed as organisms within the stream are killed and habitat altered so severely the area can no longer be inhabited. Several of the standards and best practices listed in this document are oriented towards the avoidance of spills.

4.2.3 Biological Impacts: Impacts to Riparian vegetation and Fish & Wildlife Populations

What does
“riparian” mean?

Riparian = streamside

4.2.3.1 *Riparian vegetation*

Riparian vegetation is fundamental to the maintenance of healthy aquatic ecosystems. Vegetated riparian areas play critical roles in:

- providing woody debris that contributes to channel complexity and maintains microclimate conditions;
- buffering the effects on water quality of flow changes, such as increases in stream power and erosion, and changes in water temperature;
- buffering streams from sedimentation and pollution in surface runoff;
- contributing food and nutrients in the form of insects and organic litter fall;
- stabilizing soils through root matrices; and
- providing shade and cover to control temperature and manage predation.

Riparian areas also maintain critical aquatic and terrestrial wildlife habitats adjacent to the stream. Many of British Columbia’s animal species use riparian zones. These habitats provide higher complexity and structural diversity of vegetation and wildlife than any found in upland areas (Figure 4).

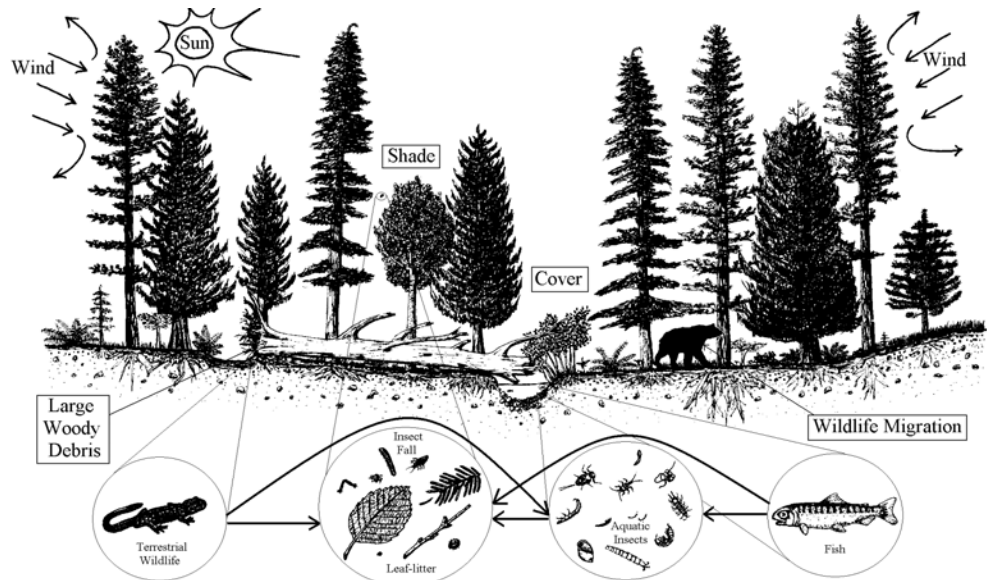


Figure 4: The primary riparian zone functions of a typical coastal stream in southwest British Columbia.

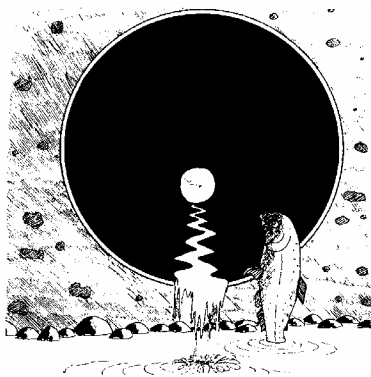


Figure 5. Changes in stream conditions can result in barriers to fish or wildlife passage

4.2.3.2 Fish and Wildlife Migration

An additional impact of instream works on aquatic habitat is the potential to form a total or partial barrier to fish or wildlife migration or movement. Instream structures or changes to the stream channel may alter flow velocities or depths. Fish migration occurs in response to a variety of needs including, but not limited to spawning, rearing, feeding, escaping too high or too low stream flow conditions, escaping poor quality or polluted waters, and escaping predators. Section 20(1) of the federal *Fisheries Act* requires fish passage to be maintained. Figure 5 illustrates one type of barrier to fish passage.

As well as providing valuable fish habitat, non-fragmented riparian areas provide critical migratory habitats for terrestrial wildlife, amphibians, and birds. Migratory bird abundance and diversity are generally greater in riparian areas, and small mammal communities tend to be more diverse along streams than other habitat types. Large mammals, such as deer and bears, use riparian areas as migratory corridors to search for food and mates, and to travel to breeding areas or between summer and winter ranges. Interruption of these migration corridors (Figure 6) reduces habitat function and value and may cause greater human-wildlife conflict and reduced wildlife survival.

Most amphibians and some reptiles migrate to specialized aquatic areas to reproduce and many spend much of their lives in riparian areas. Shoreline works in particular can have significant impacts on the habitats and migration routes used by these species. Lakeshore stabilization works can create vertical barriers to amphibian and reptile movement, and may disturb the foreshore habitats required for breeding.

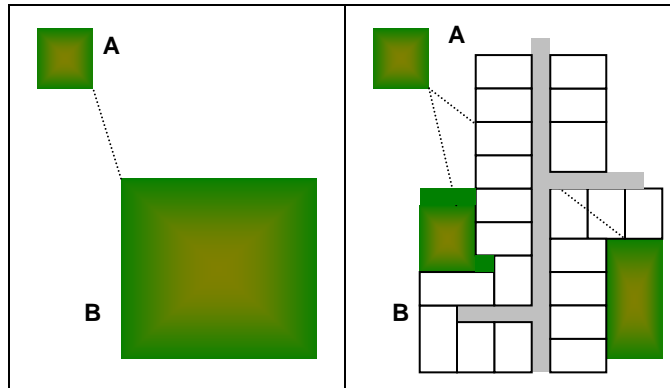


Figure 6. Patch A has become more isolated from the remnants of Patch B, after Patch B is fragmented by development and road construction. This limits movement between A and B for some species of wildlife.

4.2.3.3 *Species at risk*

Many of British Columbia's species at risk are supported by riparian and aquatic habitats. These include, but are not limited to:

- Painted Turtle (lakeshore habitat)
- Pacific Water Shrew (riparian forest habitat)
- Toothcup plant (lakeshore habitat)
- Behr's (Columbia) Hairstreak butterfly (dry riparian areas)
- Nooksack Dace (fast-flowing small streams)
- Arctic Grayling – (Williston Watershed Population)
- Bull Trout (streams and large rivers)
- Coastal Giant Salamander (streams and riparian habitat)
- Oregon Spotted Frog (shallow wetlands and marsh habitat)
- White Sturgeon (large river systems)
- Great Basin Spadefoot Toad (ponds within dry grassland habitat)

What is Critical habitat?

Critical habitat is defined under the *Species At Risk Act*. It includes high value spawning, rearing, or nesting habitat, as well as habitat critical to the maintenance of local populations of a species because of its rareness, productivity, or sensitivity. Impacts to critical habitat areas **must** be avoided.

Impacts of any degree on the habitat of threatened or endangered species can have catastrophic effects on species survival and should be avoided at all times. For some species at risk, there is no “window of least risk” during which instream works may be permitted. The risk of harm to the plant or animal remains high at all times.

Mitigate =
To lessen or reduce

Before planning any instream works, you should contact your local WLAP office for assessment and window information. You should also review the following website for further information on species at risk: <http://srmwww.gov.bc.ca/atrisk/>. In addition, the “Species Explorer” at <http://srmwww.gov.bc.ca/atrisk/toolintro.html> can help you identify which species at risk may be in your area. The legislation guiding the protection of species at risk, the federal *Species At Risk Act*, is detailed in the following section.

5 Legal Requirements: How Are My Works Regulated?

Under British Columbia's *Water Act*, anyone proposing to carry out instream works must submit either a Notification or application for Approval to WLAP, LWBC, or both.

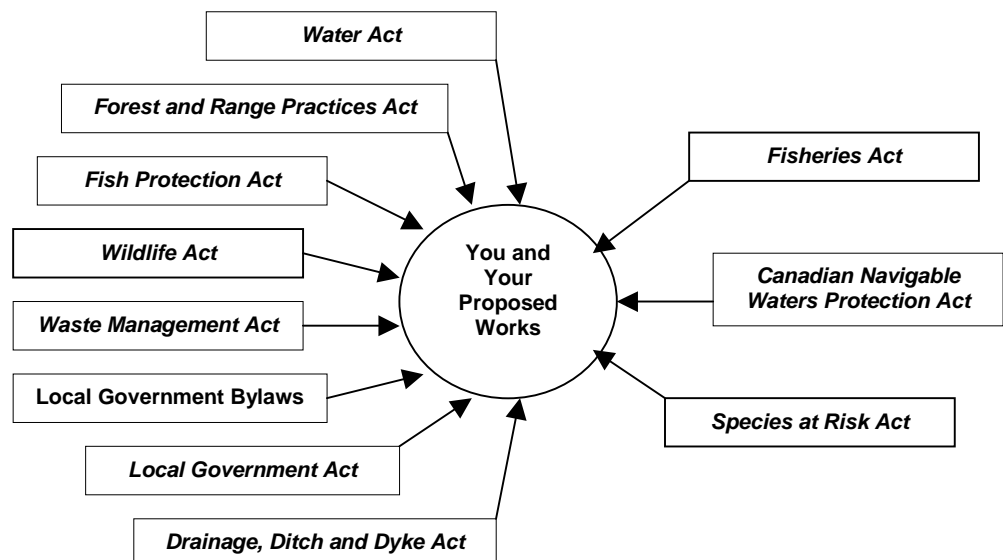
Important to note, however, is that works conducted under the authority of the *Forest and Ranges Practices Act*, *Forest Practices Code of British Columbia Act*, the *Mines Act*, or a regulation made under any of those Acts, **do not** require Notification or application for Approval under the *Water Act*.

5.1 Legal Requirements for Instream Works

Acts and regulations exist at the provincial and federal levels to protect fish and wildlife species and habitats, as well as water quality and quantity (Figure 7). Municipalities and regional districts may also have local bylaws that amplify provincial or federal legislation for working in or near water. What applies to your proposed instream works?

Several pieces of legislation are undergoing review. Information on any changes can be obtained from provincial and federal websites:

<http://www.gov.bc.ca/>
<http://canada.gc.ca/>



This section summarizes the main pieces legislation you should know about. If you have a question or concern about these and how they affect your activity or project, contact your regional Ministry, DFO, or local government offices.

Due diligence

It is your responsibility when working in and around water to:

1. be familiar with the municipal, provincial, and federal legal requirements;
2. recognize and address the potential impacts to aquatic and riparian habitats, water quality and quantity, fish and wildlife populations, and public safety and property from your proposed works;
3. recognize and address the need to avoid, mitigate or lessen those impacts or risks;
4. ensure the protection of fish and wildlife populations and their habitats, including species at risk;
5. ensure the protection of properties and human health;
6. obtain the appropriate permits and authorizations from all regulatory agencies before proceeding with activities; and
7. conduct your works in a manner that complies with the law and avoids, mitigates or lessens potential impacts to aquatic and riparian habitats, water quality and quantity, fish and wildlife populations, and public safety and property.

5.1.1 Provincial Legislation

Various pieces of provincial legislation regulate activities related to instream works. The most pertinent Acts and regulations are described below.

5.1.1.1 *Water Act*

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/W/96483_01.htm

The *Water Act* is the main provincial statute regulating water resources in British Columbia. Under the Act, it is an offence to divert or use water, or alter a stream, without formal approval from the Province.

Section 9 of the *Water Act* regulates changes in or about a stream. Under this section, the “*Water Act* Regulation” ensures that water quality, riparian habitat, and the rights of licensed water users are not compromised. In 1998, the Regulation was amended to include certain

Key sections of the
Water Act:

- **Section 1:** definitions and terms;
- **Sections 5&6:** lists the rights acquired under a water license;
- **Section 7:** lists who may acquire a water license;
- **Section 8:** allows short term approvals (water use less than 12 months);
- **Section 9:** allows approvals for changes in and about a stream; these must also meet with DFO approval under the federal *Fisheries Act*;
- **Sections 10-50:** outline license applications, rights, administrative concerns, rights of appeal, and offences.

activities that could be undertaken in compliance with the Regulation rather than under the authority of an Approval.

Under the original Regulation, many works could only be permitted if a proponent obtained a formal Approval or licence. Now, under the amended Regulation, you may carry out a number of routine works, provided that the general conditions and notification requirements are met.

Part 7 of the *Water Act* Regulation is entitled “Changes in and about a stream”. It includes sections that: permit the use of notifications rather than approvals for certain types of works; contain provisions for the protection of water quality, habitat, and other water users; and authorize changes to streams. Formal approvals are required in cases involving more complex works and for the short-term use, storage or diversion of water.

If your work involves making a change in and about a stream, your work cannot proceed unless it is:

- compliant with the requirements of the *Water Act*, and
- authorized by an approval, licence, or order under Section 9 of the *Water Act* from LWBC or
- authorized through a Notification to WLAP as permitted by Part 7 of the *Water Act* Regulation.

Activities That May Be Carried Out Under the Regulation

In general, works that do not involve any diversion of water, that may be completed within a short period of time, and that have little impact on the environment may be conducted in compliance with the Regulation, and without a permit, through the Notification process. Refer to the Regulation for a detailed list of such types of works. Some examples of works allowed under the Notification process include:

- installation of a clear-span bridge stream crossing;
- installation or repair of a pier or wharf;
- replacement and maintenance of culverts and outfalls;
- temporary stream diversions around a worksite; and
- minor maintenance of municipal utilities.

Keep in mind that all such activities must adhere to general standards and best practices and a Notification must still be submitted to WLAP. You must also follow any conditions set out by a Habitat Officer with regard to timing of the work, maintenance of minimum flow, salvage of fish or wildlife, protection of vegetation, and site restoration. Note that DFO may also have special requirements under Section 35 of the *Fisheries Act* (see Section 5.1.2 below).

Fines and Penalties Under the Water Act

A person who commits an offence under the *Water Act* may be liable on conviction to a fine of between \$200,000 per offence per day (up to \$1,000,000 per offence per day) or to imprisonment not exceeding 12 months, or to both. The *Water Act* also allows for creative sentencing: courts may require a convicted party to take action to remedy damage done, or to engage in an activity to prevent the repeat of the offence, such as paying for compensation, performing community service, or paying a bond to ensure compliance.

Streamside Protection Regulation

The Streamside Protection Regulation provides local governments with an improved planning approach to streamside protection. The science-based regulation attempts to find the best possible balance among fish protection, land development potential and other community values. Local governments will be given the flexibility to implement the directives in a manner that takes into account capacity issues, local values, settlement patterns and stream conditions. They will also be able to develop their own streamside protection measures, provided that these measures are comparable to the directives. The regulation is currently under review.

For more information, refer to the following website:
http://wlapwww.gov.bc.ca/habitat/fish_protection_act/streamside_protection/streamside_protection.html

5.1.1.2 Fish Protection Act

For full text of this legislation, visit:

http://wlapwww.gov.bc.ca/habitat/fish_protection_act/

The *Fish Protection Act* was passed in 1997 in British Columbia and is part of the provincial Fisheries Strategy. It focuses on four major objectives:

1. ensuring sufficient water for fish;
2. protecting and restoring fish habitat;
3. improving riparian protection and enhancement; and
4. strengthening local government powers in environmental planning.

The Act is not yet fully enforced, but several components could potentially affect your construction and maintenance activities if you live in an urban area. Those components include:

- the *Streamside Protection Regulation*, which protects riparian areas threatened by urban development;
- rules that prohibit the introduction into streams of debris that will be harmful to fish; and
- new water allocation rules for streams that are not designated as “sensitive streams” under the *Act*.

The *Fish Protection Act* provides protection to fish and fish habitat by:

- prohibiting stream-blocking dams on major rivers;
- mandating the consideration of fish habitat issues in dealing with applications under the *Water Act*;
- establishing special rules in relation to water licences on streams designated as being particularly sensitive to impact on fish and fish habitat and providing for the development of recovery plans for such streams, and
- allowing the provincial government to establish directives for local governments in preserving streamside areas (e.g., the Streamside Protection Regulation which is currently under review).

The *Fish Protection Act* also contains amendments to several other pieces of provincial legislation, including the *Water Act*, *Wildlife Act*, and *Waste Management Act*.

Those amendments related to the *Water Act* include:

How does the *Fish Protection Act* affect the *Water Act*?

The *Fish Protection Act*, passed in 1997, has made significant changes to the *Water Act*. Key sections include:

- **Section 22.1-22.4:** water management areas and plans;
- **Section 40.1:** prohibiting introducing debris into a stream or area adjacent to a stream that may harm or damage the stream, stream channel, property or riparian owners, fish or fish habitat; and
- **Section 40.2:** allows for remediation orders for mitigation of effects of introduced debris.

- establishing a public process for the development of water management plans to guide future government decision making;
- providing additional water use regulation authority to provide greater flexibility in ensuring water in streams at the time it is required for fish;
- expanding the definition of materials constituting debris and allowing remediation if such deposit occurs; and
- providing additional enforcement authority, including allowing creative sentencing as under the proposed *Waste Management Act* amendments and establishing higher penalties for offences related to fish and fish habitat.

Those amendments related to the *Wildlife Act* (see below) allow endangered or threatened species protection to be provided regardless of whether the cause of the extinction threat is human in origin, and allow this protection to be extended to invertebrates and plants that are factors in fish habitat.

Those amendments related to the *Waste Management Act* (see below) provide additional enforcement authority, including allowing courts to use creative sentencing to establish additional penalties (such as remediation, mitigation, or community service) that the court considers appropriate to the nature of the offence.

Fines and Penalties Under the *Fish Protection Act*

There are no direct fines and penalties under the *Fish Protection Act*. However, by not complying with the Act and its associated regulations, you risk committing an offence under the *Waste Management Act*, the *Water Act*, the *Wildlife Act*, or other legislation.

5.1.1.3 *Wildlife Act*

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm

The provincial *Wildlife Act* protects wildlife and wildlife habitat in British Columbia. The main legal tool that permits special privileges under the *Wildlife Act* is the Wildlife Permit Regulation, revised in 2000.

Under this new Wildlife Permit Regulation, two types of permits may be granted: authorization permits and exemption permits. An exemption permit is required by anyone wishing to destroy a beaver dam or muskrat

den. Some of the sections of the Act most applicable to instream works are detailed below:

Wildlife Act Definitions:

- **Fish:** bony fishes, lampreys, crustaceans, or molluscs, from or in non-tidal waters of B.C., including their eggs and juvenile stages.

Section 9: Damaging beaver dams

- (1) A person commits an offence if the person disturbs, molests or destroys
 - (a) a muskrat house or den, except on dyked land, or
 - (b) a beaver house or den or beaver dam.
- (2) Subsection (1) does not apply
 - (a) to a licensed trapper,
 - (b) if the action is taken to provide irrigation or drainage under lawful authority for the protection of property, or
 - (c) if the action is authorized by regulation.

The Act also enforces the protection of bird nest sites. Section 34 of the Act states that it is an offence to destroy nests occupied by a bird, its eggs, or its young.

Section 34: Birds, nests and eggs

- A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys
- (a) a bird or its egg,
 - (b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
 - (c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

Clearing should not occur during critical bird-nesting periods, which typically occur in spring and summer. Contact your local WLAP office to obtain the vegetation clearing timing windows for your region.

The Act also protects the nests of herons, owls, vultures, eagles, falcons, and hawks in perpetuity. Before you undertake any clearing work, Ministry staff may require you to obtain professional assistance in completing a field survey to determine that no nesting birds are present.

Section 6: Endangered and threatened species

- (1) If the Lieutenant Governor in Council considers that a species of wildlife is threatened with imminent extinction throughout all or a significant portion of its range in British Columbia because of the action of humans, the Lieutenant Governor in Council may, by regulation, designate the species as an **endangered species**.
- (2) If the Lieutenant Governor in Council considers that a species of wildlife is likely to become endangered in British Columbia if the factors affecting its vulnerability are not reversed, the Lieutenant Governor in Council may, by regulation, designate the species as a **threatened species**.

Fines and Penalties Under the *Wildlife Act*

Convictions under the *Wildlife Act* may lead to a fine of between \$1,000 and \$100,000, or a term of imprisonment not exceeding one year, or both.

5.1.1.4 *Drainage, Ditch and Dike Act & Dike Maintenance Act*

For full text of these legislations, visit:

http://www.qp.gov.bc.ca/statreg/stat/D/96102_01.htm &
http://www.qp.gov.bc.ca/statreg/stat/D/96095_01.htm.

These provincial Acts establish a system for the regulation and authorization of ditches, watercourses, drainages, and dikes in British Columbia. If your work involves the diversion, storage, use or delivery of water, you must apply under the *Water Act* for Approval and a water licence. For further information, contact LWBC at <http://lwbc.bc.ca>.

For information on dike construction and maintenance visit :

<http://wlapwww.gov.bc.ca/wat/flood/> or
<http://wlapwww.gov.bc.ca/wat/flood/structural.html>., or contact your regional WLAP office.

5.1.1.5 *Waste Management Act*

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/W/96482_01.htm

This provincial Act protects the quality of air, land and water by regulating the discharge or emission of effluent, waste or contaminants. The Act includes restrictions regarding solid and toxic wastes and contains spill-reporting requirements for certain substances. The Agricultural Waste Management Regulation falls under this Act and regulates the storage, use, and disposal of agricultural wastes. All spills of reportable quantities of substances toxic, polluting or deleterious to aquatic life must be reported to the Provincial Emergency Program 24 hour phone line at **1-800-663-3456**.

5.1.1.6 *Forest Practices Code of British Columbia Act/Forest and Range Practices Act*

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/F/96159_00.htm

The *Forest Practices Code of British Columbia Act* and its replacement, the *Forest and Range Practices Act* govern forestry-related activities. Guidance for working in or about water in compliance with these Acts is provided in the *Fish Stream Crossing Guidebook*, *Riparian Management Area Guidebook*, and other guidebooks. Instream works conducted under the authority of this Act or a regulation made under the Act, do not require *Water Act* referral or notification. For more information on the new *Forest and Range Practices Act*, visit: <http://www.for.gov.bc.ca/code/>

5.1.1.7 Oil and Gas Commission Act

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/O/98039_01.htm

Important sections of the *Fisheries Act* that are relevant to instream works:

Subsection 34 (1): defines “deleterious substance” as *any substance that, if added to any water, would degrade or alter...the quality of that water so that it is rendered or is likely rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.*

Section 35 (1): No person shall cause Harmful Alteration, Disruption or Destruction (HADD) of fish habitat, either by direct or indirect means.

Section 36(3): No person shall deposit deleterious substances in any type of water frequented by fish or in any place under any conditions where the deleterious substance may enter any such water.

Subsection 37(1): Requires approval for work that may impact fish habitat. If any work is carried out which is likely to result in HADD, you must submit development plans to DFO for approval or authorization

This provincial Act governs activities related to the search, exploration, production, gathering, processing and storage of petroleum and natural gas. Under this Act, the Oil and Gas Commission takes on some of the responsibility normally vested in other Acts (e.g., the *Water Act*, the *Forest and Range Practices Act*) for works such as road and stream crossing construction for oil- and gas-related projects. For some works, the Oil and Gas Commission may issue a permit or Approval. To obtain more information, visit the commission’s website: <http://www.ogc.gov.bc.ca/>

5.1.1.8 Local Government Act (formerly the Municipal Act)

For full text of this legislation, visit:

http://www.qp.gov.bc.ca/statreg/stat/L/96323_00.htm

Under the *Local Government Act*, local governments may enact their own bylaws for such matters as sediment control, erosion protection, wastewater discharge, watercourse protection, drainage, and tree retention. Local bylaws may amplify federal or provincial legislation for working in or near water. Contact your local municipality or regional district to find out which bylaws may apply to your proposed works.

5.1.2 Federal Legislation

5.1.2.1 Fisheries Act

For full text of this legislation, visit: <http://laws.justice.gc.ca/en/F-14/>

The *Fisheries Act* is the main federal Act affecting all fish, fish habitat, and water quality. Anytime your activity has the potential to deposit a “deleterious substance” or if you are seeking a permit to destroy or alter fish habitat, the *Fisheries Act* is invoked.

Under this Act, the term fish refers to “all fish, shellfish, crustaceans and marine animals, and the eggs, spawn, spat and juvenile stages of fish, shellfish, crustaceans, and marine animals”. Fish habitat is defined as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.”

The Act is administered federally by the Fisheries and Oceans Canada (DFO) and Environment Canada and provincially by the Ministry of Water, Land, and Air Protection. Depending on the area of the province, water quality concerns may be addressed by either Environment Canada or DFO through Section 36 of the Act, or by WLAP through the *Waste Management Act*.

Some works require only that you inform DFO; others require a Section 35(2) Authorization from DFO. Contact DFO to determine whether

The **Council on the Status of Endangered Wildlife in Canada (COSEWIC)** is given legal status under *SARA*. They have the responsibility to conduct the assessment of species and produce a list of threatened or endangered species. The federal government then formulates recovery strategies and action plans for the protection of these species.

Over the last 22 years, COSEWIC has classified 340 species in Canada as being at risk. This means they are extinct, extirpated (no longer in the wild in Canada but existing in the wild elsewhere), endangered, threatened or vulnerable.

Examples of a few of the *federally* designated species at risk found in BC:
Coastal Giant Salamander,
Dun Skipper butterfly,
Coast Basin Spadefoot Toad, and Pacific Water Shrew.

your works will require the latter. DFO may also require you to retain the services of an appropriately qualified professional to provide advice should your project have the potential to harm fish or fish habitat.

Fisheries Act approvals will include application of the Federal Policy for the Management of Fish Habitat's Guiding Principle of "no net loss of productive capacity of habitat" achieved through habitat protection, enhancement, and compensation. For more information, visit: http://www.ncr.dfo.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/index_e.asp

Fines and Penalties Under the *Fisheries Act*

Convictions under the *Fisheries Act* may be divided into Summary convictions and indictable offences. Summary convictions can result in fines up to \$100,000 per offence per day or up to one year of imprisonment. Indictable offences can result in fines up to \$500,000 per offence per day or up to two years of imprisonment, or both. Courts may also engage in what is known as "creative sentencing," whereby a convicted party could be required to take action to remedy damage done, or to engage in an activity to prevent the repeat of the offence, such as paying for compensation, performing community service, or payment of a bond to ensure compliance.

5.1.2.2 *Species at Risk Act (SARA)*

For full text of this legislation, visit:

http://www.ec.gc.ca/press/000411_b_e.htm

http://www.parl.gc.ca/37/2/parlbus/chambus/house/bills/government/C-5/C-5_3/C-5TOCE.html

The federal *Species At Risk Act* (SARA) was enacted on October 9, 2002 and aims to protect wildlife at risk from becoming extinct or lost from the wild. The ultimate objective of *SARA* is to help wildlife numbers to recover. *SARA* prohibits the killing, harming, harassing, capturing, or taking of species officially listed as threatened, endangered or extirpated, and the destruction of their residences or critical habitats. *SARA* covers birds, plants, fish, mammals, invertebrates, amphibians, and reptiles. *SARA* seeks to manage species of special concern to prevent them from becoming endangered or threatened. Compensation for loss of land use is also available in extraordinary circumstances.

This Act recognizes that the primary threat to species is the destruction or degradation of their habitat. The Act encourages the protection of habitat through conservation and voluntary measures.

The Act also contains what is referred to as the "safety net," which, through federal intervention, could protect individuals and critical habitats or regulate land use.

For more information on species at risk in the Province of British Columbia, refer to the following provincial websites:

<http://srmwww.gov.bc.ca/atrisk/>, and
<http://srmwww.gov.bc.ca/cdc/>

How Will the *Species At Risk Act* Affect My Instream Work?

SARA complements the work done by provincial and territorial governments under the Accord for the Protection of Species at Risk. This recognizes that species protection is a shared responsibility. Under *SARA*, you may need to apply for a permit to engage in an activity that will affect a species listed by COSEWIC, or the habitat of any species listed by COSEWIC.

If you determine, through doing an environmental assessment of your project, that a listed wildlife species will be negatively affected, the federal government may require that you notify them. In general, Environment Canada is responsible for overall administration of the Act, except when the Act gives responsibility to either Fisheries and Oceans Canada or Parks Canada.

A number of other laws and agreements currently in force stand beside this Act to assist with habitat protection and the protection of species at risk. These include the *Fisheries Act*, the *Migratory Birds Convention Act*, the *National Parks Act*, the *Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act*, the *Convention on International Trade in Endangered Species* and the *Canada Wildlife Act*.

Fines and Penalties Under the *Species At Risk Act*

Convictions under *SARA* can result in fines up to a range of \$50,000 to \$1,000,000 and up to a five-year term of imprisonment.

5.1.2.3 *Navigable Waters Protection Act*

For full text of this legislation, visit:

<http://laws.justice.gc.ca/en/N-22/text.html>

The *Navigable Waters Protection Act* of Canada regulates any activity in, around, under, and over navigable waters, and is administered by the Canadian Coast Guard of the DFO. Navigable waters are defined as including any body of water capable of being navigated by any type of floating vessel for the purpose of transportation, recreation, or commerce.

Authorization under this Act is required for new and replacement stream crossing works on navigable waters, as well as for works on navigable waters that would occur below the high-water mark, such as dredging, channel maintenance, and streambank protection.

How Will the *Navigable Waters Protection Act* Affect My Instream Work?

The design of your works must not hinder appropriate navigation of navigable waters. Usually works that are regulated under the *Navigable Water Protection Act* are also those that may result in a HADD under the *Fisheries Act*. When planning such works, you are required to provide

project information to DFO and enter into the DFO Review process as described in Section 5.6. For more information on the specific Approval process under the *Navigable Waters Protection Act*, visit: http://www.ccg-gcc.gc.ca/cen-arc/nwp-pen/client/index_e.htm

Fines and Penalties Under the Navigable Waters Protection Act

Convictions under the *Navigable Water Protection Act* can result in fines up to \$5,000 and/or a term of imprisonment of up to 6 months. If works are carried out without approval under the *Act*, you may also be responsible for the costs related to removal of the works and rehabilitation of the site.

5.1.3 Local Government Legislation

Local governments throughout the province have put in place various restrictions and bylaws for such things as sediment control, erosion protection, wastewater discharge, watercourse protection, drainage, and tree retention, which may also affect your proposed works. It is your responsibility to contact your local municipality or regional district to find out which local bylaws may apply to your proposed works.

5.2 When Will I Need to Submit a *Water Act* Notification?

If your works are listed in the first eight categories itemized in Section 3.3 of this document, Part 7 of the *Water Act* Regulation authorizes you to construct your works and to complete other specified changes in and about a stream to an acceptable standard following the submission of a Notification to WLAP.

If your planned works fall into the category “Other Types of Instream Works,” you must obtain a formal Approval or license from LWBC, through the *Water Act* Approval process. This type of work, in addition to requiring an Approval under the *Water Act*, will likely require the involvement and approval of federal regulatory agencies such as DFO.

The Notification process requires that you give WLAP at least 45 days notification prior to starting your planned activities. Ministry staff may provide, within the 45-day period, information further to that contained in this document regarding timing windows and other conditions for work to protect aquatic resources, species, and habitats.

If the standards and best practices listed in this document are followed, the following changes in and about a stream may be carried out:

1. **With** notification **at least 45 days** prior to:

- modification or installation of a stream culvert for the purpose of a road, trail, or footpath;

- modification or installation of a clear-span bridge;
- modification or installation of a pipeline crossing;
- modification or installation of a pier or wharf;
- modification or installation of a flow or water measuring device by the British Columbia or Canadian governments;
- modification or installation of a fish fence, screen or game guard by the British Columbia or Canadian governments;
- restoration of a stream channel by the British Columbia Government or a municipality;
- cutting of annual vegetation;
- restoration of fish habitat by the British Columbia or Canadian governments;
- repair of an existing dyke or erosion control works;
- modification or installation of a storm sewer outfall;
- control of aquatic vegetation;
- modification or installation of an ice bridge or winter ford;
- minor and routine maintenance of public utility works; and
- modification or removal of a beaver dam.

2. **Without** pre-notification, but requires reporting/notification within **72 hours** following works:

- erosion or flood protection works during an emergency flood event as designated under the *Emergency Protection Act*; and
- clearing of an obstruction from a bridge or culvert by the British Columbian government or municipality during an emergency flood event.

3. **Without** Notification:

- installation or cleaning of drain tile outlets;
- repair of bridge superstructure (excluding foundations); and
- repair, removal, or construction of fences not in the stream channel.

5.3 When Will I Need to Submit an Application for a *Water Act* Approval?

You are required to submit an Approval application to LWBC under Section 9 of the *Water Act* if you are planning any of the following works:

- changes or construction activities not listed above as being permitted under the Notification process

Legal Requirements:
How Are My Works Regulated?

- works that are listed above but are large or significant in scope
- works that have increased potential impacts due to habitat or species sensitivities or risks

It is important to note that LWBC manages the Approval application process. The Approval application process requires you to provide all habitat assessments, designs, and plans for the works needed to determine the affects of the proposal on the legal rights of downstream water licensees, channel stability, flood levels, and fish and wildlife

Remember:

Failure to obtain an Approval, provide Notification, meet the conditions in an Approval, or meet the standards or requirements under the *Water Act* Regulation would be considered non-compliance with the *Water Act* and could result in significant penalties including imprisonment, pursuant to the Act.

resource values.

Before you begin your proposed works, you must have received an Approval document from staff at LWBC.

5.4 How Do I Submit My Notification or Application for Approval?

To submit a Notification or and application for an Approval under the *Water Act*, follow the steps outline below (Figure 8).

Step 1:

Review the [Potential Impacts of Instream Works](#) section of this document to familiarize yourself with potential impacts that may arise from your proposed works;

Step 2:

Review your legal obligations in the [Legal Requirements](#) section of this document;

Step 3:

Plan your works to comply with the standards and recommended best practices detailed in the [Standards and Best Practices](#) section of this document; and

Step 4:

Determine whether your works will require a Notification to WLAP or an application to LWBC for an Approval under the *Water Act*;

Step 5:

Submit a Notification to your regional WLAP Office using the outline provided in Section 10.2, at least 45 days prior to the start date of your proposed works; or contact your regional LWBC Service Centre for information on submitting an application for an Approval under the *Water Act*. LWBC Service Centre contact information is found in Section 10.1 of this document.

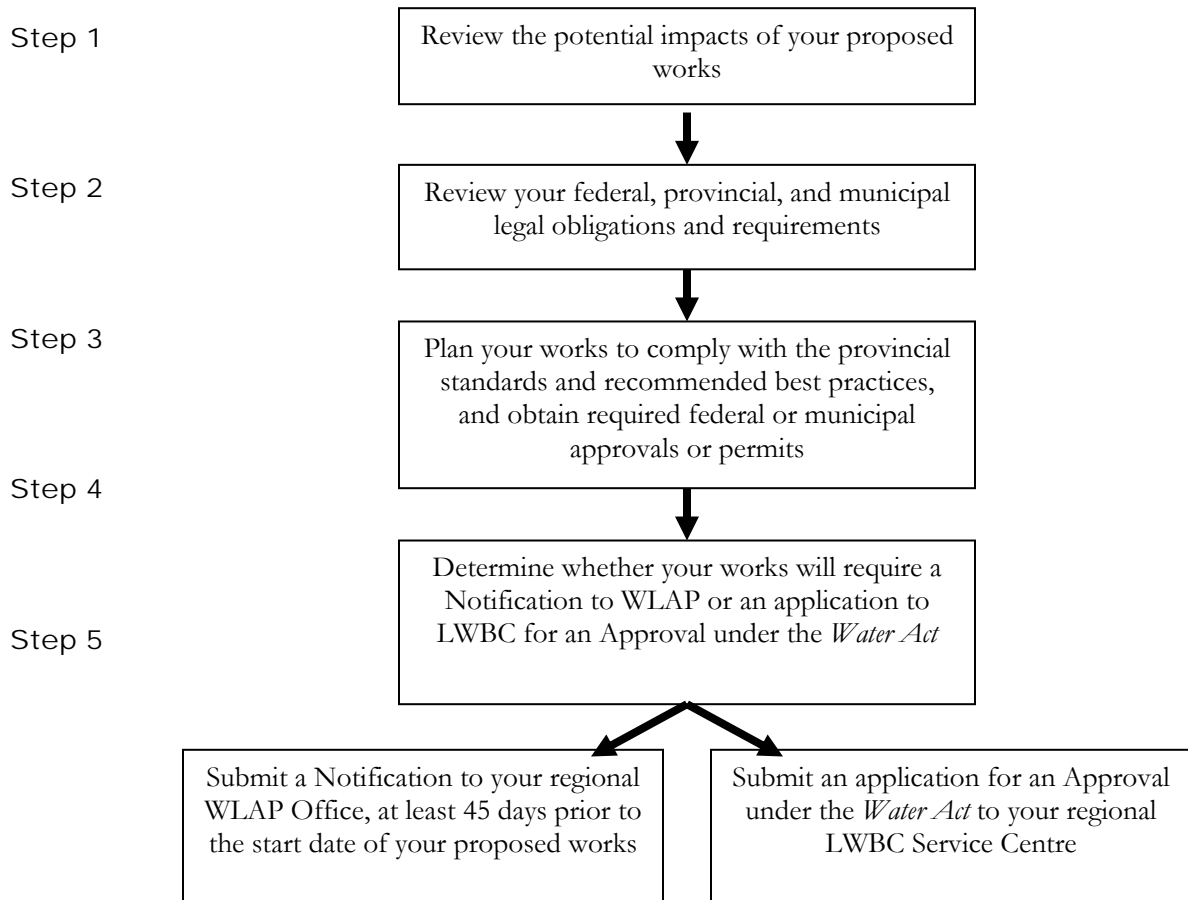


Figure 8. Provincial (WLAP and LWBC) review process.

5.5 What If My Works Are Related to Forestry, Range, Oil and Gas, or Mining Practices?

If your instream works are related to Forest, Range, Oil and Gas or Mining practices, you are **not** required to submit a Notification or apply for an Approval under the Water Act. Instream works conducted under the authority of the *Forest and Ranges Practices Act*, *Forest Practices Code of British Columbia Act*, the *Mines Act*, *Oil and Gas Commission Act* or a regulation made under any of those Acts, do not require *Water Act* referral or Notification.

If your proposed works in or about a stream are related to forestry or range practices, refer to the *Forest and Range Practices Act* and *Forest Practices Code Act of British Columbia* website for standards and best practices which apply to your works: <http://www.for.gov.bc.ca/code>

For guidance on stream crossing works for forestry and mineral or petroleum access roads, refer to the Forest Practices Code, *Fish-stream Crossing Guidebook*, March 2002, or its' equivalent. The document is available at the following website:
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>

Several other *Forest and Range Practices Act* and *Forest Practices Code* documents provide standards and best practices for works related to forestry, and the mining and oil and gas industries. Refer to the above website for links to these documents.

For more information on mining activities, refer to:
http://www.qp.gov.bc.ca/statreg/stat/M/96293_01.htm

The British Columbia Oil and Gas Commission may also issue permits and approvals for instream works related to the Oil and Gas industry. Refer to the following website for more information:
<http://www.ogc.gov.bc.ca/>

5.6 How Is Fisheries and Oceans Canada Involved?

As outlined in Section 5.1 of this document, Fisheries and Oceans Canada (DFO) has ultimate authority over fish habitat through the *Fisheries Act*. Section 35 of the Act protects fish habitat. Subsection 35(2) also contains provisions for DFO to authorize works where the harmful alteration, disruption or destruction (HADD) of fish habitat is expected. **Proposed works that result in a HADD can only proceed after an Authorization under Subsection 35(2) of the Fisheries Act**

has been issued in addition to a *Water Act* Notification or Approval.

How Can I Avoid a HADD?

The *Decision Framework for the Determination and Authorization of HADD of Fish habitat* (1998) describes DFO's approach to reviewing requests for Subsection 35(2) *Fisheries Act* Authorizations. These Authorizations are only required where harm to fish habitat is expected. Instream works can usually avoid a HADD of fish habitat if the work spans the stream or can be undertaken without:

- disturbing instream fish habitat;
- encroaching within the stream channel or active floodplain; or
- causing excessive, avoidable or irreplaceable loss of riparian vegetation.

DFO has outlined the following habitat management options that should be considered in the design of your works (Figure 9).

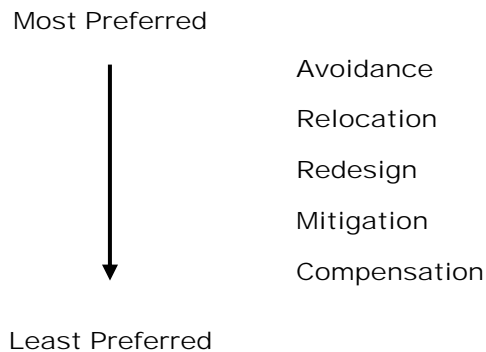


Figure 9. DFO habitat management options

DFO Contact Information is provided in Section 10.1 at the end of this document.

From this figure it should be clear that your works should be planned and designed to avoid causing a HADD, if possible. Options, such as the relocation or redesign of your works to avoid a HADD, should be considered. In certain circumstances, harm to fish habitat may be unavoidable despite relocation, redesign or mitigation. In these circumstances, DFO will require compensation for loss of fish habitat consistent with the DFO Policy for the Management of Fish Habitat (“No-Net-Loss” Policy).

DFO Habitat Classifications

In the consideration of applications for Subsection 35(2) Authorizations, the DFO review will focus on the value and sensitivity of fish habitat potentially affected. All fish habitats contribute to the productivity of fish

populations. Even in situations where fish cannot access a stream section because of a waterfall or other barrier, this section can still benefit fish production indirectly through food production and other factors. Therefore, any reduction in the quantity or quality of fish habitat may reduce fish productivity. Some habitat types make a greater contribution to fish productivity than others and are treated differently by DFO in their authorization of different types of works.

The following habitat classifications are used in the DFO review process. Please note that the indicators described in the habitat classifications are highly generalized and require regional interpretation. Those involved in conducting habitat assessments should contact their regional DFO office.

What does
*Appropriately
Qualified Professional*
mean?

Appropriately qualified professional means an applied scientist or technologist specializing in a relevant applied science or technology including, but not necessarily limited to, agrology, forestry, biology, engineering, geomorphology, geology, hydrology, hydrogeology or landscape architecture, and

- a) who is registered in British Columbia with their appropriate professional organization, and acting under that association's Code of Ethics and subject to disciplinary action by that association, and these links:
- b) who, through oy.bc.ca, demonstrated suitable education, experience, accreditation and knowledge relevant to the particular matter, may be reasonably relied on to provide advice within their area of expertise.

- **Critical Fish habitat:** Habitat that is critical in sustaining a subsistence, commercial, or recreational fishery, or fish species at risk (provincially red- and blue-listed or listed by COSEWIC because of its relative rareness, productivity, or sensitivity). Indicators of critical fish habitat include the presence of high-value spawning and rearing habitat, which are critical to the fish population present (e.g., for salmon and some trout, locations with an abundance of suitably sized spawning gravels, deep pools, undercut banks, or stable debris).
- **Important fish habitat:** Habitat that is used by fish for feeding, growth, and migration, but is not deemed to be critical. This category of habitat usually contains a large amount of similar habitat that is readily available to the population. Indicators of important fish habitat include important migration corridors, or the presence of suitable spawning and rearing habitat for the fish species present.
- **Marginal fish habitat:** Habitat that has low productive capacity and contributes marginally to fish production. Indicators of marginal fish habitat include the absence of suitable spawning habitat or rearing habitat for the fish species present (e.g., for salmon and some trout, locations without suitable sized gravels, deep pools, undercut banks, or stable debris).

The HADD of **critical fish habitat** is generally unacceptable and it is unlikely that DFO will authorize your proposed works. Therefore works that will avoid impact to critical fish habitat are strongly recommended. In **important fish habitats** an Authorization will typically be required for any works that impact fish habitat. For **marginal fish habitats** works can often be conducted without the need for an Authorization through the use of design and operational standards and best practices.

If you are required to apply for a Subsection 35(2) *Fisheries Act* Authorization you should contact an appropriately qualified professional with adequate training or knowledge of fish habitat as this person can

help you to identify, address and mitigate potential habitat or species concerns related to your proposed works. DFO will be reviewing your works in terms of their preferred management options and will need you to provide a clear rationale for moving from a more preferred to a less preferred option.

The DFO Review Process

The typical DFO review process for works that have the potential to result in a HADD is outlined in the following steps and is illustrated in Figure 10.

Step 1:

You submit an application package, including details of your proposed works, to your local DFO office (see Section 10 for a list of office locations and contact information). The information you will need to provide includes any information required by DFO to help them determine whether your works have the potential to cause a HADD and whether a Subsection 35(2) Authorization should be issued.

Applications for Authorizations should be developed and supported by appropriately qualified professionals (AQPs). Your application needs to address key information requirements including:

- justification for the proposed works and the management options applied;
- a detailed description of the fisheries resource and habitat values at your project location, including hydrological information and photographs of the site;
- details of your proposed works, including scaled drawings, schedule information, and types of equipment expected to be used;
- information regarding the type of impacts anticipated from your works and your application of mitigation measures to avoid or reduce those impacts; and
- details regarding planned habitat compensation and environmental monitoring, including costs.

Contact your local DFO office or consult the following website for more information:

http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/dfo_proj_review_info_e.pdf

Step 2:

DFO will review your information package, the value and sensitivity of the fish habitat involved, and the management options applied to

determine whether an Authorization under Subsection 35(2) of the *Fisheries Act* may be issued.

One of three things will typically happen following this review:

- DFO determines that your application is incomplete and requests that you conduct additional design work and gather additional information before resubmitting your application; or
- DFO determines that your proposed work **will** result in a HADD; therefore you require Authorization under Subsection 35(2) of the *Fisheries Act* before you can submit a *Water Act* Notification or Approval application or undertake your work; or
- DFO determines that your proposed work **will not** result in a HADD. You should then submit a *Water Act* Notification to WLAP or an application for Approval to LWBC. All communications with or from DFO must be forwarded with your Notification or Approval application.

Step 3:

If DFO has determined that your works will result in a HADD, they must then decide whether to issue an Authorization.

If DFO authorizes a HADD, the Subsection 35(2) Authorization you will receive will include specific terms and conditions regarding standards and best practices for completing the works, habitat compensation, and monitoring. Prior to the issuance of the Authorization, DFO may require a letter of credit to cover the costs for repair, replacement, or maintenance of compensation or mitigation measures. An Authorization will also require an environmental screening under the *Canadian Environmental Assessment Act* (CEAA). There is a minimum 15-day requirement for the project to be posted to the public registry of the CEAA prior to commencement of the works. For more information on the federal CEAA, please visit the following website: http://www.ceaa-acee.gc.ca/index_e.htm

If DFO does not issue a Subsection 35(2) Authorization for the HADD associated with your works or requests additional information, you may choose either to address DFO's comments and resubmit your application (return to Step 2) or to abandon your project.

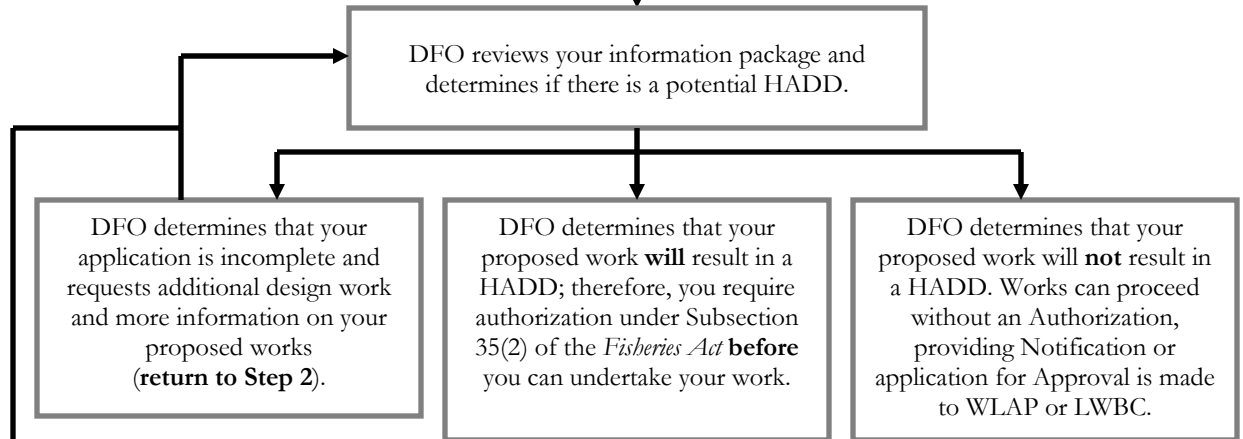
Step 4:

If DFO authorizes a HADD by issuing a Subsection 35(2) Authorization, you must then submit a *Water Act* Notification for the works to WLAP or an application for Approval to LWBC. All communications with or from DFO, including the signed HADD Authorization, must be forwarded with your notification or application.

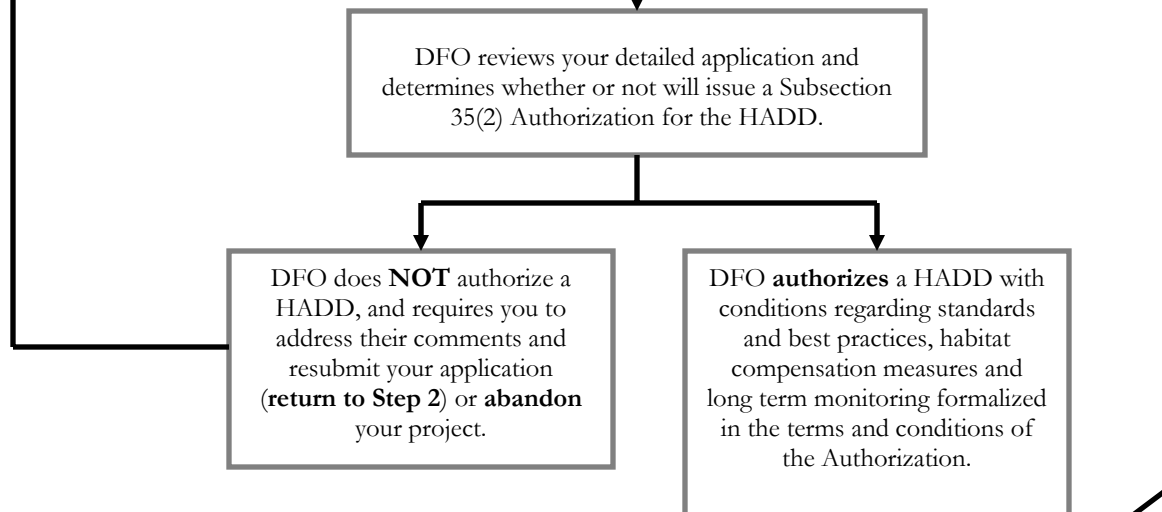
Step 1



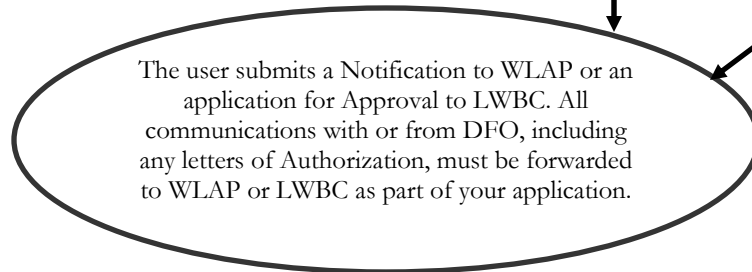
Step 2



Step 3



Step 4



REMEMBER:

The DFO review process can take months to complete and considerably longer for complex projects. Ensure that you incorporate the time and resources required to seek all approvals into the proposed schedule and budget for your works.

While the *Fisheries Act* manages fish and their habitats, the *Water Act* manages both fish and wildlife and their habitats. Authorization under the *Fisheries Act* does not give you the authority to conduct works under the *Water Act*. You must still submit a Notification or application for Approval under the *Water Act*.

5.7 When Does Local Government Get Involved?

Many local or regional governments have bylaws in place relating to the protection of streams and riparian and aquatic habitats and may require you to submit other applications for the approval of instream works. Please contact your local government offices to inquire about required permits.

6 Standards and Best Practices

Instream Works = Works In and Around Water

The term stream includes lakes, wetlands, streams, ponds, marshes, swamps, gullies, ravines, springs, and some ditches.

Numerous instream works ranging from lakeshore stabilization in the Okanagan to urban stormwater connections on Vancouver Island, from stream crossings in the Skeena to fish habitat restoration in the Kootenays, are undertaken each year on private and public lands throughout the province of British Columbia. In the past, regional Ministry staff have been responsible for providing guidance to users through conditional letters, regionally developed documents that detail notification requirements, and standards and best practices for proposed instream works. These conditions and regional standards and best practices have been consolidated and used to create one provincially relevant document that consistently applies to proponents planning instream works throughout British Columbia.

Standard: a regulatory requirement that must be followed or achieved in the design and completion of your works. This may also be referred to as a condition or requirement.

Best Practice: a recommended method or technique that should be followed to ensure the standards are met and impacts to riparian and aquatic habitats are mitigated.

What are “Standards” and “Best Practices”?

Standards and best practices are guiding statements that, when followed, will allow you to undertake instream works in a way that will avoid, limit or mitigate impacts to aquatic and riparian habitats, water quality and quantity, fish and wildlife species, and public safety and property. They exist to help you ensure your works are designed and carried out in compliance with applicable legislation and in a manner that will not cause harm to the natural environment.

Standards and best practices for instream works exist to avoid, limit or mitigate the impacts of instream works discussed in Section 4.2. These standards are developed from the legislation and regulations discussed in Section 5.

The best practices provided in this document represent some of the best-known current methods to avoid or mitigate impacts; however, the best practices recommended here do not represent an exhaustive list of available and appropriate best practices. Alternatives to and improvements on these best practices should not be overlooked when planning your proposed works, as long as the goals detailed in the applicable standards can be met.

Best practices only serve their purpose when they are properly applied. Because of this, it is important to ensure that all people participating in your works are aware of the applicable best practices, have the necessary materials available to them, and are properly trained in implementing the chosen best practices.

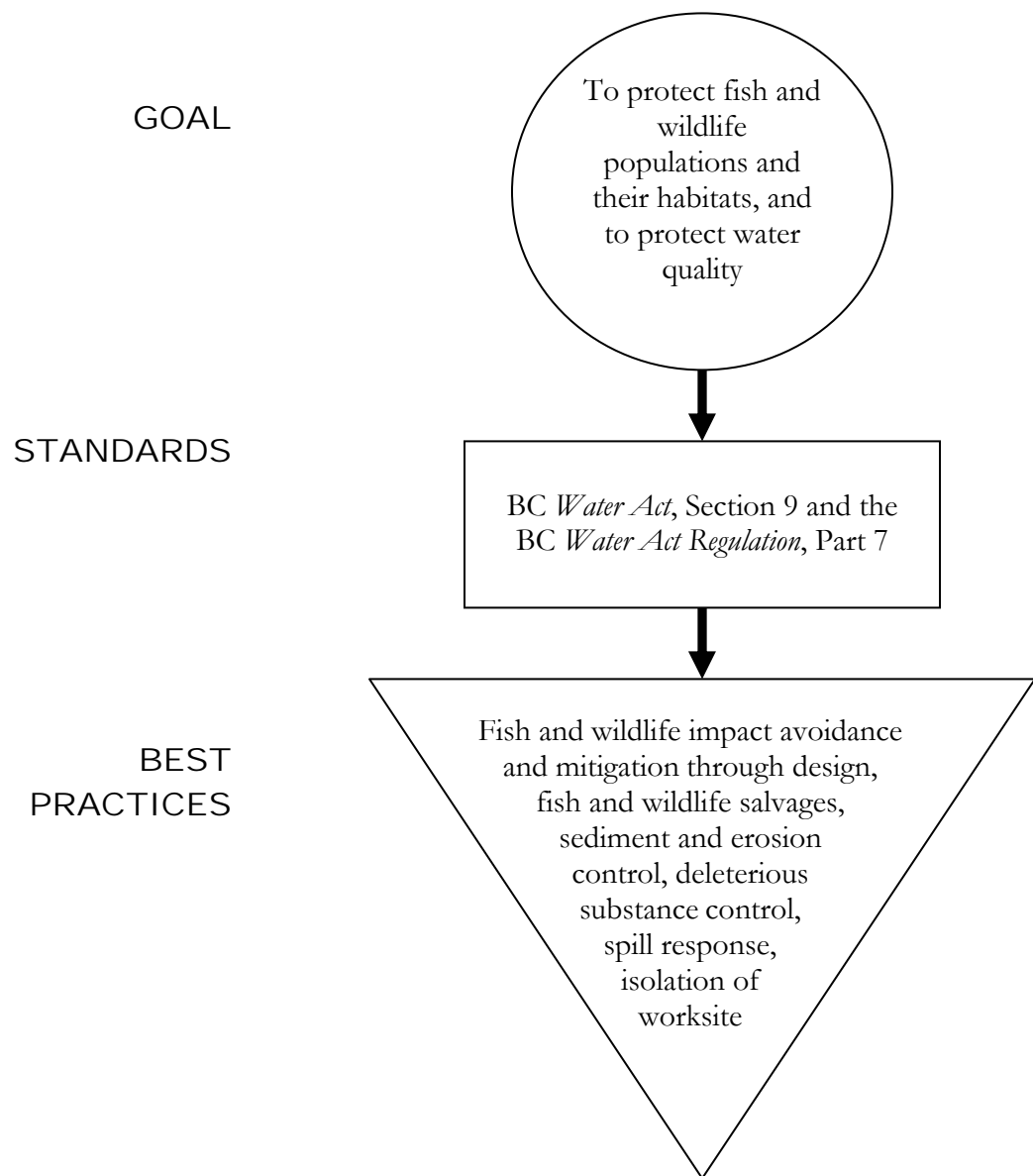


Figure 11: An example of how a provincial goal or objective leads to a standard and best practices for your works.

Engineer:

Under the *Water Act* an **engineer** means a professional engineer employed by the government or a government corporation and designated in writing by the comptroller as an engineer. It also includes a regional water manager.

If you are unfamiliar with the general standards of the *Water Act*, you can review the document *A Users Guide to Working in and Around Water, Regulation Under British Columbia's Water Act*.
<http://www.lwbc.bc.ca/03water/licencing/index.html>

This document details responsibilities and requirements under the *Water Act*.

6.1 What Standards Do I Need to Meet?

Under Part 7 of the *Water Act* Regulation, your works must meet the following standards, regardless of the type of work you propose to undertake:

Works that may have significant detrimental impacts (Section 37 (3))

If the engineer is of the opinion that a proposed change in and about a stream may have a significant detrimental impact on the nature of the stream or stream channel, the engineer may require that an application for an approval or a license be made in connection with the proposed change in and about a stream.

Legal requirements of other legislation: (Subsection 37 (4) (a))

A person **will** comply with all applicable federal, provincial, or municipal enactments, such as the *Fisheries Act (Canada)*, *Workers Compensation Act*, local zoning and building requirements, and is responsible for obtaining the necessary permits.

Land ownership: (Subsection 37 (4) (b))

If a person does not own the land, the approval of the landowner **must** be obtained whether the land is private or Crown land.

Public safety: (Section 38 (2))

A person **must** design, construct and maintain the works so that life, property, and the environment are not endangered.

Completion of Work: (Subsection 38 (1) (b))

Once works are started, the changes **must** be completed without delay, unless necessary to preserve the nature of the stream.

Protection of water quality: (Subsection 41 (a) to (g))

A person making a change in and about a stream **must** ensure that:

- (a) no substance, sediment, debris or material that could adversely impact the stream is
 - (i) allowed or permitted to enter or leach or seep into the stream from an activity, construction, worksite, machinery or from components used in the construction of any works, or
 - (ii) placed, used or stored within the stream channel,
- (b) no standards or objectives published under Section 2(e) of the *Waste Management Act* for the protection of ambient water quality are exceeded or not attained now or in the future due to the change,
- (c) there is no disturbance or removal of stable natural materials and vegetation in and about a stream that contribute to

- stream channel stability except as authorized under this regulation and in accordance with the terms and conditions specified by the habitat officer,
- (d) temporary material, fill, bridge, culvert, pump, pipe, conduit, ditch or other structure used to assist in the construction of any works are constructed and maintained only during the period of construction, and are removed on completion of the works,
 - (e) all cast-in-place concrete and grouting is completely separated from fish bearing waters for a minimum of 48 hours,
 - (f) rock from acid-generating rock formations is not used for construction, and
 - (g) the stream is restored to its natural state on completion of the change in and about a stream.

Protection of Species and Habitat (Section 42 (1) & (2))

- (1) To protect habitat, a person making a change in and about a stream under this regulation, other than under Subsection 44 (1)(o) to(s) or (2), **must** make that change in accordance with terms and conditions specified by the habitat officer with respect to:
 - (a) the timing window or the period or periods of time in the year during which the change can proceed without causing harm to fish, wildlife or habitat (refer to the provincial *Timing Windows* document or Appendix 14.1 of this document),
 - (b) the minimum instream flow or the minimum flow of water that must remain in the stream while the change is being made,
 - (c) the removal of material from the stream or stream channel in connection with the change,
 - (d) the addition of substance, sediment, debris or material to the stream or stream channel in connection with the change,
 - (e) the salvage or protection of fish or wildlife while the change is being made or after the change has been made,
 - (f) the protection of natural materials and vegetation that contribute to habitat or stream channel stability,
 - (g) the restoration of the worksite after the change has been made, and
 - (h) the requirement to obtain an approval from the federal Department of Fisheries and Oceans in connection with the change.

(2) In addition to other remedies or penalties that may be imposed on a person who makes a change in and about a stream that damages habitat, the person **must**:

(a) within 72 hours report the damage to a habitat officer, and

(b) restore and repair the habitat to its natural state or as directed by the habitat officer.

Protection of other water users: (Section 43 (1) & (2))

A person **must** ensure that existing water uses under the *Water Act* are protected and that the users are given three days prior notice and provided with a supply of water as required.

Specific Standards associated with certain types of instream works: (Section 44 (1))

For the purposes of Section 9 of the *Water Act*, changes in and about a stream listed in Section 44 of the *Water Act* Regulation may be made without the necessity of obtaining a Section 9 Approval or license for that change, provided that the change is made in accordance with the standards of the regulation and the terms and conditions, described in Section 42. Specific Standards and Best Practices relating to types of instream works can be found in the following sections of this document.

6.2 What Further Standards and Best Practices Apply to My Type of Instream Works?

The design standards and best practices your works are required to meet will vary depending on the type of instream work you are planning to complete. In most cases, it is recommended that you retain the services of an appropriately qualified professional with adequate training and knowledge of fish habitat to help determine which standards and best practices are appropriate for your proposed works.

6.2.1 Standards and Best Practices Specific to the Type of Instream Work

To determine what standards and best practices apply to your work, review the following sections for your type of instream work:

- **Stream Crossings** – including bridges, culverts, utility and pipeline crossings;
- **Stream Channel Maintenance by Government** – including sediment, vegetation, and debris removal;
- **Stream Bank and Lakeshore Stabilization** –including bank and shore stabilization;

- **Urban Stormwater Management** – including stormwater management system design and stormwater outfall construction;
- **Habitat enhancement and Restoration** – including instream works to enhance aquatic and riparian areas for fish and wildlife species;
- **Beaver and Beaver Dam Management** – including activities to manage beavers and their dams;
- **Miscellaneous Instream Works (permitted under a Notification)** – including pier and wharf works, fish screen fence installation, flow monitoring devices, and public utility maintenance activities;
- **Emergency Works** – including urgent flood and erosion protection works; and
- **Other Types of Instream Works (requiring an Approval)** – including stream diversion, channelization, dredging and realignment activities, dam construction, weir installation, sediment pond or sump construction, lake or pond creation.

7 Standards and Best Practices for Specific Types of Works

Best practices are recommended techniques that have been demonstrated to be effective and practical means of preventing or limiting harmful impacts to the environment.

The best practices presented in this document provide you with a starting point for ensuring your works are planned and completed in compliance with environmental legislation. The practices outlined here should not be regarded as a complete and comprehensive set, however. New techniques and methods or professional advice from an appropriately qualified professional may provide you with a better means of ensuring your works meet the performance standards and legislated requirements.

Therefore the option is yours: you may follow the best practices recommended in this document, or you may follow different practices with or without the advice of an appropriately qualified professional. Either way, the key aim is to ensure that your works achieve the standards and objectives set. If your works do not, then you, your agents, and the professionals you hired will be responsible for demonstrating that the practices used were an appropriate choice and were applied correctly. If this cannot be demonstrated, then all parties will be liable and accountable for any impacts to the environment, danger to human health, or infringement on water or property rights.

7.1 Standards and Best Practices for Stream Crossings

7.1.1 Background

A stream crossing refers to a structure such as a clear-span bridge or culvert used for road, driveway, pedestrian, livestock, or utility service crossing of a watercourse.

Private stream crossings are usually smaller in scale than public stream crossings (e.g., a livestock or driveway crossing) and are often constructed by an individual landowner.

Public stream crossings are usually larger in scale than private stream crossings (e.g., major road crossings) and may result in larger potential impacts to riparian and aquatic habitats.

Utility crossings include service pipelines, pipes, cables, and wires (e.g., sanitary sewer, electricity, telephone, and gas services). In addition to the usual potential impacts associated with any stream crossing structure, utility crossings pose an increased risk of impact associated with the potential for discharge of a deleterious substance carried by the utility (e.g., raw sewage, natural gas).

Winter road crossings include ice bridges, winter fords, or snowfills constructed to provide temporary seasonal stream crossings.

Temporary fords are temporary stream crossings installed to allow transportation or material movement across a channel for a limited period of time. Temporary fords have limited applicability, and risk to habitat and water quality may increase if this crossing type is improperly located or constructed.

Stream crossing works are undertaken for a variety of reasons: to construct a crossing where none existed previously; to replace an existing crossing with one of equal size; or to replace an existing crossing with a larger one or a different type of structure. Because of the risks to riparian and aquatic habitat and species, stream crossing works should only be considered when the need for the works can be **justified**:

For a new crossing - The area the crossing will provide access to is currently isolated, and the increased use of the area will not result in the degradation of aquatic and riparian habitat.

For a replacement crossing - The replacement is required to maintain access and safety, and the maintained or increased use of the area will not result in the degradation of aquatic and riparian habitat.

For enlargement of a crossing – Current zoning permits the enlargement, and the maintained or increased use of the area will not result in the degradation of aquatic and riparian habitat.

7.1.2 Objectives

The Ministry's objectives for the management of stream crossings are to discourage unnecessary crossings, to prevent harmful impacts to riparian or aquatic habitats and fish and wildlife species, and to protect water quality and channel shapes and flows during crossing construction, modification, and deactivation activities.

7.1.3 Standards for Stream Crossings

All stream crossing works for which you are submitting instream works notifications or approvals must be compliant with the general standards listed in Section 7 of this document for:

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific Standards associated with this type of work (*Water Act* Regulation Section 44(1)) permit stream crossing works completed as the following work types and under the following conditions:

Culvert installation, maintenance or removal on a road or trail stream crossing (Subsection 44(1)(a)) is permitted, providing that:

- (i) equipment used for site preparation, construction, maintenance, or removal of the culvert is situated in a dry stream channel or operated from the top of the bank;
- (ii) in fish bearing waters, the culvert allows fish in the stream to pass up or down stream under all flow conditions;
- (iii) the culvert inlet and outlet incorporate measures to protect the structure and the stream channel against erosion and scour;
- (iv) if debris cannot safely pass, provision is made to prevent the entrance of debris into the culvert;

- (v) the installation, maintenance, or removal does not destabilize the stream channel;
- (vi) the culvert and its approach roads do not produce a backwater effect or increase the head of the stream;
- (vii) the culvert capacity is equivalent to the hydraulic capacity of the stream channel or is capable of passing the 1 in 200 year maximum daily flow without the water level at the culvert inlet exceeding the top of the culvert;
- (viii) the culvert has a minimum equivalent diameter of 600 mm;
- (ix) a culvert having an equivalent diameter of 2 m or greater, or having a design capacity to pass a flow of more than 6 cubic metres a second, is designed by a professional engineer and constructed in conformance with that design;
- (x) the culvert is installed in a manner which will permit the removal of obstacles and debris within the culvert and at the culvert ends;
- (xi) the stream channel, located outside the cleared width, is not altered;
- (xii) embankment fill materials do not and will not encroach on culvert inlets and outlets;
- (xiii) the culvert has a depth of fill cover which is at least 300 mm or as required by the culvert manufacturer's specifications;
- (xiv) the maximum fill heights above the top of the culvert do not exceed 2 m; and
- (xv) the culvert material meets the standards of the Canadian Standards Association.

Clear-span bridge construction, maintenance or removal
(Subsection 44(1)(b)) is permitted, providing that:

- (i) the bridge and its approach roads do not produce a back water effect or increase the head in the stream;
- (ii) the equipment used for construction, including site preparation, maintenance, or removal of the bridge, is situated in a dry stream channel or is operated from the top of the bank;

- (iii) the hydraulic capacity of the bridge is equivalent to the hydraulic capacity of the stream channel, or is capable of passing the 1 in 200 year maximum daily flow, and the height of the underside of the bridge is also adequate to provide free passage of flood debris and ice flows; and
- (iv) the bridge material meets the standards of the Canadian Standards Association, as applicable.

Pipeline crossing construction or maintenance (Subsection 44(1)(c)) is permitted, providing that:

- (i) the pipeline and associated works are installed in a dry stream channel at a depth so that the top of the pipe is at least 1 m below the lowest elevation of the bed of the stream; and
- (ii) in the case of an aerial crossing, the crossing is constructed in accordance with the requirements prescribed in paragraph (b) for clear span bridges.

Ice bridge, winter ford or snowfill construction or maintenance (Subsection 44(1)(n)) is permitted, providing that:

- (i) the materials used are removed from the stream channel before ice break-up and that only clean ice and snow are used; and
- (ii) in the case of ice bridges, any logs, timber, and other structural materials used can be removed in a safe manner.

Temporary ford construction (Subsection 44(1)(w)) is permitted, providing that:

- (i) the construction occurs at a time in the year during which the construction can occur without causing harm to fish, wildlife, or habitat;
- (ii) the 1 in 10 year maximum daily flow over the ford is accommodated without the loss of the ford and without scouring the stream;
- (iii) a stream culvert, if used, is designed and installed to pass the average low flow during the period of use;
- (iv) the channel is protected against any anticipated erosion:
 - (A) during the period of construction and use of the ford;
 - and

- (B) after the ford crossing is removed;
- (v) sediment from approach ditches does not enter the stream;
- (vi) the driveable running surface is erosion-free;
- (vii) the stream remains in its channel and cannot be diverted down the road;
- (viii) the ford will pass channel debris; and
- (ix) the ford is removed at the end of the period of use at a time, before the next freshet, when the removal can proceed without causing harm to fish, wildlife or habitat.

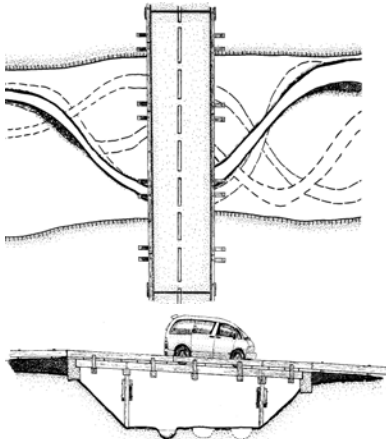
Note:

Temporary diversion construction around or through a worksite(Subsection 44(1)(x)) is permitted, providing that the worksite is no larger than the minimum area required and:

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite:
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction; and
 - (B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada).
- (ii) if cofferdams are used to isolate successive parts of the construction at the worksite:
 - (A) the cofferdams are designed by a professional engineer and constructed in accordance with that design; and
 - (B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction; or
- (iii) if ditches are used to divert flow around the worksite:
 - (A) the flow of water diverted remains within the stream channel;

Recommended:

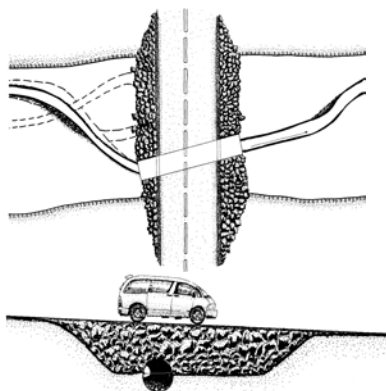
Floodplain-span crossing
(clear-span bridge)



- Stream pattern and channel migration are maintained.
- Width of crossing is narrow.
- Lies perpendicular to stream flow.
- No potential fish or wildlife migration barriers likely to result or mitigation of habitat impacts required.

Not Recommended:

Channel-span structure
(round or box culvert)



- Stream pattern is altered and channel migration is eliminated.
- Channel is eliminated under crossing and downstream.
- Width of the crossing and impacts to riparian habitat are excessive.
- Likely fish and wildlife migration barrier results, with impacts to the

(B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch; and

(C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works;

7.1.4 Best Practices

Following the best practices described here will ensure your proposed works comply with provincial standards. The practices are designed to help you plan and carry out your works in a way that protects species, habitats, and water quality and quantity.

7.1.4.1 Planning and Design Best Practices

Crossings should be designed by an appropriately qualified professional and constructed in accordance with that design. To ensure impacts to fish and wildlife habitats and populations are minimized, stream crossings should:

- Avoid floodplains, meander bends, braided streams, alluvial fans, and any other areas where bank stability may be a concern.
- Avoid critical fish and wildlife habitat areas.
- Avoid disturbing the bed and banks of the stream (this can be done by using structures that will remain outside the bankfull-width of the stream).
- Be aligned perpendicular to stream flow.
- Limit impacts to onsite and adjacent riparian areas (this can be done by minimizing the width of the right-of-way clearing).
- Involve “trench-less” technologies (i.e., directional drilling outside the channel and floodplain and below the streambed) for pipelines and other utilities crossings.
- Be designed to include opportunities to enhance the surrounding environment or to reduce the impact of the existing structure during replacement activities.

For further information on the design of stream-crossing structures, consult the following resources:

- *Access Near Aquatic Areas: A Guide to Sensitive Planning, Design, and Management*

http://www.stewardshipcentre.bc.ca/sc_bc/stew_series/bc_stewseries.asp#

Figure 12. Channel crossings

- *Forest Practices Code Fish Stream Crossing Guidebook*
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>
- *Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No.9* and other Watershed Restoration Program documents
<http://srmwww.gov.bc.ca/frco/bookshop/tech.html>

7.1.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

Timing of Works – "Work Windows"

For further information on best practices for timing of works, see Appendix 14.1.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)
<http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

instream works reduced risk-timing window provided by Ministry for your region.

- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures.

Concrete leachate is alkaline and highly toxic to fish and other aquatic life.

- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.
- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.

- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds

and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.

- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.

- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.2 Standards and Best Practices for Stream Channel Maintenance

7.2.1 Background

Streams and channels sustain fish and wildlife values and are also relied upon as drainage pathways. As such, maintenance activities are periodically required to ensure the ability and capacity of the channel to carry adequate flow is maintained. **Please note that this section pertains only to works carried out by municipalities and the British Columbia government or its agents.**

Stream channel maintenance refers to any of the following activities:

- Removal of debris, waste or garbage including discarded building materials and household waste;
- Removal of sediment, vegetation, or woody debris;
- Stream channel and lake dredging; and
- Ditch maintenance.

Stream Clean-ups:
Clean-up activities, including the removal of man-made materials from streams, are typically conducted by local stewardship groups, schools, or local governments to enhance or help restore stream habitats.

If you are planning to undertake activities like these, no Notification is required. Contact all landowners whose properties your works might affect. Refer to stewardship guidelines such as those listed at <http://www.stewardshipcentre.org> to ensure your works result in a habitat gain.

Fish and other aquatic organisms need healthy places to live, feed and reproduce. For most species, these activities usually occur along stream banks and in nearshore areas of lakes. When you are proposing the removal of sediment, debris, or vegetation from a stream or lake, you should be confident that the works are necessary and will serve a legitimate purpose.

In your Notification to the WLAP, you will need to work with an appropriately qualified professional(s) to confirm that:

- The proposed works are necessary to alleviate actual or imminently potential flooding or other hazards that would result in the loss of life or property;
- The works will not result in the immediate or long term degradation of riparian or stream habitats, or fish and wildlife populations; and
- No alternative solutions such as strategically located sediment traps, off-line detention or retention ponds, or increased watershed drainage density are available.

7.2.2 Objectives

Stream channel maintenance activities can cause temporary or permanent loss or alteration of instream habitats, and can result in both temporary and permanent losses in riparian or streamside vegetation or channel stability. Extreme care must therefore be taken when conducting stream channel maintenance activities. The Ministry's objective for the management of stream and channel clean up and maintenance is to

prevent harmful impacts to riparian and aquatic habitats, fish and wildlife species, and water quality.

7.2.3 Standards for Stream Channel Maintenance

All stream channel maintenance works for which you are submitting instream works Notifications or Approvals must be compliant with the general standards listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with this type of work (*Water Act* Regulation Section 44) permit stream channel maintenance works completed as the following work types and under the following conditions:

Restoration or maintenance of a stream channel by British Columbia or its agents (Subsection 44(1)(g));

Restoration or maintenance of a stream channel by a municipality (Subsection 44(1)(h));

Mechanical or manual cutting of annual vegetation within the stream channel (Subsection 44(1)(i)); and

Mechanical or manual control of Eurasian water milfoil and other aquatic vegetation (Subsection 44(1)(m)).

Note:

Temporary diversion construction around or through a worksite (Subsection 44(1)(x)) for works authorized under Section 44 is permitted providing that the worksite is no larger than the minimum area required; and

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite;
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction; and

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

LAKE SEDIMENT/DEBRIS REMOVAL:

If you want to remove sediment or debris from a lake, you will require a Notification. Keep in mind the following:

- Salvage activities are to be restricted to areas well away from creek mouths or shallow water (< 4 meters deep) areas.
- Do not remove standing trees adjacent to the lake foreshore or snags within the lake, as they may provide important nesting habitat.
- Do not remove logs embedded within the substrate of the lake.
- If there is a community water intake nearby, you must consult with the water purveyor before starting work.
- Lakes are also fish habitat. Apply the listed operational best practices (e.g., timing or works, sediment control, worksite isolation) to your works.

(B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada);

(ii) if cofferdams are used to isolate successive parts of the construction at the worksite:

(A) the cofferdams are designed by a professional engineer and constructed in accordance with that design; and

(B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction; or

(iii) if ditches are used to divert flow around the worksite:

(A) the flow of water diverted remains within the stream channel;

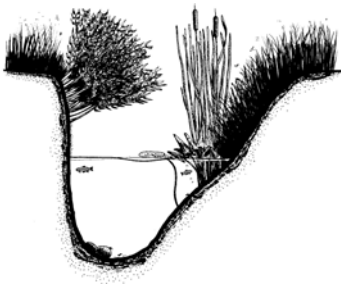
(B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch; and

(C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works.

7.2.4 Best Practices

The best practices given here **should** be followed to ensure your proposed works comply with provincial standards. They are designed to help you protect species and habitats, maintain adequate water flows, and maintain or improve existing channel characteristics through the way you plan and carry out your works.

- Only remove material needed to alleviate flood or debris flow risk. Retain, where possible, existing instream and riparian vegetation and other features. These include trees, bushes, shrubs, weeds, or tall grasses along any stream bank; mats of floating vegetation; overhanging vegetation; natural, large woody debris that does not appear to be causing damage to the bottom; and large boulders.
- Maintain or improve the existing channel complexity by retaining or creating a diverse mix of instream structures and overhanging vegetation.



Channelized Stream
Before Dredging

- Channel is deep, low surface to volume ratio.
- Channel form provides good cover for fish and their food.
- Overhanging vegetation provides shade from sun.
- Some flow complexity.



Dredged or "Maintained"
Channelized Stream

- Decreases the biological productivity of fish habitat
- Channel is shallow; high surface to volume ratio
- Channel form provides little to no cover for fish or their food
- No overhanging vegetation; no shade
- No flow complexity; efficient drainage

Figure 13. Effects of stream maintenance activities

- Do not disturb stream banks that can expose underlying soils, cause silt to enter the stream, and result in loss of fish habitat.
- Adhere to instream work windows. Carry out instream clean-up activities during conditions of low flow, when eggs and alevins are not present in the gravel, and when there is the least risk to fish and wildlife populations and habitats.
- Consider whether removal of an object from the stream will cause more damage to fish and wildlife populations and habitats than would have resulted from leaving the object as it was. If the object is large (e.g., car or shopping cart), and is more than one-third buried in the stream substrates, its removal may result in a large amount of sediment being resuspended or discharged, or may result in significant changes to in-channel habitats. In these cases, such garbage, though unsightly, may actually enhance habitat by performing a function similar to large woody debris.

To address the need for stream channel maintenance, those planning works (i.e., municipalities or the British Columbia government or its agents) should consider the form and function of local watersheds to develop long-term solutions to flooding or debris flow risks that eliminate or reduce stream and channel maintenance. These may include:

- Appropriately constructed and licensed sediment traps in the stream (requires additional *Water Act* Approval);
- Control or reduction of up-stream sources of sediment;
- Increased drainage density in the watershed;
- Construction of off-line detention or retention facilities; and
- Shade trees and shrubs planted to shade out instream vegetation.

7.2.4.1 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number

Monitoring Reports

A suggested
Environmental
Monitoring Report
outline is available in
Section 8.2 of this
document.

should be posted at the entrance to the job site or in the immediate vicinity.

- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Timing of Works – “Work Windows”

For further information
on best practices for
timing of works, see
Appendix 14.1.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and

grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.

- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.
- If it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water from entering clean water.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or

floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.

- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.
- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.

- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.

Standards and Best Practices:
Stream Channel Maintenance

- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.3 Standards and Best Practices for Stream Bank and Lakeshore Stabilization

What is Erosion?

Erosion is a natural process of sediment movement as a consequence of water currents or rainfall runoff and may be considered beneficial or detrimental, depending upon the associated environmental concerns.

Potential Negative Impacts of Bank and Shore Stabilization:

- loss of riparian or streambank vegetation;
- loss of future LWD anchoring opportunities;
- decrease in aquatic and terrestrial habitat diversity;
- direct or indirect loss of in-channel habitat through infill, habitat feature blow out, or restrictions on lateral channel movement;
- loss of channel substrate recruitment such as sand, gravel, cobbles or boulders;
- loss of stream meanders and lateral migration ability; and
- loss of floodplain, high-water fish refuge habitat or access to high-water off-channel fish habitats.

7.3.1 Background

Stream bank and lakeshore stabilization refers to works undertaken to protect or armour a bank or shore from erosion.

Increased channel flow, surface water run-off from upland areas, groundwater seepage, and the loss of riparian vegetation can all contribute to stream bank erosion. Erosion processes along lakeshores are similar to streams. They can occur naturally from the ongoing action of waves dissipating their energy against erodable banks but may be worsened by increased water levels, riparian vegetation removal, wave action associated with boat use, or other human activities.

While protecting or armouring a small section of stream bank or lake shore may prevent erosion at one location and appear to have only minor impacts to the watercourse, the compound effects of all individual works within a drainage or watershed are significant.

The more a stream experiences hardening of its banks, the greater the potential for increased and ongoing erosion problems elsewhere within that stream. Bank hardening also has significant impacts on riparian and in-channel habitats as it eliminates or permanently alters riparian and bank vegetation and leads to channelization (the elimination of channel complexity). In some cases, physical or velocity barriers to fish and wildlife movement may be created. Along lakeshores, structures designed to stabilize banks may also act as barriers, limiting fish and wildlife use of the foreshore and blocking the migration of amphibians, reptiles, or other wildlife species.

Stream bank and lakeshore stabilization works are permitted under Section 44 of the *Water Act* Regulations **only**:

- if they are conducted as part of restoration and maintenance works undertaken by a municipality, the British Columbia government, or its agents; or
- if they are completed as works to repair or maintain to their original state existing dikes or existing erosion protection works.

Stream bank and lakeshore stabilization works must only be undertaken when the need for works can be **justified** by:

- the size, scale and location of proposed works;

Standards and Best Practices:
Stream Bank and Lakeshore Stabilization

Benefits of Erosion to
Streams and Lakes:

- Provides silt, sand, gravel, and boulders, to form more complex channel beds and foreshores.
- Provides large and small woody debris that can improve instream habitat complexity, provide cover, decrease flow energy, and armour banks.

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

- the level of risk to existing buildings, roads, or services that are being threatened by the erosion; and
- a technical rationale specific to the design developed, signed and sealed by an appropriately qualified professional.

7.3.2 Objectives

The Ministry’s objective for the management of stream bank stabilization is to prevent harmful impacts to riparian and aquatic habitats, fish and wildlife species, and water quality related to the installation or repair of bank and shore stabilization works.

7.3.3 Standards for Stream Bank and Lakeshore Stabilization

All stream bank and lakeshore stabilization works for which you are submitting instream works Notifications or Approvals must be compliant with the general standards as listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific Standards associated with this type of work (*Water Act* Regulation Section 44) permit stream bank and lakeshore stabilization works completed as the following work types and under the following conditions:

Restoration or maintenance of a stream channel by British Columbia or its agents (Subsection 44(1)(g));

Restoration or maintenance of a stream channel by a municipality (Subsection 44(1)(h));

Restoration or maintenance of fish habitat by the federal or provincial Crown, or their agents (Subsection 44(1)(j)); and

Repair or maintenance of existing dikes or existing erosion protection works to their original state, (Subsection 44(1)(k)) provided that the dikes or works were functional during the previous year.

Note:

Temporary diversion construction around or through a worksite (Subsection 44(1)(x)) is permitted for works providing that the worksite is no larger than the minimum area required, and

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite:
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction; and
 - (B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada).
- (ii) if cofferdams are used to isolate successive parts of the construction at the worksite:
 - (A) the cofferdams are designed by a professional engineer and constructed in accordance with that design; and
 - (B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction; or
- (iii) if ditches are used to divert flow around the worksite:
 - (A) the flow of water diverted remains within the stream channel;
 - (B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch; and
 - (C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works.

Interested in lake
information and
resources?

Please visit the following
website for further
information:

British Columbia Lake
Stewardship Society
<http://www.nalms.org/bclss/>

7.3.4 Best Practices

In order to assess and manage your bank erosion problem, it is advisable to work with an appropriately qualified professional, or team of professionals depending on the scale and scope of the problem. This

typically requires retaining the services of an appropriately qualified environmental professional, which could include a biologist, hydrologist, fluvial geomorphologist, engineer, agrologist or the combination of one or more. The following section outlines best practices for stream bank stabilization design and construction.

7.3.4.1 Design Best Practices

- Ensure the assessment and design your professional completes considers the following:
 - Erosion dynamics (i.e., what is causing the problem);
 - Location of stream within the watershed, stream type and stream order;
 - Seasonal variations in stream flow (perennial, intermittent or ephemeral stream);
 - Local soil characteristics;
 - Existing or potential fish and wildlife use, aquatic habitat, and riparian habitat;
 - Potential access-related disturbances from machinery or other equipment if required;
 - Potential erosion or sediment movement resulting from proposed works; and
 - Existing stream morphology and potential impacts or changes to the channel.
- Ensure impacts to fish and wildlife habitats and populations are minimized by designing your bank stabilization work to meet the following requirements:
 - Uses vegetated or integrated stream bank stabilization techniques:

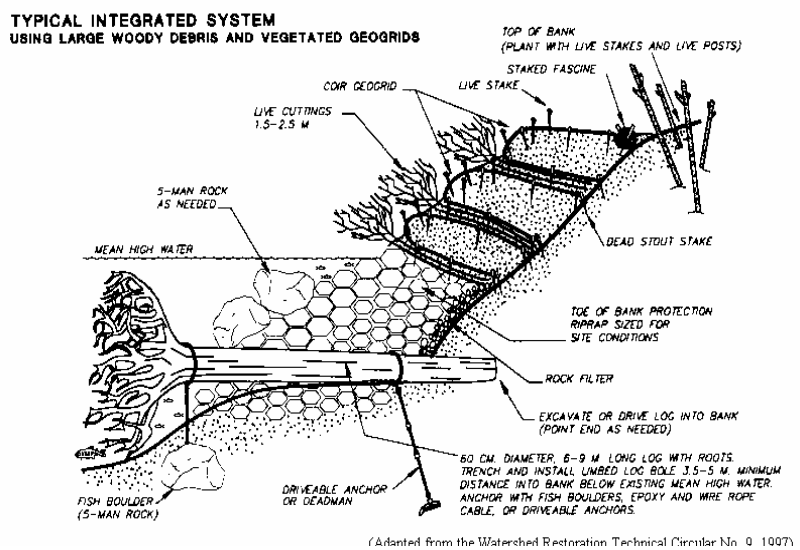


Figure 14: Example of integrated bank stabilization techniques

What are Habitat Features?

If no alternative to using “hard” engineering is possible, design consideration must address the need for fish and wildlife habitat features. These include, but are not limited to:

- boulder clusters in relief at the toe,
- oversized armor rock,
- anchored large woody debris,
- plants installed above the average high-water mark,
- native live stakes or cuttings incorporated into the rockwork with rooting soil.

- Incorporates appropriate habitat features;
- Uses natural materials, such as live vegetation and natural rock;
- Avoids the use of anthropogenic materials such as broken concrete, tires and other materials. These materials do not naturalize well and it is not clear the extent to which these materials could potentially introduce toxic substances into the stream;
- Minimizes impacts to the active floodplain and channel of the stream;
- Increases the active floodplain in the area or immediately adjacent areas to lessen erosive energy or stream power and mitigate channelization effects;
- Minimizes direct and indirect impacts to riparian vegetation, fish and wildlife individuals, populations, species, and habitats;
- Minimizes direct and indirect impacts on off-channel ponds, spawning, rearing or over-wintering areas for fish; and
- Minimizes direct and indirect impacts to other properties or services.

If your works are proposed for any of the following conditions, you may need to use “hard” engineering techniques (engineering involving hard structures like retention walls or rip rap) rather than integrated bank stabilization:

- Streams that are steep with high energy and power with high flows and high velocities,
- Banks that have extreme erosion potential,
- A specific utility or road crossing, or
- A site where vegetative or integrated bank stabilization techniques won’t work.

For further information on the design of stream bank and lakeshore stabilization works, please consult:

- *Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No. 9*
<http://www.elp.gov.bc.ca/frco/bookshop/tech.htm> or
http://www.usda.gov/stream_restoration/
- *Washington State Integrated Streambank Protection Guidelines*
<http://wdfw.wa.gov/hab/ahg/ispgdoc.htm>

7.3.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

Timing of Works – "Work Windows"

For further information on best practices for timing of works, see Appendix 14.1.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.

- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)
<http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life.
- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.

- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.
- If it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water from entering clean water.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.

- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.

- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:

http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

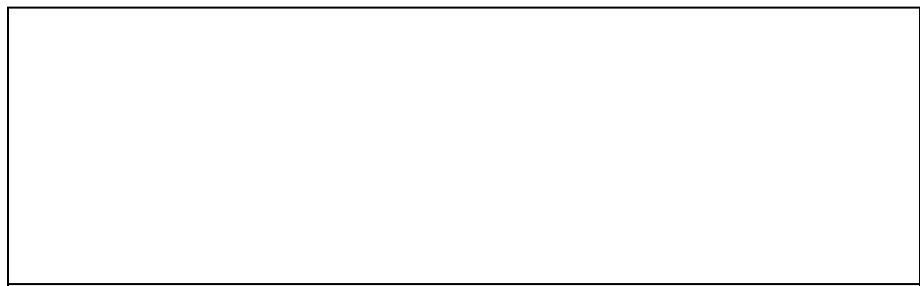
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!



7.4 Standards and Best Practices for Urban Stormwater Management

7.4.1 Background

If you want to install a new perimeter drain for your single family house:

To avoid the need to submit a Notification, you must ensure that:

- The discharge is necessary, as no opportunity exists to connect to an existing system or return to the ground discharge;
- Construction and long-term use will not result in degraded instream or riparian habitat or impacts to fish and wildlife; and
- The perimeter drain is permitted by local government legislation.

Urban and rural stormwater management refers to activities involving the connection of urban and rural drainage systems to streams. Streams are critical components of all municipal, urban and rural stormwater systems. As stormwater outfalls are the direct links between upland land use and streams, they can have significant impacts to aquatic species and habitats through the alteration of storm flow volume and timing within watercourses. Pool and riffle habitats may be destroyed, spawning gravels may be scoured out or covered with sediment, and critically low flows or base flows in streams may be reduced. Stormwater systems also impact a stream's water quality by introducing pollutants through spills and non-point source pollution.

Stormwater is typically managed only for flood control. However, recent studies, including a study conducted by the GVRD, have clearly shown that urbanization has had significant impacts on stream health and productivity in the absence of stormwater management systems that would protect fish and wildlife species and their habitats. This GVRD report can be found at the following website:

http://www.gvr.bc.ca/sewerage/stormwater_reports.htm

Discharges from new multi-lot residential subdivisions, multi-family residential developments, as well as commercial, institutional or industrial sites are considered **stormwater system connections** and require a Notification. **Perimeter drain** discharges include proposed new discharges from independent single lot single-family residential properties only, and do not require a Notification.

7.4.2 Objectives

To prevent harmful impacts to water quality, riparian and aquatic habitats and fish and wildlife species through activities related to the connection of stormwater management systems to local streams, the following approach is provided:

Objective: Putting Water Back into the Ground - Volume Reduction

To reduce and mitigate the total runoff volume caused by increased urban development and the subsequent increase in impervious surface area, and to maximize the amount of runoff returned to shallow groundwater via recharge.

Objective: Preserving or Improving the Water - Water Quality
To mitigate water quality impacts to fish habitat by collecting and treating “first flush” events of smaller storms and more frequent runoff events from impervious areas.

Objective: Holding Back the Water – Rate Control/Detention
To restrict the post-development peak runoff flow rate to that of the pre-development peak runoff flow rate for selected design return periods.

The provincial document, *Stormwater Planning: A Guidebook for British Columbia*, helps to introduce and orient local governments towards addressing stormwater management in urban and rural developments.

The document is available at the following website:

<http://wlapwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>

In the highly urbanized and fast-developing GVRD, much work has been conducted on stormwater management through the Liquid Waste Management Planning process. See the following website for additional information, as well as reports and publications:

<http://www.gvrd.bc.ca/sewerage>

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada.

Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

7.4.3 Standards for Stormwater Management

All proposals for the connection of a new stormwater system to a stream, or the connection of a new system to an existing stormwater system that is connected to a stream must address the protection of riparian and aquatic habitats and their supported fish and wildlife species through the design and implementation of a stormwater management system that will mitigate to the greatest extent the harmful impacts of stormwater to water quality, and aquatic and riparian habitats.

All stormwater management system designs and outfall constructions for which you are submitting instream works notifications or approvals must be compliant with the general standards as listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with this type of work (*Water Act* Regulation Section 44(1)) permit works completed as the following work types and under the following conditions:

Appropriately
Qualified
Professionals:

Appropriately qualified professionals should **always** be consulted to provide technical rationale when determining the feasibility of these recommendations. For choices of structural best practices, it is recommended that options in stormwater best management practice (BMP) reference guides be considered, such as in the *GVSS&DD Best Management Practices Guide for Stormwater, October 1999*, which is available at the following website:

http://www.gvrd.bc.ca/sewerage/management_guide.htm

Construction or maintenance of storm sewer outfalls

(Subsection 44(1)(l)), provided that the storm sewer outfall is designed by a professional engineer, and constructed, maintained and used so as not to obstruct the flow of water in the stream or to cause erosion or scour in the stream.

Note:

Temporary diversion construction around or through a worksite (Subsection 44(1)(x)) is permitted for works providing that the worksite is no larger than the minimum area required, and

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite,
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction, and
 - (B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada),
- (ii) if cofferdams are used to isolate successive parts of the construction at the worksite,
 - (A) the cofferdams are designed by a professional engineer and constructed in accordance with that design, and
 - (B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction, or
- (iii) if ditches are used to divert flow around the worksite,
 - (A) the flow of water diverted remains within the stream channel,
 - (B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch, and

- (C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works.

7.4.4 Best Practices

If your perimeter drain discharges to a *non-ravine* area:

- Construct a rock pit with a minimum storage area of 9m³ outside of the riparian area and online with your drain. This rock pit will allow some of the water collected to return to ground.
- Use a porous material for your overflow pipe, and trench the pipe from the rock pit to the stream bank.
- Locate the pipe discharge approximately 15cm from the streambank, above the active floodplain height.

If your perimeter drain discharges to a *ravine* area:

- Construct a rock pit and overflow pipe as above, but only trench the pipe to the top of the ravine.
- Use a flexible pipe to convey the drain from the top of bank to the toe of the slope.
- Stake the pipe in place and construct a rock splash pad at the discharge to dissipate flows.

Integrated stormwater management planning at a watershed level, as committed to by the GVRD, should be conducted wherever possible and practical. Such plans should address fish and wildlife habitat and species protection as watersheds change from activities associated with urban and rural development. Stormwater management systems designed for urban rural developments should be consistent with these municipal plans where they exist. See the following website for the GVRD's stormwater planning template:

<http://www.gvrd.bc.ca/sewerage/pdf/ismptemplate.pdf>

The following section outlines recommended best practices to support the standards, which should be addressed in urban stormwater management systems and connection design and construction where an integrated stormwater management plan has not been completed:

7.4.4.1 Stormwater Management Systems

The design of a stormwater system and its connections will determine the extent to which impacts to fish and wildlife habitats and populations may be avoided or mitigated. When proposing a new stormwater outfall, you should have confirmation through a technical rationale that the outfall is necessary, and that alternatives such as draining the site to the ground or draining the site to a constructed drainage facility like a rock pit or drainage trench are not appropriate. The connection should be designed by an appropriately qualified professional, and constructed in accordance with that design.

To ensure impacts to fish and wildlife habitats and populations are minimized, stormwater systems should use the following design recommendations which have been adapted from the *Urban Stormwater Guidelines and Best Management Practices for Protection of Fish and Fish Habitat*, 2001 DFO draft discussion paper.

Putting Water Back Into the Ground – Volume Reduction (VR)

Design Best Practices

Volumes from smaller rain events from impervious areas should not be discharged but should be infiltrated to ground.

Structural Best Practices

Ground infiltration systems, biofiltration swales or burrows, or long-term storage in constructed wetlands or ponds should be used.

Preserving or Improving the Water –
Water Quality (WQ)

Design Best Practices

The volume of the 24-hour event equaling the majority of the total rainfall from impervious areas should be collected and treated with suitable BPs.

Structural Best Practices

Biofiltration swales or burrows, constructed wetlands, or exfiltrating dry detention pond systems should be used.

Holding Back the Water –
Rate Control/Detention (RC)

Design Best Practices

The post-development flows should match the volume, shape and peak instantaneous rates of pre-development flows for larger flood events using appropriate best practices.

Structural Best Practices

Suitable best practices include dry detention ponds, constructed wetlands, wet detention ponds, or storage swales.

7.4.4.2 Hydrological Design

In order to accurately determine rates of runoff for stormwater management systems, sites should be monitored and flows modelled using analysis programs with continuous simulation. Site hydrological data should be collected for a minimum of 12 months unless there is acceptable regional data.

7.4.4.3 Storm Sewer Outfall Design

In addition to these best practices, the design for your stormwater outfall connection should also:

- be located where it will minimize impacts to the existing riparian vegetation and/or alterations to the channel and active floodplain and associated fish and wildlife habitats;
- be located to mimic natural site drainage patterns and not alter existing watershed boundaries;
- provide appropriate water energy dissipation;
- minimize erosion and discharge flow impacts to the channel by directing the discharge to a maximum 45 degree angle to downstream flow;

- minimize impacts to the riparian corridor continuity by having a minimal footprint;
- minimize direct and Indirect impacts to onsite and adjacent fish and wildlife individuals, populations and species; and
- minimize direct and indirect impacts to other properties or services.

For further information on the design of stormwater connections and perimeter drains, please consult:

- *Greater Vancouver Sewage and Drainage District Best Management Practices Guide for Stormwater, Oct. 1999.*
http://www.gvrd.bc.ca/sewerage/managment_guide.htm

7.4.4.4 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the Water Act Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

Timing of Works –
“Work Windows”
For further information
on best practices for
timing of works, see
Appendix 14.1.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry’s regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Spill Reporting
Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life.
- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.
- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)
<http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.
- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:

http://srmwww.gov.bc.ca/sry/csd/downloads/foams/vegetation_riparian/treereplcrit.pdf

be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.

- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.5 Standards and Best Practices for Habitat Enhancement and Restoration

7.5.1 Background

Habitat enhancement and restoration works include any works in or about a stream designed to restore or increase the productive capacity of aquatic or riparian habitat. The types of work include, but are not limited to: rehabilitating aquatic habitats, restoring fish access, rehabilitating stream banks, rehabilitating off-channel habitat, introducing channel complexity (placement of large-woody debris, boulder clusters), restoring mainstem rearing habitat, introducing pool and riffle sequences, and augmenting minimum stream flows. They do not include works associated with beaver dams. Please refer to the following section of this document for information on beaver and beaver dam management.

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

7.5.2 Objectives

The Ministry’s objective for the management of habitat enhancement and restoration is to prevent harmful impacts to water quality, riparian and aquatic habitats, and fish and wildlife species arising from the habitat enhancement works and restoration activities.

7.5.3 Standards for Habitat Enhancement and Restoration

All habitat enhancement and restoration works for which you are submitting instream works Notifications or Approvals must be compliant with the general standards listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with this type of work (*Water Act* Regulation Section 44(1)) permit habitat enhancement and restoration works completed as the following work type and under the following conditions:

Restoration or maintenance of a fish habitat by the Crown in the right of either Canada or British Columbia, or their agents (Subsection 44(1)(j))

Note:

Temporary diversion construction around or through a worksite (Subsection 44(1)(x)) is permitted for works providing that the worksite is no larger than the minimum area required, and

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite;
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction; and
 - (B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada);
- (ii) if cofferdams are used to isolate successive parts of the construction at the worksite:
 - (A) the cofferdams are designed by a professional engineer and constructed in accordance with that design; and
 - (B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction; or
- (iii) if ditches are used to divert flow around the worksite:
 - (A) the flow of water diverted remains within the stream channel;
 - (B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch; and
 - (C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works.

7.5.4 Best Practices

The following section outlines recommended best practices for habitat enhancement and restoration design and construction.

7.5.4.1 Design Best Practices

As the long-term objective of habitat enhancement and restoration works is to improve available instream and riparian habitats for fish and wildlife species, the impacts resulting from the works should be limited to short-term, construction-related impacts. However, care must be taken in the planning and design of enhancement and restoration structures. Changes to instream structures can have unexpected impacts to stream hydraulics and may cause unintentional habitat disruption or destruction. If you would like assistance in planning your works, consider hiring an appropriately qualified professional for assistance. Information is also available from the following documents:

- *Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No. 9*, available from:
<http://srmwww.gov.bc.ca/frco/bookshop/tech.html>
- *Fish Habitat Enhancement: A Manual for Freshwater, Estuarine, and Marine Habitats*, available from:
http://www-heb.pac.dfo-mpo.gc.ca/english/pubn_order.pdf

Examples of a Few Types of Habitat enhancement and Restoration Works:

- Restoring fish access
- Creating bank cover
- Rehabilitating off-channel habitats
- Complexing the stream channel with large woody debris or boulder clusters
- Creating pool-riffle sequences with small rock weirs
- Prevent the creation of a barrier to fish migration;
- Consider impacts to all species or habitat-types within the area of your worksite;
- Enhance existing or restore historical biological diversity;
- Use a design created by an appropriately qualified professional, and construct the works in accordance with that design;
- Maintain the active floodplain in its existing condition;
- Protect the streambed;
- Minimize direct and indirect impacts to onsite and adjacent riparian areas, fish and wildlife individuals, populations, species, and habitats; and
- Minimize direct and indirect impacts to other properties, roads, services or utilities.

Because of these risks to riparian and aquatic habitats and species, habitat enhancement works must only be undertaken when the need for works can be **justified**:

- The works will not negatively impact existing fish habitat;
- The works will avoid critical habitat areas;
- The works will minimize disturbances to riparian vegetation, active floodplains, ravines, and instream habitat;
- The works will not negatively impact any native fish and wildlife populations or their habitats;
- The works will result in an immediate and long-term net gain of aquatic habitat; and
- The works are designed to benefit as many of the native fish and wildlife species that use the stream as possible.

When you have ensured that your chosen design meets the listed design best practices, plan your habitat enhancement works to comply with the following construction or operational best practices.

7.5.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

to ensure a common understanding of the mitigative best practices for the project.

- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Timing of Works (Subsection 42(1)(a))

Timing of Works –
“Work Windows”
For further information
on best practices for
timing of works, see
Appendix 14.1.

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately

report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life.
- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.
- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)
<http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.

- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.
- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!

- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

Standards and Best Practices:
Habitat Enhancement and Restoration

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.6 Standards and Best Practices for Beaver and Beaver Dam Management

7.6.1 Background

Beaver biology

- Beavers live in colonies of between 3-9 individuals.
- The colony uses one or more lodges or burrows and will build one or more dams.
- Beavers are thought to forage as far as 800m upstream and within 50m inland of their dams.
- Active beaver systems are not permanent, as they typically run out of available food sources within easy reach of the pond within 2-3 years.
- Beavers prefer low gradient watercourses (<6%) and need ample access to herbaceous and woody materials

Beaver impoundments often create flooding and other drainage related problems on adjacent lands, especially during fall, winter, and spring. This can be a cause for concern, particularly at road and rail stream crossings and on agricultural and forest resource lands.

Beaver impoundments may also severely restrict fish passage. Juvenile fish are often able to migrate downstream through dams by making use of small rivulets around the dam, but adult migration can be impaired especially during low water conditions when the stream flows do not overtop the dam.

While the flooding caused by beaver dams can be problematic, beavers play an important role in creating off-channel ponds through their damming activities. Beaver ponds can be critical in supporting ecological diversity and successional changes within streams. Flooding and renewal of riparian vegetation by beavers, followed by the collapse of the dam and renewal of stream cover, all serve to provide rich organic soils to the aquatic ecosystem. In that respect, beaver dams contribute to watershed health and biodiversity. Through their damming activities, these “natural engineers” can supply up to 25% of the low summer water reserves required for viable fish and aquatic wildlife habitat. Amphibian species thrive in created ponds, and salmonids found in habitats with beaver ponds have been shown to have higher growth rates (Bergstrom, 1985).

To disturb, molest or destroy a beaver house, den or dam is an offence under Section 9 of the *Wildlife Act* unless you are a trapper, licensed under that *Act*. Alteration or removal of a dam is permitted under the *Wildlife Act* “to provide irrigation or drainage under lawful authority for the protection of property” and under the *Water Act* for drainage purposes with specific restrictions. To remove a beaver dam, you must have the permission of the landowner and notify the Ministry at least 45 days in advance of your removal project. Be prepared to supply supporting documentation and justification for the works with respect to the size, scale, and location of your proposed works and the level of risk to existing buildings, roads, or services being threatened with flooding.

7.6.2 Objectives

The Ministry’s objectives for the management of beavers and beaver dams are to encourage our coexistence with beavers, to allow beavers to remain where appropriate, and to manage beaver populations in areas where beaver presence is not appropriate. For beaver dam removal activities, the Ministry’s objective is to prevent harmful impacts to beaver populations, fish

and wildlife species, water quality and quantity, and riparian and aquatic habitats.

7.6.3 Standards for Beaver and Beaver Dam Management

All beaver dam removal works for which you are submitting instream works Notifications or Approvals must be compliant with the general standards listed in Section 7 of this document for:

FEDERAL STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with this type of work (*Water Act* Regulation Section 44(1)) and *Wildlife Act* Regulation Section 9) authorize beaver dam removal works completed as the following work type and under the following conditions:

Removal of a beaver dam under Section 9 of the Wildlife Act, provided that the removal is carried out in such a manner that downstream flooding and erosion do not occur (Subsection 44(1)(v), *Water Act* Regulation)

A person commits an offence if the person disturbs, molests or destroys a beaver house or den or beaver dam (Subsection 9(1)(b), *Wildlife Act*).

As the *Wildlife Act* section quoted above indicates, removal of a beaver dam requires a permit under the *Wildlife Act* Regulation. Contact your regional WLAP office for additional information on permit application requirements.

7.6.4 Best Practices

Long-term planning for beaver dam management is important. Planning should ensure that any activities undertaken would be effective in both the short and long terms. A beaver management plan should consider and include all of the following:

- Dam modification and debris management options;
- Population management strategies; and
- Dam removal only where absolutely necessary.

Remember:

Beaver impoundments can be critical in supporting the ecological diversity and successional changes within streams. Beaver dam removal works can result in very intrusive impacts to streams and stream corridors and are often only short-term solutions.

Disadvantages of
Beaver Dams
Removal

- Beaver removal works can result in very intrusive impact to streams and stream corridors;
- A flush of silty water can smother downstream fish spawning and rearing habitat;
- A rapid reduction of pond depth that can result in stranding and mortality of fish and other animals;
- Scouring and erosion of the downstream channel and banks, which can impact private property and infrastructure;
- Potential contamination of downstream wells; and
- The beaver, if left on site, will usually repair the breach immediately.

It is also important to consider that not all beaver problems can or should be handled in the same way. Dam removal is most effective as a tool when used in concert with other management techniques. There are a number of design strategies that can address these circumstances and provide effective alternatives to repeated removal of these barriers. Effective planning and monitoring of beaver dam management techniques can reduce operational and liability costs.

7.6.4.1 Examples of Dam Replacement and Isolation Techniques

Information on several techniques recommended for beaver dam management is provided below. Note that all of these techniques may require some form of maintenance.

Dam Removal

Complete beaver dam removal should only be considered in the following circumstances:

- After all other management tools have been exhausted;
- Where an emergency situation has arisen; and
- Where measures can be taken to ensure that no harmful alteration to fish habitat will occur.

Dam removal is generally ineffective when not used together with other management techniques, as beavers will usually repair the breach immediately, often within hours. There are a number of alternate design strategies that can address these circumstances and provide effective alternatives to repeated removal of dams. A few of these are listed below.

Replacement of Road Culverts with Clean-span Bridges

Beavers prefer to construct their dams in low gradient locations where there are natural constrictions in the stream flow and a ready source of food and building materials. This often means that road crossing culverts become prime targets for dam building activities. Where fish habitat and adjacent land values require free flowing stream conditions, it is recommended that these crossings be prioritized for eventual replacement with clean span bridges, wherever feasible. Replacement of a culvert with a free span bridge requires submission of a notification and compliance with Section 9 of the Water Act.

Culvert Screening Devices

Culvert design conversions, including upstream screening methods, should be considered on small, low gradient systems where protection of fish access is desirable and frequent maintenance can be undertaken. Where fish are present, the structure should be designed and installed to promote fish migration patterns. These structures are typically affixed to the inlet end of a culvert. There is at least one proprietary design known as the “Beaver Stop” which includes a double-walled wire cage assembly that is fastened to the upstream end of the culvert.

Perforated Culverts

A PVC pipe may be installed through the dam to form a one-piece screen and culvert. The pipe will have as many holes as possible drilled in the upstream end.

Log or Rock Fish Ladders adjacent to Beaver Dams

Log or rock fish ladders adjacent to beaver dams can be workable alternatives, used to promote fish access over beaver dams. These structures, however, may not adequately address flooding.

Fencing Techniques

Fencing should be designed to safely and effectively exclude the beaver from accessing upland vegetation while maintaining unrestricted stream flows. In order to ensure safe and effective beaver exclusion fencing, the following guidelines should be adhered to:

- Fence mesh openings should be small enough to prevent entry by beaver kits (<15 cm); and
- Fencing should be placed above the winter high-water mark of the watercourse.

7.6.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

- Dam modification activities should be monitored full-time during any instream works or sensitive activity. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Timing of Works –
“Work Windows”
For further information
on best practices for
timing of works, see
Appendix 14.1.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure any equipment and machinery used is in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.

Spill Reporting
Report any spill of a
reportable quantity of a
listed substance to the
Provincial Emergency
Program (PEP) at
1-800-663-3456 and to
your nearest DFO office
at the contact numbers
listed at the end of this
document.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.

- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.
- If it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water from entering clean water.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure any machinery used is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures

New Land
Development BMPs
The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.

- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.
- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

must be completed in a manner that will not disturb aquatic organisms.

- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

No-net-loss of fish
and wildlife
habitat?

Minimize impacts of your
activities and leave the
stream in better condition
than how you found it!

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.7 Standards and Best Practices for Miscellaneous Instream Works

7.7.1 Background

Several types of instream works less commonly undertaken are also permitted under the Notification process. If your work type is listed in Section 3.3 as being permitted under the Notification process but a specific type document is not provided, please apply the following standards and best practices to your document.

FEDERAL STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

7.7.2 Objectives

The Ministry’s objective for the management of instream works is to prevent harmful impacts to water quality, riparian and aquatic habitats, and fish and wildlife species during instream activities.

7.7.3 Standards for Other Types of Instream Works

All instream works for which you are submitting instream works notifications or approvals must be compliant with the general standards listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with these types of work (*Water Act* Regulation Section 44(1)) permit works completed as the following work types and under the following conditions:

Piers and Wharfs (Subsection 44(1)(d)):

The construction, maintenance or removal of a pier or wharf in a stream, provided that the ebb and flow of water and movement of material under the influence of waves or currents is not obstructed;

Flow Monitoring Devices (Subsection 44(1)(e)):

The construction, maintenance or removal of a flow or water level measuring device in a stream by the Crown in right of either Canada or British Columbia, or their agents;

Fish Screen Fences (Subsection 44(1)(f)):

The construction or removal of a fish fence, screen or fish or game guard across a stream by the Crown in right of either Canada or British Columbia, or their agents, provided that it is designed, constructed, maintained or used so as not to obstruct the flow of water in the stream; and

Minor and Routine Maintenance of Public Utility Works (Subsection 44(1)(u)):

The maintenance of a minor and routine nature by a public utility of its works.

7.7.4 Best Practices

The following section outlines recommended best practices for the design and construction of miscellaneous instream works.

7.7.4.1 Design Best Practices

The following best practices should be used in the design of piers, wharves, and related structures:

- Time construction to periods when use of the site by aquatic species is minimal (instream window).
- Construct docks so as to maintain a free flow of water currents beneath them to prevent erosion and sediment deposition along the shore, wherever possible.
- Reduce the width of approach trestles in shallow water.
- Locate structures so that future dredging will not be required.
- Use pre-cast concrete, steel or plastic construction material rather than treated wood, where possible, and especially in poorly flushed areas.
- If treated wood must be used, use wood treated with water-based preservatives. Pre-order wood timbers cut to size first then treated, where this is possible. Avoid the use of creosote treated wood in fresh water.
- Construct as much of the structure as possible in an upland area rather than in place and over the water.
- Provide an impermeable deck, spill containment, and a collection system for surface runoff where piers or trestles support mechanical or refueling equipment.
- Orient marina floats with currents or prevailing winds to prevent trapping surface debris and oily residue.
- Avoid the placement of floats or pile structures over significant areas of marine vegetation.
- Elevate piers well above the water, and orient floats in a north-south direction so that they do not shade bottom vegetation beds.
- Locate floats so that they remain afloat even at the lowest tides.

7.7.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the standards and comply with the *Water Act* Regulation's Protection of Habitat (Section 42(1)) and Protection of Water Quality (Section 41) standards, you should follow or implement these operational best practices:

Monitoring

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.
- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.

Timing of Works –

"Work Windows"

For further information on best practices for timing of works, see Appendix 14.1.

- Complete the works as quickly as possible once they are started.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life.
- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.
- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)
<http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>

New Land
Development BMPs
The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of ± 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of ± 2 NTU.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.
- If it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water from entering clean water.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of

the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.

- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.
- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/fo rms/vegetation_riparian /treereplcrit.pdf

- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.

No-net-loss of fish
and wildlife
habitat?

Minimize impacts of your
activities and leave the
stream in better condition
than how you found it!

- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.8 Standards and Best Practices for Emergency Works

7.8.1 Background

Emergency instream works are specifically defined in the British Columbia *Water Act* Regulation (Subsections 44 (o) and (p)). Emergency works include erosion or flood protection works required during a flood emergency declared under the British Columbia *Emergency Program Act*, or works required to clear an obstruction from a bridge or culvert during a flood event when there exists a potential danger to life or property. The British Columbia government, its agents, or a municipality are permitted to undertake both types of work.

Unfortunately the Regulations do not address all high-risk emergency situations or those works that require attention prior to the next flood event to ensure that they do not become high risk. A protocol to manage these other emergency situations is proposed in the following best practices section.

FEDERAL

STANDARDS:

The federal *Fisheries Act* regulates fish and fish habitat in Canada. Section 35 of the *Act* prohibits the “harmful alteration, disruption, or destruction of fish habitat” (HADD) unless authorized by DFO.

If your works may result in a HADD, you will need to contact DFO for an Authorization of your works.

If species at risk are present, the federal *Species At Risk Act* will also apply.

REMEMBER:

You **must** submit a Notification to the WLAP or an Approval application to LWBC for your proposed works.

7.8.2 Objectives

To ensure that emergency works are conducted without further damage or risk to human life or property while avoiding or mitigating potential risks to fish and wildlife populations and habitats.

7.8.3 Standards for Emergency Works

All emergency instream works must be compliant with the general standards listed in Section 7 of this document for:

- Compliance with Federal, Provincial, and Municipal Legislation
- Land Ownership
- Public Safety
- Completion of Work
- Protection of Water Quality
- Protection of Species and Habitat
- Protection of Other Water Users

Specific standards associated with this type of work (*Water Act* Regulation Section 44(1)) permit works completed as the following work types and under the following conditions:

Emergency Flood and Erosion Protection Works (Subsection 44(1)(o)):

The construction or placement of erosion protection works or flood protection works during a flood emergency, but not including restoration works, declared under the *Emergency Program Act*, under the direction of

the Crown in right of British Columbia, or its agents, or by a municipality.

Flood Event Debris Removal (Subsection 44(1)(p):

The clearing of an obstruction from a bridge or culvert by the Crown in right of British Columbia, or its agents, or by a municipality during a flood event when there exists a potential danger to life or property.

7.8.4 Best Practices Protocol to Manage Emergency Works and to Mitigate Impacts During Their Construction

The following protocol is recommended to manage all potential emergency works that require either immediate (Type 1) or imminent (Type 2) completion of works, either outside or within the recommended instream work window:

Type 1 emergencies are situations that require immediate attention **during a flood event or as designated under the Provincial Emergency Program**. These situations have caused, or present in the immediate future (**i.e., within 24 hours**), a high potential danger to human life, significant damage to property, or significant adverse impacts to fish or wildlife populations or their habitats.

Type 2 emergencies are situations that require attention in the near future, **immediately prior to the next flood event**. These situations would present a high potential danger to human life, significant damage to property, or significant adverse impacts to fish or wildlife populations or their habitats if not addressed immediately prior to the next flood event.

An appropriately qualified professional should confirm all emergency works. Once confirmed, all emergency works should follow the protocols for the type of emergency as outlined below:

Type 1 Emergency Protocol

- Local government, crown agency operations staff, or their agents should commence necessary works to alleviate the emergency and immediately advise their appropriately qualified professional monitor at any time of day and any day of the week.
- During the completion of works, operations staff or their agents should incorporate the standards and best practices appropriate to the type of instream works being completed to ensure the protection of fish and wildlife populations and habitats.
- The monitoring professional should attend the site immediately to conduct salvages and to ensure environmental protection measures are designed, constructed or installed, and maintained appropriately. The monitor should remain at the site full-time to monitor the works until completion.
- **Only works necessary to mitigate the emergency should be completed.** Any remaining works should be deferred until the next instream work window or conducted through the regular process.

- The monitoring professional must notify WLAP, DFO, and any other appropriate agencies by fax and phone within 72 hours. The monitor should include in his or her communication the use of this protocol, the technical rationale for justification of the proposed emergency works, the information associated with the Notification, and any special mitigating best practices used for completing the works outside the instream work window. Agency staff may visit the site, after receipt of the Notification.

Type 2 Emergency Protocol

- Local government, or crown agency operations staff, or their agents should advise their appropriately qualified professional monitor during the first available office hours:
 - **Only works necessary to mitigate the emergency should be proposed.** Any remaining works should be deferred until the next instream work window, or conducted through the regular process;
 - The proposed works should be scheduled to be completed prior to the next flood event, and should be designed to incorporate the recommended standards and best practices appropriate to the type of instream works proposed. If appropriate, special mitigative measures should be incorporated into the design to reduce the risks of working outside the instream work window.
 - The monitoring professional must notify WLAP, DFO, and any other appropriate agencies by fax and phone and include all design, plans, and mitigation documents. The professional should include in their communication the use of this protocol, the technical rationale for justification of the proposed emergency works, the information associated with the Notification, and any special mitigating best practices used for completing the works outside the instream work window. Agency staff may visit the site, after receipt of the Notification;
 - The monitoring professional should meet onsite with agency staff if available to review the design, associated plans, and proposed works. Any additional best practices should be discussed and agreed to during the site visit. Works should then be completed prior to the next flood event.
 - The monitoring professional should attend the site prior to conducting any instream works to complete salvages, and to ensure environmental protection measures are constructed, installed and maintained appropriately. Works should then be monitored full-time until completion.

7.8.4.1 Operational Best Practices

Emergency works carry a higher potential risk to fish and wildlife populations and habitats. The following operational best practices should be addressed in the planning, design and completion of all proposed emergency instream works.

Monitoring

Monitoring Reports

A suggested
Environmental
Monitoring Report
outline is available in
Section 8.2 of this
document.

- An appropriately qualified professional knowledgeable and experienced in monitoring the particular type of works should monitor all emergency works full-time. **Due to the sensitivity of conducting works during potentially high-risk periods to fish and wildlife populations and habitats, an appropriately qualified professional with extensive related experience in sediment, erosion and run-off control techniques, as well as fish and wildlife salvage should conduct the monitoring of works.**
- The monitor should complete a written report for the proponent within **10 working days** of completion of the majority of works. The report should include the following:
 - Detailed accounts of the completion of works with milestone events;
 - Confirmation of the use of standards and recommended best practices, or supported alternatives through an appropriate professionals' supported signed, and sealed technical rationale;
 - Confirmation of the consistency of the completed works with the Notification submitted;
 - Fish and wildlife protection mitigation difficulties encountered, and how those difficulties were managed; and
 - Outstanding issues with the Notification, how and when those activities will be completed and confirmed, and how and when they will be reported.
- A final copy of the report(s) should be provided to the proponent, a copy retained by the environmental monitor, a copy forwarded to WLAP to be filed with the Notification, and a copy provided to any other agency(s) with jurisdiction.

Timing of Works (Subsection 42(1)(a))

Timing of Works – "Work Windows"

For further information
on best practices for
timing of works, see
Appendix 14.1.

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region, if possible. As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected;
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds, if possible;
- If possible, undertake works during favourable weather and low water conditions; and
- Complete the works as quickly as possible once started.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the

salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.

- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/forms/vegetation_riparian/treereplcrit.pdf

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management

activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.

- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.

Standards and Best Practices:
Emergency Works

- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

No-net-loss of fish
and wildlife
habitat?

Minimize impacts of your
activities and leave the
stream in better condition
than how you found it!

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.9 Standards and Best Practices for Other Types of Works Requiring *Water Act* Approvals

Consult with DFO to determine if your works will result in a HADD.

You will likely need to contact DFO for an Authorization of works under Subsection 35(2) of the Fisheries Act.

In addition to obtaining a DFO Authorization, you **must** apply for an Approval of the works under Section 9 of the *Water Act*.

Review this document and contact LWBC for information on the Approval application process.

7.9.1 Background

Instream works such as stream realignment or diversion; dam, weir, or sediment sump construction; pond or lake creation; permanent flow diversions; or any other works not permitted under the *Water Act* Regulation require an Approval under Section 9 of the *Water Act*. These are typically significant works that permanently alter the direction, pattern or flow of a stream's path. Significant habitat alteration is almost always required for these types of works and as a result, federal and provincial regulatory processes are invoked. These types of works typically result in a HADD of fish habitat.

Generally, the direction or capacity of a stream's natural channel should never be altered. There are many consequences that can be devastating to the stream and its aquatic life over the long term. Stream diversion, sediment pond or lake creation are just a few examples of works of this type that require very complex proposals as part of an application for Approval. Planning and designing these works typically requires the involvement of many specialized qualified professionals. Many complex issues involving, physical, biological and social constraints must also be addressed.

The following should be considered when proposing this type of works:

- The **location of the stream** and its' effects on adjacent properties and services before and after the proposed alteration. The value of adjacent properties can be greatly affected by changing the streams' proximity to them. The risk of flooding and erosion to properties and roads, services, and utilities can also be greatly affected.
- **Cost.** An altered stream should result in a net gain of fish habitat for the stream immediately after construction and in the long term. The costs for reproducing a natural fully productive stream are substantial, and costs typically continue for years after the initial construction. Depending on the stream, the habitats supported, and the conditions in the area, habitat creation associated with stream alterations can cost upwards of \$10,000 per linear metre.
- **The long-term viability and maintenance of the stream.** Streams are stable, dynamic organisms that support hundreds of different balanced aquatic and terrestrial life cycles. The path that streams follow is the most preferred and will need to change over time within its active floodplain depending on the topography of the area. Altering, restricting

or fixing its path affects the ability of the stream to change or react to change and will limit its ability to support fish and wildlife habitats and populations. Works that restrict a stream's channel or floodplain also increase stream power and erosive forces in channel bends, resulting in a need for substantial bank protection to keep the channel position fixed and the water moving in a direction that it doesn't prefer to go. This hardening of the banks increases stream power more and results in increased costly channel maintenance needs that continue forever.

7.9.2 Objectives

Along with LWBC, WLAP's objective for the management of *Water Act* Section 9 Approvals is to prevent immediate and long-term harmful impacts to riparian and aquatic fish and wildlife habitats, fish and wildlife populations, and water quality and quantity.

7.9.3 Standards for Works Requiring Approvals

All activities **not** permitted under the *Water Act* Regulation require an Approval pursuant to Section 9 of the *Water Act*. A Section 9 Approval provides the conditions or standards that must be met when completing works. As works under Section 9 typically result in a HADD, application should **always** be made to DFO. Section 35 of the *Fisheries Act* prohibits a HADD unless authorized by DFO.

7.9.4 Best Practices

You should retain an appropriately qualified professional to assist with your proposal for works. Any application for an Approval under Section 9 should consider the following best practices.

7.9.4.1 Design Best Practices

An application for a Section 9 Approval should provide justification that:

- The works cannot be avoided;
- All alternatives to conducting the works have been considered;
- The works have been designed such that there would be no significant immediate or long-term impacts to upstream or downstream riparian or aquatic fish and wildlife habitats;
- The works have been designed such that there would be no significant immediate or long-term impacts to adjacent, upstream, or downstream properties, roads, services, or utilities.
- Permission can be obtained for any actual or potential impacts to property rights;
- There would no impacts to upstream or downstream water rights;
- The works are designed, constructed, monitored, and maintained by a team of appropriately qualified professionals, machine operators and other skilled construction staff that are specialized in the design,

A Consequence of Change

Even without tight turns and steep banks, altered watercourses can typically take 20 to 30 years to achieve dynamic stability and 30 years or more to reach the level of productivity that they had prior to being changed.

Please note...
Should you be successful in the application for an Approval, the Section 9 Approval document you receive may provide more specific conditions, requirements or best practices than those listed below

Monitoring Reports
A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

Timing of Works –
“Work Windows”
For further information on best practices for timing of works, see Appendix 14.1.

construction and maintenance of such works and of fish and wildlife habitat streams; and

- The works would result in significant immediate and long-term net gain in fish and wildlife habitat.

7.9.4.2 Operational Best Practices

All individuals carrying out instream works should be very familiar with the listed standards and best practices. To address or achieve the listed standards and comply with the *Water Act*, you should apply the following operational best practices:

Monitoring

- As these types of works can result in significant impacts to fish and wildlife habitats, construction activities should be monitored **full-time** to the completion of the project. The environmental monitor should be an appropriately qualified professional and should have been provided with written authority to modify or halt any construction activity if deemed necessary for the protection of fish and wildlife populations or their habitats. A sign should be posted at the entrance to the job site or in the immediate vicinity listing the monitor’s company name and phone number;
- A copy of this section of the document listing standards and best practices for your works, all appropriate plans and drawings, your *Water Act* Section 9 Approval, your DFO *Fisheries Act* Subsection 35(2) Authorization (if appropriate), and any other permits should be forwarded to the contractor or crew supervisor. Keep them readily available at all times at the site while the work is proceeding;
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project; and
- Have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document for a suggested template) to agencies identified in the Approval document.

Timing of Works (Subsection 42(1)(a))

- If works are scheduled for streams where fish or species at risk are present, or if their presence in the stream is not known, complete in-channel or bank work during the instream works reduced risk-timing window provided by Ministry for your region.
- Only clear vegetation for worksite access during the vegetation clearing timing window, to protect nesting birds.

- As species at risk typically have no window of least risk, avoid in-channel work wherever possible when the presence of species at risk is known or expected.
- Refer to Appendix 14.1 or contact the Ministry's regional office for information on timing window requirements for your area.
- Only undertake works during favourable weather and low water conditions.
- Complete the works as quickly as possible once they are started.

Spill Reporting

Report any spill of a reportable quantity of a listed substance to the Provincial Emergency Program (PEP) at **1-800-663-3456** and to your nearest DFO office at the contact numbers listed at the end of this document.

Deleterious Substance Control/Spill Management (Subsections 41(a)(b) & 42(1)(d))

- Prevent the release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine, or storm sewer system. The recommendations for sediment and erosion control outlined in the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al.* 1992) can also be used for reference.
- Ensure equipment and machinery are in good operating condition (power washed), free of leaks, excess oil, and grease. No equipment refuelling or servicing should be undertaken within 30m of any watercourse or surface water drainage.
- Ensure all hydraulic machinery entering a stream uses environmentally sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment. Train onsite staff in its use. Immediately report any spill of a substance that is toxic, polluting, or deleterious to aquatic life of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**.
- Do not use treated wood products in any construction below the high-water mark of the stream channel, to prevent the release of preservatives that are toxic to fish.

Wood Products

For more information on acceptable wood products to use in or near water, consult the document *Guidelines to Protect Fish and Fish habitat From Treated Wood Used in Aquatic Environments in the Pacific Region* (2000)

Concrete Works (Subsections 41(e) & 42(d))

- Ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside sealed formed structures. Concrete leachate is alkaline and highly toxic to fish and other aquatic life.
- A CO₂ tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur. Train staff in its use.

- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water of reportable quantities to **1-800-663-3456**. Implement emergency mitigation and clean-up measures (such as use of CO₂ and immediate removal of the material).
- Completely isolate all concrete work from any water within or entering into any watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until the works are completed. Emergency measures should be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units.
- Prevent any water that contacts uncured or partly cured concrete (during activities like exposed aggregate wash-off, wet curing, or equipment washing) from directly or indirectly entering any watercourse or stormwater system.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is between 6.5 and 8.0 pH units and the turbidity is less than 25 nephelometric turbidity units (NTU), measured to an accuracy of +/- 2 NTU.

Isolation of the Work Area (Subsections 42(b) & 44(x))

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose, or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.

Salvage of Fish and/or Wildlife (Subsection 42(1)(e))

- Complete a fish and amphibian salvage before the start of works if any portion of the wetted channel will be isolated or dewatered. An appropriately qualified professional must complete the salvage. It is the responsibility of the salvage crew to obtain the necessary permits required by British Columbia Fisheries Regulations or Canada *Fisheries Act* before conducting the salvage activities.
- Choose low impact salvage methods such as minnow trapping and seining before opting for higher impact electrofishing.
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

New Land

Development BMPs

The Ministry is currently preparing a document entitled *Environmental Best Management Practices for Urban and Rural Land Development* that will contain additional information on best practices. Consult the Ministry websites for more information.

Sediment Control (Subsections 41(a)(b)(c) & 42 (1)(c)(d)(f))

- Ensure that material such as rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the watercourse is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
- Ensure machinery is operated from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Put sediment control measures into place before starting any works that may result in sediment mobilization.
- Construct any ditches, water bars, or water diversions within the work area so they do not directly discharge sediment-laden surface flows into the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.
- Use mitigating measures to protect excavated material from eroded and reintroduced into the watercourse. Such measures include, but are not limited to, covering the material with erosion blankets or seeding and planting it with native vegetation.
- When material is moved offsite, dispose of it in a manner that prevents its entry into any watercourse, floodplain, ravine, or storm sewer system.

Vegetation Management (Subsections 41(c) & 42 (f)(g))

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:

- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

Site Restoration (Subsections 41(a)(c) & 42(1)(c)(f)(g))

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.

Standards and Best Practices:
Other Types of Works Requiring *Water Act* Approvals

No-net-loss of fish
and wildlife
habitat?

Minimize impacts of your
activities and leave the
stream in better condition
than how you found it!

- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival.

For further information regarding an application for a *Water Act* Section 9 Approval your proposed works, contact the LWBC Service Centre in your region (see the Contact List provided in Section 10.1) or visit: <http://lwbc.bc.ca/>

REMEMBER:

Your project will not be considered to be in compliance with the Act or the Regulation if any of the standards have not been met. Ensure you implement appropriate best practices to avoid impacts and mitigate your works.

7.10 Alternatives to Best Practices

Procedures other than those outlined in the Standards and Best Practices sections may be used provided that all standards, legislative and regulatory requirements are met as well as short and long term objectives.

For larger or more complex works, or works where habitats or species may be more sensitive to impacts, the use of an appropriately qualified professional should be considered. Appropriately qualified professionals can assist with designing and planning works that will meet the required standards and can provide advice on the selection of appropriate best practices. For works requiring an application for *Water Act* Approval, the use of an appropriately qualified professional is very strongly recommended.

8 Monitoring and Reporting

Monitoring and reporting activities are actions you are required to carry out as a demonstration of your compliance with standards and best practices for your activity. For example, these activities may involve recording and reporting on your works to demonstrate that you have appropriate sediment and erosion controls in place, that you have completed your works within the appropriate timing windows of least risk, or that you have completed required aquatic species salvages.

8.1 Monitoring

The independent environmental monitoring of works is undertaken to ensure that works are completed in compliance with the required standards, best practices, and conditions. Depending on the nature of the works and the sensitivity of the site, the environmental monitor may be on site continually or may make periodic site visits.

To ensure your works meet the requirements of applicable legislation:

- Ensure that construction activities are to be monitored full-time during start-up and any instream works or sensitive activity. During other phases of your instream works monitoring may be on a daily basis to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if deemed necessary for the protection of fish and wildlife populations or their habitats. A sign must be posted at the entrance to the job site or in the immediate vicinity that lists the monitor's company name and phone number.
- Forward a copy of this document listing standards and best practices for your works, and all appropriate plans, drawings and documents to the contractor or crew supervisor. This package should be at the site and readily available at all times while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Ensure that a monitoring report using the recommended format is completed and submitted by the environmental monitor to the client and applicable agencies within 60 days of project completion.

8.2 Reporting

The following information should be provided to your local WLAP Ministry office as part of an environmental monitoring report completed by your environmental monitor.

1. **Project Description**

- Project name;
- Site location;
- Type of works; and
- Person or organization undertaking the works.

2. **Site Inspections**

- Frequency of monitoring;
- Staff member(s) conducting the inspection;
- Dates and times of inspection;
- Extent of inspection;
- Summary description of each inspection visit; and
- Weather on the day of inspection and during the period immediately preceding the inspection.

3. **Construction Stage**

- A brief description of the construction activities completed; and
- A brief description of planned construction activities for the period following the site inspections.

4. **Mitigation Measures/Structures**

- Recommended mitigation measures, including the maintenance of previously constructed measures, and the construction, installation or implementation of new measures; and
- Review of previously recommended mitigation measures.

5. **Salvage Results**

- Results of fish and amphibian salvages conducted prior to works, including, at a minimum, a specific site location, list of species, and numbers salvaged.

6. **Comments/Other**

- Description of any incidents related to environmental issues or emergencies that occurred on the site and how they were monitored, mitigated and remediated; and
- Description of any outstanding mitigative measures or monitoring programs needed for until the completion of site restoration.

7. **Photographs**

- Representative date stamped photographs should be taken during each site inspection, and during and after all incidents.

8.3 Spill Reporting

Spills in streams can be devastating. In some cases, entire stream ecosystems are destroyed as organisms within the stream are killed and habitat altered so severely the area can no longer be inhabited. A toxic or deleterious substance is any substance that, if discharged to the environment (air, land, or water) would kill fish, wildlife, vegetation or their food, or would degrade or alter the quality of air, land or water so that it becomes toxic or harmful to organisms or their habitats. This could include but is not limited to substances such as sediment, concrete wash, fuel, lubricants, pesticides or herbicides.

The *Waste Management Act* prohibits the discharge of toxic or deleterious substances to air, land or water. The *Fisheries Act* also prohibits the discharge of a toxic or deleterious substance to any stream that directly or indirectly supports fish or fish habitat. The penalties for the discharge of a toxic or deleterious substance can be significant and could include imprisonment. All efforts should be taken to avoid such spills. Several of the standards and best practices listed in this document are oriented towards spill avoidance.

By law, you are required to immediately report any spill of a reportable quantity of any toxic or deleterious substance into air, land or air.

Contact:

Provincial Emergency Program (PEP)

(24 hour phone line):

1-800-663-3456.

You must also report any discharge of a toxic or deleterious substance to a stream to the nearest DFO office or to 1-800-465-4336.

9 Compliance and Enforcement

As part of the change in the management of the province's environmental resources, WLAP or other agency staff will be visiting and inspecting instream worksites through a program of compliance monitoring.

Failure to provide Notification, obtain Approval, to address or achieve the standards or requirements under the *Water Act* Regulations or to meet the conditions in an Approval would be considered non-compliance with the *Water Act* and could result in significant penalties including imprisonment.

10 Your Next Steps

After review of this document you should be in a position to know whether you are ready to move forward with your proposed instream works.

If you have determined that a *Water Act* Notification is appropriate, you should:

- Seek professional advice regarding the design and plan for your proposed work;
- Plan your works to incorporate best practices to protect aquatic resources and ensure compliance with existing standards;
- Complete a Notification package (see the following section) for your works; and
- Send the Notification package to your regional WLAP representative.

If you have determined that a *Water Act* Approval is appropriate, you should:

- Seek professional advice regarding the design and plan for your proposed work;
- Plan your works to incorporate best practices to protect aquatic resources and ensure compliance with existing standards; and
- Contact LWBC for information on completing an Approval application package for your works. Forward it to the Land and Water Management Division of your regional LWBC Service Centre.

If you have determined that, ***in addition*** to your provincial requirements, a federal *Fisheries Act* Authorization is required, or if you are unsure as to whether your project will require a DFO Authorization, you should:

- Contact your local DFO office. Contact information is provided in the following section.
- An example of the information required by DFO (Lower Fraser) is available at the following website: http://www-heb.pac.dfo-mpo.gc.ca/publications/publications_e.htm

10.1 Agency Contact Information

BC WLAP – Regional Ecosystem Section Contacts		
Office	Mailing Address	Phone/Fax/Email
Region 1 Vancouver Island	Ministry of Water, Land and Air Protection 2080 A Labieux Road, Nanaimo BC V9T 6J9	Phone: (250) 751-3100 Fax: (250) 751-3103 sharon.erickson@gems3.gov.bc.ca
Region 2 Lower Mainland	Ministry of Water, Land and Air Protection 2 nd Floor – 10470-152 nd St., Surrey, BC V3R 0Y3	Phone: (604) 582-5235 Fax: (604) 930-7119 LMRworks@victoria1.gov.bc.ca
Region 3/8 Thompson/Okanagan	Ministry of Water, Land and Air Protection 1259 Dalhousie Drive, Kamloops, BC V2C 5Z5	Allison.Cebuliak@gems5.gov.bc.ca
Region 4 Kootenay	Ministry of Water, Land and Air Protection #401 - 333 Victoria Street, Nelson, BC V1L 4K3	Phone: (250) 354-6333 Fax: (250) 354-6332
Region 5 Cariboo	Ministry of Water, Land and Air Protection #400 - 640 Borland Street, Williams Lake, BC V2G 4T1	Phone: (250) 398-4530 Fax: (250) 398-4214
Region 6 Skeena	Ministry of Water, Land and Air Protection PO Box #5000 - 3726 Alfred Avenue, Smithers, BC V0J 2N0	Fax: (250) 847-7728
Region 7 Omineca	Ministry of Water, Land and Air Protection 4051-18 th Ave. Prince George, BC V2N 1B3	Phone: (250) 565-6135 Fax: (250) 565-6940
Region 9 Peace	Ministry of Water, Land and Air Protection 10003-110 th Ave. Rm. 400, Fort St. John, BC V1J 6M7	Phone: (250) 787-3567



Figure 15. WLAP Regions

Agency Contact Information

LWBC Service Centres		
Office	Mailing Address	Phone/Fax/Email
Lower Mainland Service Region Service Centre - Surrey	Suite 200-10428 153rd St Surrey BC V3R 1E1	Tel: (604) 586-4400 Fax: (604) 586-4434
Northern Service Region Service Centre - Prince George	Suite 455-1011 4th Ave Prince George BC V2L 3H9	Tel: (250) 565-6779 Fax: (250) 565-6941
Southern Service Region Service Centre - Kamloops	3rd Floor 145 3rd Ave Kamloops BC V2C 3M1	Tel: (250) 377-7000 Fax: (250) 377-7036
Vancouver Island Service Region Service Centre - Nanaimo	501-345 Wallace St Nanaimo BC V9R 5B6	Tel: (250) 741-5650 Fax: (250) 741-5686



Figure 16. LWBC Service Regions

Fisheries and Oceans Canada (DFO) BC Offices			
Office	Address	Contact Information	Hours of Operation
Bella Bella	Box 38, Bella Bella, BC V0T 1B0	Tel: (250) 957-2363 Fax:(250) 957-2767	Call Ahead: No Admin. Staff
Bella Coola	Box 130 (Hwy 20) Bella Coola, BC V0T 1C0	Tel: (250) 799-5345 Fax:(250) 799-5540	M to F: 8 AM to 4 PM
Campbell River	315-940 Alder Street, Campbell River, BC V9W 2P8	Tel: (250) 850-5701 Fax:(250) 286-5852	M to F: 8 AM to 4 PM
Chilliwack	45742 A Yale Road West, Chilliwack, BC V2P 2N4	Tel: 604-702-2278 Fax:604-702-2280	M to F: 10 AM to 2 PM
Clearwater	Box 610-1121 E. Hwy,16 Clearwater, BC V0E 1N0	Tel: (250) 674-2633 Fax:(250) 674-3553	Call Ahead: Open one day a week
Comox	148 Port Augusta Street, Comox, BC V9M 3N6	Tel: (250) 339-2031 Fax:(250) 339-4612	M to F: 9 AM to 3:30 PM
Cranbrook	P.O. Box 676 #201-101, 10th Ave., Cranbrook, BC V1C 4J2	Tel. (250) 417-2360 Fax. (250) 417-2361	M to F: 8 AM to 4 PM
Delta	100 Annacis Parkway, Unit 3 Delta, B.C. V3M 6A2	Tel: 604-666-8266 Fax:604-666-7112	M to F: 8 AM to 4 PM
Duncan	Box 241, 5653 Club Road, Duncan, BC V9L 3X3	Tel: (250) 746-6221 Fax:(250) 746-8397	M to F: 8 AM to 4 PM
Gold River	499 Muchalaht Drive (Box 130) Gold River BC, V0P 1G0	Tel: (250) 283-9075 Fax: (250) 283-9058	Call Ahead: No Admin Staff
Hazelton	Box 490 4351-11th Avenue, New Hazelton, BC V0J 2J0	Tel: (250) 842-6327 Fax:(250) 842-6283	Call Ahead: No Admin. Staff
Kamloops	985 McGill Place, Kamloops, BC V2C 6X6	Tel: (250) 851-4950 Fax:(250) 851-4951	M to F: 8 AM to 4 PM
Langley	5550 - 268th Street, Langley, BC V4W 3X4	Tel: 604-607-4150	M to F: 8 AM to 4 PM
Lillooet	Box 315 - 654 Industrial Place, Lillooet, BC V0K 1V0	Tel: (250) 256-2650 Fax:(250) 256-2660	M to F: 8 AM to 4 PM
Masset	Box 99, 1590 Old Beach Road, Masset, BC V0T 1M0	Tel: (250) 626-3316 Fax:(250) 626-3253	M to F: 8-12 AM and 1-4 PM
Mission	32873 London Avenue, Mission, BC V2V 6M7	Tel: 604-814-1055 Fax:604-826-1064	M to F: 8 AM to 4 PM

Agency Contact Information

Fisheries and Oceans Canada (DFO) BC Offices			
Office	Address	Contact Information	Hours of Operation
Nanaimo (Front Street)	60 Front Street, Nanaimo, BC V9R 5H7	Tel: (250) 754-0230 Fax:(250) 754-0309	M to F: 8 AM to 4 PM
Nanaimo (SCD)	3225 Stephenson Point Road, Nanaimo, BC V9T 1K3	Tel: (250) 756-7270 Fax:(250) 756-7162	M to F: 8 AM to 4 PM
Nelson	112 McDonald Drive, Nelson, BC V1L 6B9	Tel. (250) 352-0891 or (250) 352-0892 Fax. (250) 352-0916	M to F: 8 AM to 4 PM
Parksville	457 East Stanford Avenue, Parksville, BC V9P 1V7	Tel: (250) 954-2675 Fax:(260) 248-6776	Call Ahead: No Admin. Staff
Parksville	1100 Lee Rd. Parksville, BC V0R 2S0	Tel: (250) 954-1354 Fax:(250) 954-0173	M to F: 8 AM to 4 PM
Pender Harbour	Box 10 12841 Madeira Park Rd, Madeira Park, BC V0N 2H0	Tel: (604) 883-2313 Fax: (604) 883-2152	M to F: 8 AM to 12 PM
Penticton	201-3547 Skaha Lake Road, Penticton, BC V2A 7K2	Tel: (250) 770-4486 or (250) 770-4487 Fax: (250) 492-1314	M TO F: 8AM - 4PM
Port Alberni	250 - 4877 Argyle Street Port Alberni, BC V9Y 1V9	Tel: (250) 724-0195 Fax:(250) 724-2555	M to F: 8 AM to 4 PM
Port Hardy	Box 10, 8585 Wolloson Road, Port Hardy, BC V0N 2P0	Tel: (250) 949-6422 Fax:(250) 949-6755	M to F: 8 AM to 4 PM
Powell River	7255 Duncan Street, Powell River, BC V8A 5N6	Tel: (604) 485-7963 Fax:(604) 485-7439	M to F: 8:30 AM to 12:30 PM
Prince George	3690 Massey Drive, Prince George, BC V2N 2S8	Tel: (250) 561-5366 Fax:(250) 561-5534	M to F: 8 AM to 4 PM
Prince Rupert	417-2nd Avenue West, Prince Rupert, BC V8J 1G8	Tel: (250) 627-3499 Fax:(250) 627-3427	M to F: 8 AM to 4 PM
Queen Charlotte City	PO Box 99, 137 Bay Street, QCC, BC V0T 1S0	Tel: (250) 559-4413 Fax:(250) 559-4678	M/W/F: 8 AM to 4 PM T/R: 8 AM to 12 PM
Quesnel	1205 North Cariboo Hwy, #97, Quesnel, BC V2J 2Y3	Tel: (250) 992-2434 Fax:(250) 992-7232	M to F: 8 AM to 1 PM
Salmon Arm	Box 1160, 1751-10th Ave SW, Salmon Arm, BC V1E 4P3	Tel: (250) 804-7000 Fax:(250) 804-7010	M to F: 8 AM to 4 PM
Smithers	Box 578, 3177 Tatlow Road, Smithers, BC V0J 2N0	Tel: (250) 847-2312 Fax:(250) 847-4723	M to F: 8 AM to 4 PM
Squamish	1120 Hunter Place, Box 2360, Squamish, BC V0N 3G0	Tel: 604-892-3230 Fax:604-892-2378	Call Ahead: No Admin. Staff
Steveston	12551 No. 1 Road, Richmond, BC V7E 1T7	Tel: 604-664-9250 Fax:604-664-9255	M to F: 8 AM to 4 PM
Terrace	5235 A Keith Avenue, Terrace, BC V8G 1L2	Tel: (250) 615-5350 Fax:(250) 615-5364	M to F: 8 AM to 4:30 PM
Tofino	Box 48, 161 1st Street 2nd Fl, Tofino, BC V0R 2Z0	Tel: (250) 725-3468 Fax:(250) 725-3944	M to F: 8 AM to 12 PM

Fisheries and Oceans Canada (DFO) BC Offices			
Office	Address	Contact Information	Hours of Operation
Upper Nass (New Aiyansh)	Box 29, Nass Camp, BC V0J 3J0	Tel: (250) 633-2408 Fax: (250) 633-2439	Call Ahead: No Admin. Staff
Vancouver RHQ	Suite 200 - 401 Burrard Street, Vancouver, BC V6C 3S4	Tel: 604-666-0384 Fax: 604-666-1847	M to F: 8 AM to 4 PM
Victoria	4250 Commerce Circle, Victoria, BC V8Z 4M2	Tel: (250) 363-3252 Fax: (250) 363-0191	M to F: 8 AM to 4 PM
Victoria - CCG	25 Huron Street, Victoria BC V8V 4V9	Tel: (250) 480-2600 Fax: (250) 480-2702	M to F: 8 AM to 4 PM
Whitehorse	100 - 419 Range Road, Whitehorse, Yukon Y1A 3V1	Tel: (867) 393-6722 Fax: (867) 393-6738	M to F: 8:00 AM to 4:30 PM
Williams Lake	310A North Broadway, Williams Lake, BC V2G 2Y7	Tel: (250) 305-4002 Fax: (250) 305-3017	M to F: 8 AM to 4 PM: No admin staff after 12.

10.2 Notification Form

Notification Form (pursuant to Section 44 of the Water Act Regulation)

1. Type of Instream Works:

☐ **Stream Crossing**

- ☐ Culvert
- ☐ Clear-span bridge
- ☐ Pipeline crossing
- ☐ Winter roads
- ☐ Temporary fords

☐ **Stream Channel Maintenance**

- ☐ Sediment removal
- ☐ Vegetation removal
- ☐ Debris removal

☐ **Stream Bank and Lakeshore Stabilization**

- ☐ Bank stabilization
- ☐ Shore stabilization
- ☐ Maintenance or repair of existing dyke or erosion protection works

☐ **Urban Stormwater Management**

- ☐ Stormwater outfalls
- ☐ Habitat enhancement and Restoration
- ☐ Beaver and Beaver Dam Management

☐ **Other Types of Instream Work**

- ☐ Pier/Wharf
- ☐ Flow Monitoring Device
- ☐ Fish Fence
- ☐ Routine Maintenance of a Public Utility

☐ **Emergency Works**

2. Project title: _____

3. Applicant name: _____

Address: _____

Phone: _____ Fax: _____

Email: _____

4. Location of works:

Site location (UTM, or Latitude and Longitude): _____

Regional District: _____

City/Municipality: _____

Street address or nearest landmark: _____

Stream name: _____

Location on stream: _____

What stream / river / lake does it flow into? : _____

Street address of affected properties: _____

5. Agent(s) name: _____

Address: _____

Phone: _____ Fax: _____

Email: _____

6. List of Appropriately Qualified Professionals; names; contact information; designations and project responsibilities:

7. Who is monitoring the work? :_____

Address:_____

Phone:_____Fax:_____

Email:_____

☐ Yes, s/he is an appropriately qualified professional.

8. Who is doing the work? :

Address:_____

Phone:_____Fax:_____

Email:_____

9. When are the works scheduled? :

Start (yy/mm/dd):_____

End (yy/mm/dd):_____

10. Have you referred this to DFO? :

- ☐ No, N/A. The works would not result in a “harmful alteration, disruption or destruction of fish habitat”, or
- ☐ Yes. The works may result in a “harmful alteration, disruption or destruction of fish habitat”. An application has been forwarded to Fisheries and Oceans Canada (DFO), and all future communications with DFO will be submitted referencing this project;

11. Have you included in your Notification...?

- ☐ Detailed photographs of the site prior to the proposed works, taken from a variety of perspectives to clearly record:
- ☐ The proposed location of works including any riparian vegetation or in-channel habitat to be disturbed;
 - ☐ The cross-section of the stream at the proposed crossing location;
 - ☐ The extent of potential disturbance from the works and access requirements, and
 - ☐ The proposed area of mitigation or compensation for habitat alteration associated with the work.

12. Have you provided in your Notification...?

- ☐ Detailed plans and supporting documentation of the proposed crossing design that address the appropriate standards and best practices, and
- ☐ Approvals or permits from other agencies.

13. I have read the “Standards and Best Practices for Instream Works, March 2004” document and have incorporated the standards and best practices which apply to my works into this notification. I am the landowner, proponent or authorized agent working on behalf of the landowner or proponent, and take full responsibility for the completion and accuracy of the Notification Form and accompanying documents.

Name (please print):_____

Signature:_____

Date:_____

Submit this Notification form and accompanying documents to your regional WLAP office **at least 45 days prior to the proposed start date for your works.** To ensure that your Notification is complete, contact your regional office regarding any special requirements they may have for your Notification.

11 Glossary

Alevin: Another name for juvenile fish that have recently hatched from the egg. This is an intermediate life stage during which the fish feed off an attached yolk sac and remain within gravels and cobbles in the streambed.

Annual vegetation: Vegetation that completes its growth cycle in one year (e.g., grasses).

“Appropriately qualified professional”: An applied scientist or technologist specializing in a relevant applied science or technology including, but not necessarily limited to, agrology, forestry, biology, engineering, geomorphology, geology, hydrology, hydrogeology or landscape architecture, and who is registered in British Columbia with their appropriate professional organization, and acting under that association's Code of Ethics and subject to disciplinary action by that association, and who, through demonstrated suitable education, experience, accreditation and knowledge relevant to the particular matter, may be reasonably relied on to provide advice within their area of expertise.

Aquatic habitats: Areas associated with water that provide food and cover and other elements critical to the completion of an organism's life cycle (e.g., wetlands, rivers, riparian areas and streams).

Avoidance: Minimizing the effects of an undertaking on fish habitat through identifying and bypassing areas of concern to fisheries.

Bedload: Particulate (e.g., gravels, cobbles and boulders) that is transported by rolling and bouncing along the channel bottom in the lower layers of stream flow.

Benthic invertebrates: Animals lacking backbones that live in the substrates of aquatic systems (e.g., aquatic worms, larval flies and midges, molluscs).

Best Management Practice: A recommended technique that has been demonstrated to be an effective and practical means of preventing or limiting harmful impacts to the environment. Best Management Practices include any program, technology, process, siting criteria, operating method, measure, or device that controls, prevents, removes, or reduces pollution.

Best Practice (see Best Management Practice): A method or technique that **should** be followed to ensure the standards are met and impacts to riparian and aquatic habitats are mitigated.

Bioengineering: The use of living plant materials to perform some engineering function (e.g., enhanced soil stability).

For provincial and COSEWIC species at risk lists see these links:

<http://www.gov.bc.ca/WLAP>
<http://www.cosewic.gc.ca/cosewic>

Check dam: A small dam constructed in a ditch or similar place to decrease water velocity and promote the deposition of sediment.

Clear-span bridge: A stream crossing structure that spans the stream's bankfull channel and does not involve the construction or installation of any structure within the stream's banks.

Coffer dam: A watertight enclosure built in a shallow river or creek, which is pumped dry to allow construction activities in the isolation of flowing water.

Compensation: "The placement of natural habitat, increase in the productivity of existing habitat or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada's fisheries resources" (DFO, 1986).

Critical habitat: Habitat used by species at risk or habitat critical to sustaining local populations of a species, because of its rareness, productivity, and sensitivity. This includes high value spawning/rearing or nesting habitat.

Critical fish habitat: Habitat that is critical in sustaining a subsistence, commercial, or recreational fishery, or fish species at risk (provincially red- and blue-listed or listed by COSEWIC because of its relative rareness, productivity, and sensitivity). Indicators of critical fish habitat include the presence of high-value spawning and rearing habitat, which are critical to the fish population present (e.g., for salmon and some trout, locations with an abundance of suitably sized spawning gravels, deep pools, undercut banks, or stable debris).

DFO: Federal Department of Fisheries and Oceans

Deleterious Substance: Any substance that, if added to any water, would degrade or alter the quality of that water so that it becomes toxic or harmful to aquatic organisms or habitat.

Diversion dam: A barrier built within the active channel of a watercourse in order to divert water along a different flow path.

Diversion ditch: A ditch that directs water and silt into stabilized areas away from a watercourse.

Due diligence: A legal term that requires individuals on the job to maintain a reasonable standard of care. This term applies to environmental precautions but also to other areas such as safety, for example.

Dyke: An impervious elongated mound of earth constructed to confine water or another liquid from entering or leaving an area of land.

Ecosystem: The dynamic and interrelated complex of plant and animal communities and their non-living environment. All parts of an ecosystem,

including physical, chemical, and biological components, are interconnected; that is, they affect and are affected by all other parts.

Erosion: A natural process of sediment movement as a consequence of water currents, rainfall runoff, or wind, which may be considered beneficial or detrimental, depending upon the associated environmental concerns.

Fish: All fish, shellfish, crustaceans and marine animals, and the eggs, spawn, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.

Fish habitat: The areas in and about a stream, such as spawning grounds and nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes. This includes streamside habitat.

Floodplain: A level, low-lying area adjacent to streams that is periodically flooded by stream water. It includes lands at the same elevation as areas with evidence of moving water, such as active or inactive flood channels, recent fluvial soils, sediment on the ground surface or in tree bark, rafted debris, and tree scarring.

Grade: The slope of road, channel, or natural ground.

Geotextile filter fabric: A synthetic material placed under erosion control material (i.e., riprap), with the primary functions of layer separation, aggregate confinement and distribution of load.

Harmful alteration, disruption or destruction of fish habitat (HADD): The DFO define HADD of fish habitat as “any change in fish habitat that reduces its capacity to support one or more life processes of fish”.

Habitat: The natural home of a plant or animal within an ecosystem, which provides food and shelter and other elements critical to an organism’s health and survival.

Habitat enhancement: Any manipulation of habitat that improves its value and ability to meet the specified requirements of one or more species.

Hyporheic zone: The porous layer of the streambed where the intermixing of ground and surface waters occurs.

Important fish habitat: Habitat that is used by fish for feeding, growth, and migration, but is not deemed to be critical. This category of habitat usually contains a large amount of similar habitat that is readily available to the population. Indicators of important fish habitat include important migration corridors, or the presence of suitable spawning and rearing habitat for the fish species present.

Instream window: See **Timing window**. Also referred to as the “instream work window” and “instream reduced risk work window”. When works are

timed to occur during the instream window, there is a reduced risk of damage to spawning habitat, fish eggs, and juvenile fish and reduced impacts to adult and juvenile aquatic organisms that may be migrating, over-wintering or rearing.

LWBC: Land and Water British Columbia.

Marginal fish habitat: Habitat that has low productive capacity and contributes marginally to fish production. Indicators of marginal fish habitat include the absence of suitable spawning habitat or rearing habitat for the fish species present. (e.g., for salmon and some trout, locations no suitable sized gravels, deep pools, undercut banks, or stable debris).

Migration: Animal movements between two or more separate habitats (e.g., from over-wintering habitat to spawning habitat).

Mitigation: Actions taken during the planning, design, construction, and operation of a project to alleviate or reduce potential adverse effects on aquatic habitat, such as culvert design modifications to allow fish passage, timing constraints for instream work, and erosion control measures.

No-net-loss: A working principle of the Federal DFO which strives to balance unavoidable habitat losses through avoidance, mitigation, and habitat replacement on a project-by-project basis. (DFO, 1986).

Revegetation: The re-establishment of vegetation in disturbed areas.

Riparian vegetation: Vegetation adjacent to a watercourse, lake, swamp, or spring, that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for stream bank stability.

Riprap: Rock or stone placed on earth surfaces for protection of the soil against the erosive action of flowing water or precipitation.

SARA: Federal *Species At Risk Act*

Sediment: Particulate matter that is entrained within, or settled out from, water.

Silt: The fine-particulate fraction of sediment.

Silt fence: A synthetic barrier erected to restrict the movement of unconsolidated material from a disturbed area to any sensitive areas.

Spawning habitat: Fish habitat associated with the breeding of fish.

Species at risk: A species designated as a species at risk by provincial or federal legislation or policy due to its vulnerable, threatened, or endangered status.

Standard: A regulatory requirement that must be followed in the design and implementation of your works. This may also be referred to as a condition or requirement.

Stream: A natural watercourse or source of water supply, whether usually containing water or not, ground water, and a lake, river, creek, spring, ravine, swamp and gulch.

Substrate: The bottom or bed materials of a water body or watercourse in which plants and organisms live and grow.

Suspended solids: Particulate matter, such as silt or clay, that is entrained within a water column (i.e., has not settled to the substrate)

Timing window: A period of reduced risk during which a particular type of works (i.e., instream works or vegetation clearing) are permitted. Referred to by various terms including “reduced risk window” and “window of least risk”. Timing windows vary depending on a site-specific basis, depending on which species may be present and the sensitivity of habitat.

Vegetation clearing window: See **Timing window**. A period of least risk for vegetation disturbance when there will be a reduced risk of impacting bird eggs, nests, and young.

WLAP: BC Ministry of Water, Land and Air Protection

Woody debris: Sound and rotting logs and stumps that provide cover for small animals and their predators (both fish and wildlife).

12 References

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<http://www.lwbc.bc.ca/03water/licencing/index.html>
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- Agricultural Watercourse Maintenance Policy Guidelines for Lower Fraser Valley and Vancouver Island.* Valid until September 30, 2000. Prepared by Partnership Committee on Agriculture and the Environment.
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- Environmental Stewardship in the Municipal Act: A Synopsis of Local Governments' Power*. 1996. Prepared by DFO, FRAP.
- Fish Habitat Conservation and Protection: Guidelines for Attaining No Net Loss*. 1999. Prepared by DFO.
- Fish Habitat Enhancement: A Manual for Freshwater, Estuarine and Marine Habitats*. 1990. Prepared by DFO, Envirowest Environment Consultants.
- Fish Habitat Rehabilitation Procedures. Watershed Restoration Technical Circular No.9*. 1997. Prepared by Watershed Restoration Program, MELP and MOF.
<http://srmwww.gov.bc.ca/frco/bookshop/tech.html>
- Fisheries Habitat Protection Guidelines Concerning the Use of Explosives in Water*. 1999. Prepared by Alberta Environment Natural Resource Service.
- Forest Practices Code: Fish Stream Crossing Guidebook*. 2002. Prepared by MOF and WLAP.
<http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf>
- Forest Practices Code: Fish-Stream Identification Guidebook*. 1995. Prepared by MOF and WLAP.
- Forest Practices Code: Forest Road Engineering Guidebook*. 1995. Prepared by MOF and WLAP.
- Forest Practices Code: Riparian Management Guidebook*. 1995. Prepared by MOF and WLAP.

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<http://www.agf.gov.bc.ca/resmgmt/publist/500series/512100-1.pdf>
- Greening your BC Golf Course: a Guide to Environmental Management.* 1996. Prepared by Fraser River Action Plan (FRAP).
- Guidelines on Storage, Use and Disposal of Wood Residue for Protection of Fish and Fish Habitat in British Columbia.* 1996. Prepared by DFO, DOE, Fraser River Action Plan.
- Guidelines to Protect Fish and Fish Habitat From Treated Wood Used in Aquatic Environments in the Pacific Region.* 2000. Prepared by DFO.
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http://www.gvrd.bc.ca/sewerage/stormwater_reports.htm
- Habitat Conservation and Protection Guidelines.* Developed from the Policy for the Management of Fish Habitat. 1994. Prepared by DFO.
- WLAP Region 2 Instream Works Notification Forms and Guidance Documents.* 2001. Prepared by BC Ministry of Environment, Lands, and Parks.
- Land Development Guidelines for the Protection of Aquatic Habitat.* 1992. Prepared by Fisheries and Oceans Canada and BC Ministry of Environment, Lands and Parks.
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- Water Management – A User's Guide to Working in and About Water. Watercourse Crossing, 2nd ed.* 1999. Prepared by Pipeline Water Crossing Committee (CPWCC).
- Watershed Restoration Technical Circular No. 3 Resource Road Rehabilitation Handbook: Planning and Implementation Guidelines (Interim Methods).* 1994. Prepared by BC Ministry of Environment, Lands and Parks; BC Ministry of Forests.
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- Watershed Stewardship, A Guide for Agriculture.* 1996. Prepared by DFO, Environment Canada (DOE), MELP (WLAP).

13 Additional Information Sources

A number of other resource documents and information sources may help you to plan your instream works. The links listed here (accurate at the time of printing, March 2004) are just a sample of the type of information you can access.

The following British Columbia government search engines and libraries are recommended for queries related to provincial documents:

Government of British Columbia Search Engine
<http://datafind.gov.bc.ca/>

Ministry of Forests, Ministry of Sustainable Resource Management and
Ministry of Water, Land, and Air Protection Library
<http://www.for.gov.bc.ca/hfd/library/>

To access the full text of applicable federal and provincial legislation, try the following links:

Canadian Department of Justice – provides alphabetized links to federal statutes and regulations, including the *Fisheries Act*, *Migratory Birds Convention Act*, and *Navigable Waters Protection Act*.
<http://laws.justice.gc.ca/en/>

The Revised Statutes and Consolidated Regulations of British Columbia – provides links to provincial legislation including the *Water Act* Regulations, *Forest and Range Practices Act*, and *Wildlife Act*.
<http://www.qp.gov.bc.ca/statreg/>

For further information regarding the *Water Act* Regulation, refer to the following Provincial websites:

Users Guide to Working in and Around Water, Regulation Under British Columbia's *Water Act*
<http://www.lwbc.bc.ca/03water/licencing/index.html>

Water Act Regulations
<http://srmwww.gov.bc.ca/wat/wrs/waterreg/consolidatedreg.pdf>

The federal Department of Fisheries and Oceans websites contain information on responsibilities pertaining to the *Fisheries Act*:

The Canada *Fisheries Act*

<http://laws.justice.gc.ca/en/F-14/>

DFO Habitat Protection and Conservation Guidelines (1998)

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/fhmguide/index_e.asp

DFO Policy for Management of Fish habitat

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/index_e.asp

DFO Guidelines for Attaining No net loss

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/fhmcons/index_e.asp

“What the Law Requires” information

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/law-lois/index_e.asp

“Working Around Water?” Fact Sheet Series

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/water-eau/index_e.asp

For further standards and best practices documents, refer to the following websites:

Land Development Guidelines for the Protection of Aquatic Habitat. 1992. Chilibeck, B. *et al.*

http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/guidelines/ldg_e.pdf

Best Management Practices to Protect Water Quality from Non-Point Source Pollution, March 2000.

<http://www.nalms.org/bclss/bmphome.html>

Stormwater Planning: A Guidebook for British Columbia

<http://WLAPwww.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html>

Forest Practices Code of BC: Guidebook on Fish Stream Crossings

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

Environmental Best Management Practices and Requirements for Land Developments, March 2001. Ministry of Environment, Lands and Parks, Vancouver Island Region.

http://WLAPwww.gov.bc.ca/vir/pa/bmp_dev.pdf

Washington State Integrated Streambank Protection Guidelines

<http://wdfw.wa.gov/hab/ahg/ispgdoc.htm>

Cement and Concrete: Environmental Considerations

<http://www.buildinggreen.com/features/cem/cementconc.html>

Carbon Dioxide for Concrete Wash Water Treatment

<http://www.praxair.com/Praxair.nsf/d63afe71c771b0d785256519006c5ea1/78b5b272ccfbcd88852565550069e32d?OpenDocument>

For information on British Columbia's fish and wildlife species, including species at risk, that may help you to plan your works, refer to the following websites:

FishInfo BC – a Ministry of Sustainable Resources site providing on-line access to the BC Fisheries Data Warehouse and containing links to fish distribution data searchable with a mapping tool called Fish Wizard.

<http://www.bcfisheries.gov.bc.ca/fishinfobc.html>

BC Conservation Data Centre – a site including links to information on species at risk including red and blue listed plant and animal species.

<http://srmwww.gov.bc.ca/cdc/>

British Columbia Stewardship Centre - Lists information ranging from sensitive habitat inventories and habitat maps to stewardship and land development guidelines. This site has a wide variety of links to other online documents and resources.

http://www.stewardshipcentre.bc.ca/sc_bc/main/index.asp?sProv=bcB

British Columbia Lake Stewardship Society.

<http://www.nalms.org/bclss/>

Biodiversity and Wildlife in BC, WLAP.

<http://WLAPwww.gov.bc.ca/wld/>

The Wildlife Act Permit Regulation, An Introduction and *Wildlife Act: New Requirements* pamphlets. Printed Sept 1, 2000, revised Aug 6, 2002.

<http://WLAPwww.gov.bc.ca/wld/pub/permreg/permreg.htm>

For maps, atlases, and habitat inventories relating to your project area, try the following links:

Community Mapping Network: Maps and Data Entry websites, including habitat mapping from regions across the province.

<http://www.shim.bc.ca/maps2.html>

Sensitive Ecosystem Inventories of British Columbia, prepared by WLAP and the Canadian Wildlife Service.

<http://srmwww.gov.bc.ca/sei/index.html>

Fraser River Estuary Management Program/Burrard Inlet Environmental Action Program.

<http://www.bieapfrempp.org>

Natural Areas Atlas for the Capital Regional District (CRD) covering southern Vancouver Island.

<http://www.crd.bc.ca/es/natatlas/>

Sunshine Coast Habitat Atlas, prepared by Sunshine Coast Regional District and Fisheries and Oceans Canada.

<http://habitat.scrd.bc.ca/>

Habitat Atlas for Wildlife at Risk – South Okanagan and Similkameen, WLAP.

<http://WLAPwww.gov.bc.ca/sir/fwh/wld/atlas/index.html>

For information on fish habitat restoration techniques, refer to the following websites and documents:

Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No.9 and other Watershed Restoration Program documents.

<http://srmwww.gov.bc.ca/frco/bookshop/tech.html>

Fish Habitat Enhancement: A Manual for Freshwater, Estuarine, and Marine Habitats, available from:

http://www-heb.pac.dfo-mpo.gc.ca/english/pubn_order.pdf

General Best Practices Documents and Publication.

<http://srmwww.gov.bc.ca/sry/csd/forms/>

Instream Works Best Practices Information Documents and Checklists.

http://srmwww.gov.bc.ca/sry/csd/forms/index.htm#hpur_frm

Stewardship Series Documents

http://www.stewardshipcentre.bc.ca/sc_bc/stew_series/bc_stewseries.asp#

Access Near Aquatic Areas

http://www.stewardshipcentre.bc.ca/sc_bc/stew_series/bc_stewseries.asp#

14 Appendices

Appended to this document are several short sections containing further information on the following operational best practices for instream works:

- Reduced risk timing windows
- Work area isolation
- Fish and wildlife Salvage
- Monitoring of works
 - Environmental monitoring report template
- Deleterious substance control/spill management
- Concrete works
- Sediment control
- Vegetation management
- Site restoration

14.1 Reduced Risk Timing Windows For Fish and Wildlife

14.1.1 Background

All works in and about a watercourse are high-risk activities, and fish or wildlife populations and their habitats can be significantly impacted at **any** time. As a result, all instream works require strict mitigative best practices to ensure that fish and wildlife populations and habitats are protected. By controlling the timing of works changes in and about a stream can be limited to periods of least risk.

Timing windows ensure that instream works avoid causing harm to spawning habitat, fish eggs, and juvenile fish while also preventing impacts to adults and juveniles that may be migrating, over-wintering, or rearing.

Timing windows for the clearing of vegetation help to reduce the risk of impacting bird eggs, nests, and young. Timing windows vary depending on a site-specific basis, depending on which species may be present and the sensitivity of habitat. Please be advised that for certain species at risk there may be no period of least risk.

14.1.2 Objectives

To reduce the risk of impacts to fish and wildlife populations and their habitats, instream works and vegetation clearing are limited to non-critical periods of the year.

14.1.3 Operational Best Practices

These recommended timing requirements apply to **all** proposed instream work types.

- Only undertake works during favourable weather and low water conditions.
- During periods of heavy and persistent precipitation, stop works if there is a risk of sediment delivery to the watercourse. Ensure sediment control measures are in place.
- Complete the works as quickly as possible once started.

If your works involve fish bearing streams...

- If works are scheduled for **fish-bearing streams** or if fish presence in the watercourse is not known, complete in-channel or bank work during the **reduced risk timing window** provided for your region. Contact your regional WLAP office for specific timing window information.

What if the stream channel is dry or has no visible water? Fish, invertebrates and wildlife may live within wetted spaces between gravels, cobbles and boulders, even though there may be no visible water.

Works may proceed **outside** of the instream timing window, provided there is no water flowing through stream substrates, and that there are no species at risk present. This should be confirmed in a technical rationale by an appropriately qualified professional.

Stringent sediment, erosion and run-off controls and other preventative measures would still be required to ensure downstream fish and wildlife populations and habitats are protected.

If your works involve species at risk

- Species at risk typically have **no window** of least risk; so in-channel work should be avoided wherever possible when their presence is known or expected. For information on timing window requirements for your area, contact your regional WLAP office.

If your works involve vegetation clearing...

- Only clear vegetation for the worksite or access within the ***vegetation clearing timing window for the protection of nesting birds*** provided for your region. Contact your regional WLAP office for specific timing window information.
- Ensure that your activities will not result in the disturbance of bird nests, young, or eggs.

Works **outside** of the instream window may only be completed if a technical rationale completed by an appropriately qualified professional is provided. This rationale should demonstrate that there would be **no increased risk** to fish and wildlife populations and habitats as a result of the proposed works and should provide details regarding the proposed works including confirmation that they:

- **Are** in a section of stream with confirmed absence of fish or species at risk;
- **Are not** in a stream or section of a stream immediately upstream of a section or stream with fish or species at risk;
- Would **not** adversely impact any individual, species, or population of fish or species at risk;
- Do **not** include the use of concrete pours;
- Would **not** result in the discharge of sediment to downstream sections or streams with fish or species at risk; and
- Would **not** impact benthic macro-invertebrate production.

14.2 Work Area Isolation

14.2.1 Background

Protection of water quality within your project area is one of the primary foci of all instream works standards and best practices. By ensuring complete and thorough isolation of your work area, you can help to protect water and habitat quality for aquatic life within adjacent and downstream waters.

Isolation of your worksite can be completed by:

- installing a dam structure around the instream portion of your work area,
- creating a temporary diversion of flow, and
- dewatering the isolated area

14.2.2 Objectives

The objective of this set of best practices is to ensure that the water quality standards are met and aquatic species and habitats protected during instream works through the isolation of the work area from flow.

14.2.3 Standards

The following specific standards for worksite isolation are provided in Subsection 44(1)(x) of the *Water Act* Regulations:

Temporary diversion construction around or through a worksite

(Subsection 44(1)(x)) is permitted for works providing that the worksite is no larger than the minimum area required, and

- (i) if pumps, pipes or conduits are used to divert water around or through the worksite,
 - (A) the pumps, pipes or conduits are sized to divert the 1 in 10 year maximum daily flow for the period of construction, and
 - (B) any pump or intake withdrawing water from fish bearing waters is screened in accordance with the Fish Screening Directive of the Department of Fisheries and Oceans (Canada),
- (ii) if cofferdams are used to isolate successive parts of the construction at the worksite,
 - (A) the cofferdams are designed by a professional engineer and constructed in accordance with that design, and

- (B) the natural channel remaining outside of the cofferdams is adequate to pass the 1 in 10 year maximum daily flow during the period of construction, or
- (iii) if ditches are used to divert flow around the worksite,
 - (A) the flow of water diverted remains within the stream channel,
 - (B) the ditches are designed and constructed to divert the 1 in 10 year maximum daily flow around or through the worksite and are protected from any anticipated erosion during the period of construction and use of the ditch, and
 - (C) the ditches are completely backfilled and the area returned as closely as possible to the natural state on completion of the works.

14.2.4 Operational Best Practices

To ensure your works meet the requirements of applicable legislation:

- Isolate your work area from all flowing water, but do not cut off flow to downstream portions of the stream at any time during construction.
- Temporarily divert, enclose or pump the water around the worksite. Ensure the point of discharge to the creek is located immediately downstream of the worksite to minimize disturbance to downstream populations and habitats.
- For works near or in lakes or larger water bodies, if it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water from entering clean water.

14.3 Fish and Wildlife Salvage

14.3.1 Background

Protection of aquatic fish and wildlife species within your project area is one of the primary focuses of all instream works standards and best practices. By ensuring any fish or wildlife found within your isolated work area are transferred to adjacent non-impacted areas, you can help to protect aquatic life.

14.3.2 Objectives

The objective of this set of best practices is to ensure that habitat and species protection standards are met during instream works involving the isolation of the work area from flow, or disturbance of habitat.

14.3.3 Standards

Subsection 42(1)(e) of the *Water Act* Regulations provides for the salvage or protection of fish or wildlife during the course of your proposed works.

14.3.4 Operational Best Practices

- Complete a fish and amphibian salvage for works prior to the start of works if any portion of the wetted channel will be isolated and/or dewatered. A certified appropriately qualified professional should complete the salvage;
- It is the responsibility of the salvage crew to obtain the necessary permits required by the British Columbia Fisheries Regulations or Canada *Fisheries Act* prior to conducting the salvage activities. Contact your regional WLAP office for additional information;
- Opt for low impact salvage methods such as minnow trapping and seining, before using higher impact electrofishing, where possible; and
- Use special techniques and take extra caution when completing salvages that might involve species at risk. If species at risk are expected to be present, contact the regional Ministry office in your area for information regarding assessment and salvage requirements for species at risk.

14.4 Monitoring of Works

14.4.1 Background

The independent environmental monitoring of works is an activity undertaken to ensure that works are completed in compliance with the required standards, best practices, and conditions. Depending on the nature of the works and the sensitivity of the site, the environmental monitor may be onsite continually or may make periodic site visits.

14.4.2 Objectives

The set of best practices relating to environmental monitoring will ensure that a high level of environmental protection is in place during your activities in or about a watercourse.

14.4.3 Operational or Construction-related Best Practices

To ensure your works meet the requirements of applicable legislation:

- Construction activities should be monitored full-time during start-up and any instream works or sensitive activity, and on a daily basis during any other construction activity to the completion of the project. The environmental monitor must be an appropriately qualified professional and will be provided with written authority to modify or halt any construction activity if it is deemed necessary to do so for the protection of fish and wildlife populations or their habitats. A sign listing the monitor's company name and phone number should be posted at the entrance to the job site or in the immediate vicinity.
- Forward a copy of the section of this document listing the standards and best practices for your works and all appropriate plans, drawings, and documents to the contractor or crew supervisor, and keep this information readily available at the site while the work is proceeding.
- Hold a pre-construction meeting between the environmental monitor and the contractor undertaking the work on the site to ensure a common understanding of the mitigative best practices for the project.
- Within **60 days** of the project's completion have the environmental monitor complete and submit at least one copy of a monitoring report consistent with the recommended standard format (see Section 8.2 of this document) to both you and the Ministry.

Monitoring Reports

A suggested Environmental Monitoring Report outline is available in Section 8.2 of this document.

14.4.4 Environmental Monitoring Report Template

The following information should be provided to your local WLAP office as part of an environmental monitoring report completed by your environmental monitor.

Project Description

- Project name;
- Site location;
- Type of works; and
- Person or organization undertaking the works.

Site Inspections

- Frequency of monitoring;
- Staff member(s) conducting the inspection;
- Dates and times of inspection;
- Extent of inspection;
- Summary description of each inspection visit; and
- Weather on the day of inspection and during the period immediately preceding the inspection.

Construction Stage

- A brief description of the construction activities completed; and
- A brief description of planned construction activities for the period following the site inspections.

Mitigation Measures/Structures

- Recommended mitigation measures, including the maintenance of previously constructed measures, and the construction, installation or implementation of new measures; and
- Review of previously recommended mitigation measures.

Salvage Results

- Results of fish and amphibian salvages conducted prior to works, including, at a minimum, a specific site location, list of species, and numbers salvaged.

Comments/Other

- Description of any incidents related to environmental issues or emergencies that occurred on the site and how they were monitored, mitigated and remediated; and
- Description of any outstanding mitigative measures or monitoring programs needed for until the completion of site restoration.

Photographs

- Representative date stamped photographs should be taken during each site inspection, and during and after all incidents.

14.5 Deleterious Substance and Spill Management

14.5.1 Background

The introduction to a stream of any substance that may cause harm to fish or fish habitat is prevented under the federal *Fisheries Act*. The British Columbia *Waste Management Act* also lists substances that may not be discharged into the environment.

What is a deleterious substance?

A deleterious substance is any substance that, if added to any water, would degrade or alter the quality of that water so that it becomes toxic or harmful to aquatic organisms and habitat.

14.5.2 Objectives

The objective of this set of best management practices is to prevent the release of any deleterious substance to a watercourse as a result of instream works.

14.5.3 Standards

Section 41 of the *Water Act* Regulations provides for the protection of water quality for your proposed works.

14.5.4 Operational or Construction-related Best Practices

To ensure your works meet the requirements of applicable legislation:

- Prevent the release of silt, sediment or sediment-laden water, raw concrete or concrete leachate, or any other deleterious substances into any ditch, watercourse, ravine or storm sewer system. The recommendations for sediment and erosion control outlined in the "*Land Development Guidelines for the Protection of Aquatic Habitat*" can also be used for reference
- Ensure equipment and machinery is in good operating condition (power washed), free of leaks or excess oil and grease. No equipment refueling or servicing should be undertaken within **thirty (30.0) metres** of any watercourse or surface water drainage
- Ensure all hydraulic machinery to be used instream uses **environmentally sensitive hydraulic fluids** which are non-toxic to aquatic life, and which are readily or inherently biodegradable

- Do not use treated wood products in any construction below the high-water mark of the stream channel to prevent the release of preservatives toxic to fish.
- Keep a spill containment kit readily accessible onsite in the event of a release of a deleterious substance to the environment.
- Immediately report any spill of a substance toxic to aquatic life of reportable quantities to the **Provincial Emergency Program 24 hour phone line at 1-800-663-3456.**

14.6 Concrete Materials Use

14.6.1 Background

Concrete, cement, mortars, grouts and other Portland cement or lime-containing construction materials are basic or alkaline materials. They are highly toxic to fish and must only be used near water with extreme care.

What are acceptable pH ranges?

A pH level around 7 is typical for most watercourses, and this neutral pH is required for the survival of aquatic organisms. Should the pH rise or drop out of this range, fish and other aquatic organisms will become stressed and may die. Complete isolation of the work area is needed to ensure that pH value in the surrounding waterbody does not rise (become more alkaline) during works. WLAP's *British Columbia Approved Water Quality Criteria for pH* sets the range for acceptable pH change with respect to fresh water aquatic life between 6.5 and 9.0. However, any increase in pH noted in conjunction with concrete works should be monitored and emergency protection measures implemented in accordance with the best practices below.

14.6.2 Objectives

The objective of this set of best practices is to ensure no concrete materials or leachate enters any watercourses.

14.6.3 Standards

Subsections 41(a)(b)(e)(f) of the Water Act Regulations provide for the protection of water quality during your proposed works.

14.6.4 Operational or Construction-related Best Practices

To ensure your works meet the requirements of applicable legislation:

- Use pre-cast concrete structures whenever possible.
- As concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials (concrete) will **not** deposit, directly or indirectly, sediments, debris, concrete, concrete fines, wash or contact water into or about any watercourse. Concrete materials cast in place must remain inside formed structures.
- Keep a carbon dioxide (CO₂) tank with regulator, hose and gas diffuser readily available during concrete work. Use it to release carbon dioxide gas into the affected area to neutralize pH levels should a spill occur. Train workers to use the tank.

- Provide containment facilities for the wash-down water from concrete delivery trucks, concrete pumping equipment, and other tools and equipment.
- Report immediately any spills of sediments, debris, concrete fines, wash or contact water to **1-800-663-3456**. If possible, immediately remove the materials from the water and implement emergency mitigation and clean-up measures.
- Completely isolate all concrete work from **any** water within or entering into **any** watercourse or stormwater system.
- Monitor the pH frequently in the watercourse immediately downstream of the isolated worksite until completion of the works. Emergency measures will be implemented if downstream pH has changed **more than 1.0 pH unit**, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be **below 6.0 or above 9.0 pH units**.
- Prevent any water that contacts uncured or partly cured concrete during activities like exposed aggregate wash-off, wet curing, or equipment washing from directly or indirectly entering any watercourse or stormwater system.
- Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters for a minimum of 48 hours if ambient air temperature is above 0°C and for a minimum of 72 hours if ambient air temperature is below 0°C.
- Isolate and hold any water that contacts uncured or partly cured concrete until the pH is **between 6.5 and 8.0 pH units**, and the turbidity is **less than 25 nephelometric turbidity units (NTU)**, measured to an accuracy of +/- 2 NTU.

For further information regarding the safe use of concrete materials, refer to the following websites:

Cement and Concrete: Environmental Considerations

<http://www.buildinggreen.com/features/cem/cementconc.html>

Carbon Dioxide for Concrete Wash Water Treatment

<http://www.praxair.com/Praxair.nsf/d63afe71c771b0d785256519006c5ea1/78b5b272ccfbcd88852565550069e32d?OpenDocument>

14.7 Sediment, Runoff and Erosion Control

14.7.1 Background

In addition to the natural sediment, runoff and erosion control function that vegetated buffer strips provide, a number of best practices are commonly used to reduce sedimentation, runoff and erosion associated with construction in and around watercourses.

An Appropriately Qualified Professional (AQP) can include someone certified as an [Erosion Control Specialist](#) by the International [Erosion Control Association](#).

14.7.2 Objectives

Sediment, runoff and erosion control best practices will help to meet the standards of the *Water Act* with respect to water quality and protection of instream species and habitat.

14.7.3 Operational or Construction-related Best Practices

To ensure your works meet the requirements of applicable legislation:

- Ensure fill or other materials used for this project on areas adjacent to the stream are inert, free of contaminants and will be placed so that they will not gain entry into the watercourse.
- Ensure material, such as rock, riprap, or other materials that are to be placed on the banks or within the active channel or floodplain of the watercourse are inert and free of silt, overburden, debris or other substances deleterious to aquatic life.
- Ensure machinery works from the bank of the stream and not in the stream channel to minimize impacts and to better enable mitigation of sedimentation.
- Install sediment, runoff and erosion control measures before starting any works.
- Construct any ditches, water bars or water diversions within the work area so they do not directly discharge sediment-laden surface flows to the stream. Divert such flows to a vegetated area where flows can slowly infiltrate.
- Minimize the disturbance to existing vegetation on and adjacent to the stream banks.
- Remove excavated material and debris from the site or place it in a stable area above the high-water mark or active floodplain of the stream, as far as possible from the channel.

- Protect this material from erosion and reintroduction to the watercourse by using mitigating measures including, but not limited to covering the material with erosion blankets or seeding/planting with native vegetation.
- When material is moved offsite, dispose of it in such a manner as to prevent its entry into any watercourse, floodplain, ravine, or storm sewer system.

Sediment, Erosion and Run-off Control Plans

In addition to these best practices, each project should have in place a written contingency plan to deal with sediment control during instream projects in the event there is:

- An increase in stream flow due to increased precipitation, or
- An increase in local overland runoff, or
- Saturation of the work area.

Information on various sediment control techniques and their applicability to your project can be found in many documents, including the following documents and websites:

Land Development Guidelines for the Protection of Aquatic Habitat, Barry Chilibeck et al, 1992.

http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/guidelines/ldg_e.pdf

Water Quality Best Management Practices Best Management Practices to Protect Water Quality from Non-Point Source Pollution, March 2000.

<http://www.nalms.org/bclss/>

International Erosion Control Association

<http://www.ieca.org/>

14.8 Vegetation Management

14.8.1 Background

Vegetation management refers to best practices regarding the maintenance and protection of riparian vegetation during works in and about a watercourse. This included replacement criteria for impacted vegetation and hazard tree removal best practices.

14.8.2 Objectives

The vegetation set of best practices is intended to meet the standards requiring that no-net-loss or a gain in habitat be realized as a result of the works. In addition to this goal, vegetation management best practices will ensure activities like hazard tree removal may be completed with minimized impacts to surrounding riparian vegetation.

14.8.3 Operational Best Practices

Large-scale modification and removal of riparian vegetation is not considered a best management practice for the proper functioning of streams. However, especially in urban settings, where development has occurred in and around riparian areas, conflicts between riparian vegetation and safety of property and human life may occur. Considerations should be given to finding a long-term solution to address safety issues while maintaining proper riparian function.

To ensure your works meet the requirements of applicable legislation:

- Limit the extent of vegetation clearing done for access to your site and at your work area.
- Consider other options when contemplating the need to remove vegetation. It is very often not the best choice for fish and wildlife habitat and species.
- Wildlife trees are important for many wildlife, bird, and amphibian species. Avoid vegetation removal or management activities that will affect trees used by all birds and other wildlife while they are breeding, nesting, roosting or rearing young. Section 34 (a) of the *Wildlife Act* protects all birds and their eggs, and Section 34 (c) protects their nests while they are occupied by a bird or egg. Different areas of the province have different breeding periods for birds, and therefore have different vegetation removal or management periods of least risk to nesting birds. To find out what the vegetation removal and management period of least risk is for the protection of breeding birds in your area, contact the regional Ministry office.

Tree Replacement Criteria

For information on the Replacement Tree Criteria required by provincial and federal agencies, visit:
http://srmwww.gov.bc.ca/sry/csd/downloads/forms/vegetation_riparian/treereplcrit.pdf

- Section 34(b) of the *Wildlife Act* protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season.
- If you are proposing to top or remove trees, have the trees within the riparian area assessed by an appropriately qualified professional biologist to determine the presence and status of bird nests. If trees are suspected of being hazardous, then also have them assessed by a qualified professional arborist who is also a Wildlife Danger Tree Assessor, to determine the presence and nature of the hazard.
- Where topping or removing the dead limb can remove the danger, opt for doing this rather than removing the entire tree.
- Where the entire tree must be removed then the tree replacement criteria should be applied.
- Retain large woody debris and the stubs of large diameter trees where it is safe to do so. These are important for preserving fish habitat and wildlife populations.
- Fall or top all trees so that the branches do not enter the stream channel. If any branches do inadvertently end up in the channel, remove them from the site to where they will not enter the channel during high flows. Removal of limbs from the channel must be completed in a manner that will not disturb aquatic organisms.
- Fall the tree across the stream only when no other method of tree removal is possible because of safety reasons (e.g., to protect fallers or buildings). Removal of the felled tree must be completed in a manner that does not damage the banks and the bed of the stream. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
- Fall the tree away from the channel unless there is an immediate threat to the public, and remove the material within the instream work window.
- Ensure that equipment used for vegetation removal complies with this document's listed best practices for deleterious substance control.
- Schedule vegetation removal and the management or removal of hazard trees or limbs within the window of least risk for breeding birds and before the instream window, wherever possible. This will help to prevent work delays and allow your works to be scheduled within the instream work window.

14.9 Site Restoration

14.9.1 Background

Site restoration refers to activities used to return the work area to a stable state resembling the site's original instream and riparian habitat characteristics.

14.9.2 Objectives

The site restoration set of best practices is intended to meet the standards requiring that no-net-loss or a gain in habitat be realized as a result of the works. In addition to this goal, site restoration activities will help to minimize the risk of potential post-construction impacts such as slope erosion.

14.9.3 Operational or Construction-related Best Practices

To ensure your works meet the requirements of applicable legislation:

- Grade disturbed areas to a stable angle of repose after work is completed. As well, revegetate these areas to prevent surface erosion and subsequent siltation of the watercourse.
- Protect disturbed soil areas on the banks and areas adjacent to the stream from surface erosion by hydroseeding with a heavy mulch, tackifier, and seed mix; by installing erosion blankets; or by heavily revegetating.
- Plant a diverse mix of native trees, shrubs, and herbaceous plants appropriate to the site conditions, to revegetate and replace impacted riparian vegetation.
- Restore all in-channel or active floodplain habitats that have been disturbed during the completion of works to a condition that is enhanced from their original state. This meets the Ministry goal of no-net-loss of fish and wildlife habitat.
- Remove any remaining sediment and erosion control measures (i.e., silt fence). Ensure all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets full survival

No-net-loss of fish and wildlife habitat?

Minimize impacts of your activities and leave the stream in better condition than how you found it!