

## BEST MANAGEMENT PRACTICES FOR LAKESHORE STABILIZATION

### Background

Much of Okanagan Region of the BC Ministry of Environment (BC MOE) is covered by large to moderate sized lakes that lie close to urban centres and are important for water recreation and recreational fisheries. In addition to their recreational values, shoreline areas of these water bodies are sensitive and productive fish and wildlife habitats. Lakeside (riparian) vegetation is an important component of these habitats. The protection of fish, wildlife, their habitats and water quality depends upon the protection of vegetated lakeshores to:

- protect root systems that stabilize shorelines and maintain natural bank geometry;
- sustain a natural source of fish food in the form of leaf litter and insect drop;
- maintain cover and shade for predator avoidance and temperature moderation in shallow near shore rearing areas; and,
- reduce the introduction of sediment and non-point source pollution into the lake.
- provide critical habitats for many wildlife species, especially amphibians, raptors and cavity dependent species.

Lakeshore stabilization refers to works undertaken to protect or armour a bank or shore from erosion. Erosion processes along lakeshores are similar to streams. They can occur naturally, from the ongoing action of waves dissipating their energy against erodible banks, and can be worsened by increased water levels, wave action associated with boat use, other human activities, including vegetation removal.

While the protection or armouring of a small section of lake shore may prevent erosion at one location and may appear to have only minor impacts to the lake, the compounding effects of individual works within a watershed are significant. Lakeshore stabilization works can have significant impacts on riparian and near shore habitats where riparian, bank and foreshore vegetation is eliminated or permanently altered. 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 (e.g. painted turtles).

**For most property that slopes toward water, leaving the natural shoreline undisturbed is often the best and least expensive protection against erosion. A filter strip of thriving vegetation on and near the shore binds the soil and minimizes erosive soil loss from surface runoff, waves and from use by people. Existing vegetation can also be enhanced by planting appropriate native woody or aquatic plants.**

## **Objectives**

To ensure the proposed works protect water quality and the aquatic and shoreline habitats necessary for aquatic and terrestrial species that rely on these riparian areas.

## **Applicable Provincial Legislation**

### **BC Water Act and Its Regulations**

Works in or about a stream are defined under Section 9 of the Water Act as any and all works proposed in or about a stream, ravine or active floodplain of a stream or its riparian or streamside area. The following works may be permitted under the Water Act Regulation, allowing you to complete your works under the Water Act Notification process:

#### ***Lakeshore protection works covered by regulation***

- Repair or maintenance of existing dykes or erosion protection works to their original state, provided that the dikes or works were functional during the previous year.

These works may also be permitted only under specific conditions. See the publication *Water Management - A Users Guide to Working In and Around Water* for specifics. This document is available for viewing on the Internet at:

[http://www.env.gov.bc.ca/wsd/water\\_rights/licence\\_application/section9/index.html](http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/index.html)

If your planned works do not fall into this category, then you must obtain a formal approval through the Water Act Approval process which is managed by Front Counter BC. See [http://www.env.gov.bc.ca/wsd/water\\_rights/licence\\_application/section9/index.html](http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section9/index.html) or contact Front Counter BC at (250) 372-2127.

### **BC Land Act and Land Title Act**

Though upland areas located adjacent to water bodies may be privately owned, the Province of British Columbia owns nearly all areas located between the high and low watermarks of streams, rivers and lakes. Individuals cannot build on or develop aquatic Crown land without the Province's authorization, even if they own adjacent property or upland. As a result, proposed lakeshore stabilization works should not be constructed below the lake high water mark - onto lake foreshore areas and/or areas lost to erosion and/or gained by deposition (accretion) - without prior approval from the Crown. If you have any questions regarding your proposed lakeshore stabilization works and the ownership of eroded or accreted lands at the lake margin, then you should contact Front Counter BC in Kamloops at (250) 372-2127 for further information regarding tenure applications for Crown foreshore areas.

### **BC Wildlife Amendment Act, 2004**

Recent amendments to the Wildlife Act, prohibits the killing, harming, harassment, capture or taking of species at risk and the damage or destruction of a residence of a

species at risk except as authorized by regulation, permit or agreement. Additional information regarding the BC Wildlife Amendment Act, 2004, is available at [http://www.legis.gov.bc.ca/37th5th/1st\\_read/gov51-1.htm](http://www.legis.gov.bc.ca/37th5th/1st_read/gov51-1.htm). Additional information regarding the BC Wildlife Act is available at [http://www.qp.gov.bc.ca/statreg/stat/W/96488\\_01.htm](http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm).

### **Riparian Areas Regulation, 2004**

The Riparian Areas Regulation, enacted under Section 12 of the Fish Protection Act in July 2004, calls on local governments by March 31, 2006, to protect riparian areas and their features, functions and conditions during residential, commercial, and industrial development. Some local governments have implemented this legislation but others have been given an extension until March 31, 2006. Check with your local government as to the applicability. Development refers to a variety of activities associated with or resulting from regulation or approval of residential, commercial or industrial activities or ancillary activities to the extent that they are subject to local government powers under Part 26 of the Local Government Act. Additional information is available at [http://www.env.gov.bc.ca/habitat/fish\\_protection\\_act/riparian/riparian\\_areas.html](http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/riparian_areas.html).

### **Other Applicable Provincial Legislation**

Your works may also require authorization under the Local Government Act (formerly the Municipal Act; see [http://www.qp.gov.bc.ca/statreg/stat/L/96323\\_00.htm](http://www.qp.gov.bc.ca/statreg/stat/L/96323_00.htm)). Local bylaws may amplify federal or provincial legislation for working in or near water. You should contact your local municipality or regional district to find out which local bylaws may apply to your proposed works.

### **Applicable Federal Legislation**

#### **Fisheries Act**

The federal Fisheries Act provides protection for all fish and fish habitat in Canada. The Fisheries Act defines 'fish habitat' 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 definition indicates that watercourses, including but not limited to streams, ditches, lakes, ponds and wetlands, that provide water or nutrients into a fish bearing stream or lake, are considered fish habitat even if they do not directly support fish and/or if they only have temporary or seasonal flows. This definition also indicates that not only the watercourse itself but also vegetated streamside areas that provide nutrients and shade to the stream or lake are considered fish habitat. Section 35 of the Fisheries Act in particular prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat that is not authorized in advance by Fisheries and Oceans Canada (DFO). Depositing sediment or any other 'deleterious substance' into streams supporting fish is also prohibited under section 36(3) of the Fisheries Act.

The Fisheries Act can be found online at <http://laws.justice.gc.ca/en/F-14/>. Please also check out the following website:

[http://www-heb.pac.dfo-mpo.gc.ca/publications/publications\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/publications/publications_e.htm)

for additional guideline documents and, in particular, the document *Habitat Conservation and Protection Guidelines (1998)*. For further information regarding works that may result in a HADD of fish habitat, please contact your nearest DFO Field Office.

### **Species at Risk Act**

The Okanagan Region is home to a variety of species including many species at risk. Impacts to the habitat of threatened or endangered species can have catastrophic effects on a species' or local population's survival and should be avoided at all times. Some species at risk have no "window" of least risk during which instream works may be permitted because of the risk of harm to the animal. Before planning any work, review the website <http://www.env.gov.bc.ca/atrisk/> for further information on the species at risk in your area and follow the links provided there to the Conservation Data Centre and other resources. The "Species Explorer" at the same link can also help you to find out what species at risk may be in your area. However, the lack of data found on the Species Explorer does not confirm the absence of species at risk as the level of inventory data varies over the region. The legislation guiding the protection of species at risk, the federal Species at Risk Act, is detailed in the following website:

[http://www.speciesatrisk.gc.ca/legislation/default\\_e.cfm](http://www.speciesatrisk.gc.ca/legislation/default_e.cfm)

### **Navigable Waters Protection Act**

The Navigable Waters Protection Program (NWPP) of Transport Canada ensures protection of the public right to navigation and protection of the environment through the administration of the Navigable Waters Protection Act. Program responsibilities of importance to lakeshore stabilization include the approval of works built or placed in, on, over, under, through or across navigable water in Canada prior to construction of the work(s); the removal of obstructions to navigation, including unauthorized works; and, regulating the provision and maintenance of lights, markers, etc. required for safe navigation. Before you start your project, you should contact the nearest NWPP office in your area to determine what information and documentation is required for you to submit an application under the Navigable Waters Protection Act. Further information regarding the Navigable Waters Protection Act is available online at

<http://www.tc.gc.ca/marinesafety/Ships-and-operations-standards/nwp/menu.htm>

### **Best Management Practices**

The following Best Management Practices (BMP's) are directed to the design, construction and maintenance of lakeshore stabilization works on lakes of the Okanagan Region of BC MOE. Use of the Bumps will help guide works to protect fish and wildlife habitat and avoid conflicts with the Fisheries Act and other applicable legislation.

## Design Best Practices

**Lakeshore stabilization works should only be undertaken when the need for works can be justified by the level of risk to existing buildings, roads, services or property that are being threatened by erosion. Consideration also needs to be given to the size, scale and location of proposed protective works.**

In order to assess and manage the dynamics of your lakeshore erosion problem, it is advisable to work with a qualified professional or team of professionals depending on the scale and/or scope of the problem. **This may require you to retain the services of an appropriately qualified professional, which could include a biologist, hydrologist, fluvial geomorphologist, engineer, and/or agrologist, alone or in some combination.**

Design may be critical to avoiding conflicts with legislation during the construction and maintenance of lakeshore stabilization works. Ensure that your qualified professional provides an assessment and design that considers the following factors:

- local soil characteristics;
- erosion dynamics of the shoreline (i.e., what is causing the problem);
- existing lakeshore morphology and potential impacts or changes;
- existing or potential fish and wildlife use, aquatic habitat and riparian habitat;
- potential access related disturbances from machinery or other equipment, if required, and the ability to access and repair lakeshore stabilization works in the future;
- potential erosion or sediment releases resulting from proposed works;
- minimizing the footprint of the works and associated foreshore disturbance;
- minimizing direct and indirect impacts to riparian vegetation and fish and wildlife individuals, populations, species and habitats; and,
- avoiding direct and indirect impacts to other properties or services.
- potential for the spread of or colonization by invasive plants.

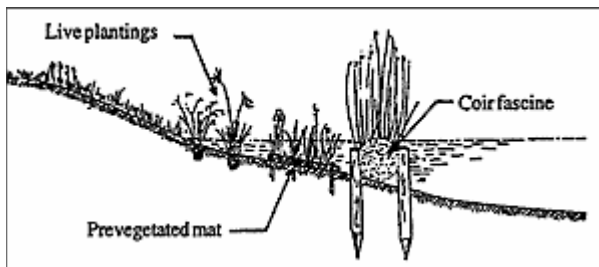
In particular, to ensure that impacts to fish, wildlife and their habitats and populations are minimized, the design for your stabilization works should include the following:

- vegetated or integrated lakeshore stabilization techniques,
- habitat features, such as planting of native vegetation ecologically suited to the site conditions (i.e., suited to the biogeoclimatic subzone and site series), above the lake high water mark;
- appropriate native shrubs, live stakes or live bundles installed into any proposed rockwork, together with sufficient rooting soil to ensure vegetation growth and survival;
- use of natural materials, such as live vegetation and, where required, natural acid free rock;

- avoidance of anthropogenic materials, such as broken concrete, tires and other materials as these materials do not naturalize well and it is not clear the extent to which these materials could potentially introduce toxic substances into the lake over the short-term and/or long term; and,
- maintenance of existing wildlife access to the lake foreshore (e.g. ensure that proposed works do not form a barrier to wildlife movement) as techniques for lakeshore stabilization that preserve fisheries values may or may not always address this concern.
- Lakeshore stabilization works should not reclaim eroded land or encroach below the lake high water mark. Many of the lakes in this region are controlled and the high water mark or natural boundary is a defined elevation. The following information should be used to guide the design of lakeshore stabilization works on these waterbodies:

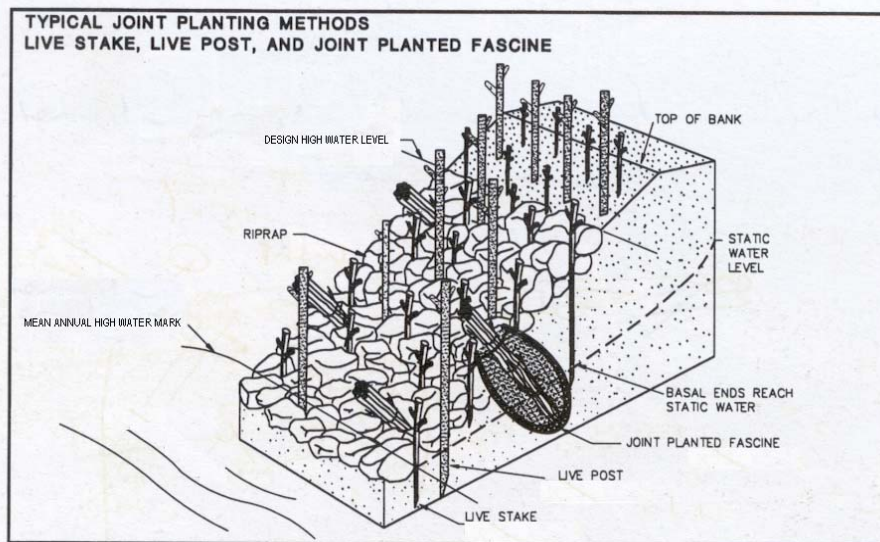
|                |                                                                                |
|----------------|--------------------------------------------------------------------------------|
| Osoyoos Lake   | 913 uscgs (crest of spillway)                                                  |
| Okanagan Lake  | 343 metres geodetic (natural boundary)                                         |
| Kalamalka Lake | 392 metres geodetic (approximate high water mark)                              |
| Christina Lake | 446.7 metres geodetic (natural boundary)                                       |
| Mara Lake      | 348.4 metres geodetic elevation                                                |
| Mabel Lake     | 3.08 metres elevation on inactive WSC staff gauge 08LC038 at Rivermouth Marina |

Eroding lakeshore areas subject **low to moderate wave action** can often be stabilised using low-cost vegetative stabilization or “bioengineering” techniques. These techniques rely on live plantings - alone or in combination with dead or inorganic stabilizing materials - to prevent erosion, control sediment and provide fish and wildlife habitat (Figure 1). Such bioengineering techniques may also be used to speed the recovery of historically eroded sites.



**Figure 1** Lakeshore erosion control using a combination design of coir fascine (rolled coconut fibre mat) and wetland plantings, a pre-vegetated erosion control mat and live plantings. (From A.T. Leiser, as cited in *Bioengineering for Hillslope, Streambank and Lakeshore Erosion Control*)

Integrated techniques - using a combination of vegetation and natural hard structures such as large woody debris and/or riprap - can be used to stabilize eroding lakeshore areas subject to **moderate to high wave action** (Figure 2).



**Figure 2** Joint planting of live cuttings within a riprap matrix (adapted from Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No. 9)

Lakeshore areas subject to **high wave action**, areas having extreme erosion potential and/or sites where initial assessments indicate that vegetative or integrated shoreline stabilization techniques won't work, may require "hard" engineering (i.e., engineer-designed hard structures) to ensure effective erosion protection. However, a technical rationale outlining why softer bioengineering or integrated techniques cannot be used should be developed for such situations, specific to the design proposed, and signed and sealed by an appropriately qualified professional.

For additional information regarding environmentally sensitive lakeshore stabilization techniques and lake stewardship, you, your qualified professional or your contractor may consult with the BC Lake Stewardship Society at 1-877 BC LAKES or (250) 717-1212.

Additional information on the techniques described above may also be found at the following web sites:

**A Soil Bioengineering Guide for Streambank and Lakeshore Stabilization**

<http://www.fs.fed.us/publications/soil-bio-guide/>

**Fish Habitat Rehabilitation Procedures, Watershed Restoration Technical Circular No. 9**

[http://www.env.gov.bc.ca/wld/documents/wrp/wrtc\\_9.pdf](http://www.env.gov.bc.ca/wld/documents/wrp/wrtc_9.pdf)

**Washington State Integrated Streambank Protection Guidelines**

<http://wdfw.wa.gov/hab/ahg/ahguides.htm>

Sediment and erosion control information is available online in the *Land Development Guidelines for the Protection of Aquatic Habitat* at [http://www-heb.pac.dfo-mpo.gc.ca/publications/publications\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/publications/publications_e.htm).

## Operational Best Practices

### *Monitoring*

- Construction activities should be monitored full-time during project start-up and during any instream work or sensitive activity periods, otherwise on a daily basis to the completion of the project. The environmental monitor(s) should be an ***appropriately qualified professional(s)*** and be provided with written authority to modify and/or halt any construction activity if deemed necessary for the protection of fish and wildlife populations or their habitats. A sign should be posted listing the monitor's company name and phone number at the entrance to or in the immediate vicinity of the job site.
- The monitor should also have access to all approval or BMP information associated with the project.
- A copy of this document listing standards and best practices for your works and all appropriate plans, drawings and documents should be forwarded to the contractor/crew supervisor and kept readily available at all times at the site while the work is proceeding.
- A pre-construction meeting should be held 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 completion of the project, the environmental monitor should complete and submit a copy of a monitoring report consistent with the recommended standard format (see monitoring chapter of *Standards and Practices for Instream Works*) to his/her client and a copy to BC MOE with the Water Act Approval or Permit No. noted.

### *Timing of Works*

If works are scheduled for fish-bearing water bodies (can be found at <http://www.fishwizard.com>) or if fish presence in the water body is not known, then in-channel or bank work should be completed during the instream works reduced risk timing window approved for your region. If you have received a response to an application, then the applicable timing window may be specified. Otherwise, to find out what the timing window requirements are for your area, check the regional website at <http://wlapwww.gov.bc.ca/okr/wateract/workwindows.html>. If you do not have web access contact your regional BC MOE office.

Be advised that for certain fish, amphibians or species at risk there may be no window of least risk as all periods of their life cycle are of high risk. This region supports many species that are vulnerable, threatened or endangered, some of which are listed under the Species at Risk Act. A helpful resource for determining the presence of species at risk or other wildlife is the Conservation Data Centre (<http://www.env.gov.bc.ca/cdc/>). **The absence of an observation record does not mean a species is not present.** Qualified



professionals should be engaged where proposed works pose a risk to species at risk where their presence has been confirmed or could be expected.

Irrespective of timing window requirements, works should be undertaken during favourable weather and low water conditions and be completed as quickly as possible once started.

### ***Deleterious Substance Control/Spill Management***

- 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* (Chilibeck *et al.*, 1992) can also be used for reference (see [http://www-heb.pac.dfo-mpo.gc.ca/publications/publications\\_e.htm](http://www-heb.pac.dfo-mpo.gc.ca/publications/publications_e.htm)).
- Ensure that equipment and machinery is in good operating condition, clean (power washed offsite), and free of leaks, excess oil and grease. No equipment refuelling or servicing should be undertaken within thirty (30) metres of any watercourse or surface water drainage.
- Ensure that 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 bio-degradable.
- Keep a spill containment kit readily accessible on-site in the event of a release of a deleterious substance to the environment and train on-site staff in its use. Immediately report any spill of a substance that is toxic, polluting or deleterious to aquatic life and of reportable quantities to the Provincial Emergency Program 24-hour phone line at **1-800-663-3456**. For definition of reportable amounts, please refer the Spill Reporting Regulation at <http://www.env.gov.bc.ca/eemp/spillnotification.html>.
- The use of wood preservatives in or around fish bearing water bodies can adversely impact fish habitat. The safest approach is to use untreated wood or inert materials. The improper use of wood preservatives can adversely affect a broad range of aquatic organisms as the preservatives may contain chemicals that can cause long-term adverse biological effects. If proposed for use, all preserved wood should be treated and follow post-treatment procedures outlined in the document *Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region* (see <http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf>).

### ***Concrete Works***

- 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 CO<sub>2</sub> tank with regulator, hose and gas diffuser must be readily available during concrete work to neutralize pH levels should a spill occur and staff should be trained 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 CO<sub>2</sub> 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*

- Isolate your work area from the lake using a silt curtain or a silt fence as applicable.

#### *Minimise Disturbance*

- Only construction, modification or maintenance works required to meet lakeshore stabilization design specifications should be undertaken below the lake high water mark. No foreshore filling or land reclamation should occur, nor should human or machine disturbance of foreshore and/or riparian vegetation occur during construction except as provided for by these BMPs.
- Beach substrates (e.g. rock, cobble, sand or gravel) should not be used as fill and/or back fill for proposed lakeshore stabilization works.
- Upon completion of construction activities, all work areas below the lake high water mark should be left in a smooth condition free of any depressions that may result in fry entrapment.
- All works should be done in a manner that limits the amount of disturbed soils. Disturbed soils often increase the opportunity for invasive plants to establish.

#### *Sediment Control*

- Minimize the disturbance to existing vegetation on and adjacent to the lakeshore.
- Put sediment control measures in place before starting any works that may result in sediment mobilization.
- Ensure machinery is operated from above the lake high water mark and not on the foreshore to minimize impacts and to better enable mitigation of sedimentation.
- 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 lake and/or restrictive covenant or riparian area, and as far as possible from the lakeshore. Protect this material and any remaining exposed soils within the work site from erosion and reintroduction to the

lake by using mitigative measures including, but not limited to, covering the material with erosion blankets and/or seeding/planting with native vegetation.

- When material is moved off-site, dispose of it in such a manner as to prevent its entry into any watercourse, floodplain, ravine or storm sewer system.
- Where proposed for use, ensure that material such as rock, riprap or other materials placed on the lakeshore or floodplain area are inert and free of silt, overburden, debris, or other substances deleterious to aquatic life. Imported rock material should also be durable, angular in shape and suitably graded and sized to resist erosion and movement by water action. In addition, to prevent future erosion, materials placed on the lakeshore or floodplain area should have an adequately entrenched toe/base to prevent under cutting by wave action and be constructed and anchored (i.e., tied back) to prevent undercutting during storm or high water events.

### ***Vegetation Management***

- Limit vegetation clearing for access to and within 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. You should 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. Nesting periods can be identified by a qualified professional or another source is the book *Birds of the Okanagan Valley, British Columbia by Cannings et al 1987*.
- 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.
- Section 6 of the BC Wildlife Amendment Act, 2004, pertaining to species at risk and/or the Species at Risk Act may also be applicable to vegetation management activities.
- If you are unable to avoid riparian disturbance and are proposing to top or remove trees, then have the trees within the riparian area assessed by an appropriately qualified professional who is also a certified Wildlife Danger Tree Assessor to determine the presence and nature of any hazards. If you require additional information, then please refer to the BC MOE *Best Management Practices for Hazard Tree and Non-Hazard Tree Limbing, Topping or Removal*. Also refer to information on the replacement tree criteria required by Provincial and Federal agencies. It can be found at the following website:  
[http://srmwww.gov.bc.ca/sry/csd/downloads/forms/vegetation\\_riparian/treereplcrit.pdf](http://srmwww.gov.bc.ca/sry/csd/downloads/forms/vegetation_riparian/treereplcrit.pdf)  
or refer to the *Tree and Shrub Replacement Criteria for Fisheries and Oceans Canada (Salmon Arm Subdistrict)*
- Plant native trees, shrubs and herbaceous plants ecologically suited to the site conditions (i.e., suited to the biogeoclimatic subzone and site series) to revegetate the site and replace impacted riparian vegetation. Often undisturbed riparian areas along the adjacent lakeshore can be used as reference areas for suitable species.

- Revegetation plans should manage for the colonization and spread of invasive plant species. For more information on Invasive weeds see The Weeds BC website <http://www.weedsbc.ca/>

### ***Site Restoration***

- Grade disturbed areas above the lake high water mark 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.
- Disturbed soil areas may be protected from surface erosion by hydroseeding with a heavy mulch, tackifier and seed mix; by installing erosion blankets; and/or, by heavily seeding/planting with native vegetation. This technique can also reduce the risk if establishment of invasive species.
- Remove any remaining sediment and erosion control measures (e.g. silt fences).
- Ensure that all equipment, supplies, and non-biodegradable materials have been removed from the site.
- Complete post-construction multiyear monitoring to ensure your revegetation meets survival requirements.

### **REMEMBER**

If you have not already done so, then you **must** submit a Notification to Land and Water BC Inc. for proposed lakeshore stabilization works if it is for repair or maintenance of an existing structure and complies with the Water Act Regulation. If the proposed works are new and require approval under Section 9 of the Water Act, then applications are to be submitted to Land and Water BC Inc.

Projects that have been adequately developed using BMPs and the best information available at the time of approval and do not proceed should be revisited if approvals have lapsed and the project is being reactivated. This will ensure that the proposed development considers any new scientific data and conforms to **current** habitat management policy, guidelines and legislation. Ensure you keep all reports and information on file to support your use of due diligence as this information may be requested if your works are monitored by provincial or federal agencies.

This is a regional document. Additional information may be found in the Provincial publication *Standards and Best Practices for Instream Works (March 2004)*. This document can be found at the following website:

<http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

along with other BMPs that may be of use. Contact your nearest DFO Field Office if you have any concerns with regards to your proposal and application of the Fisheries Act. It is your responsibility to ensure that your project is in compliance with applicable legislation such as the Fisheries Act, Water Act and local government bylaws and regulations.