

Skeena Region

Reduced Risk In-stream Work Windows and Measures

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1. PURPOSE AND OBJECTIVES

This document provides direction to those involved in development in and around a “stream” (see definitions) regarding implementation of timing windows and measures to adequately manage and conserve aquatic resources in the Skeena Region. The direction herein applies to all federal, provincial and municipal statutes and legislation including, but not limited to, *Fisheries Act, Water Act, Forest Practices Code, Forest Range Practices Act...*

These measures and timing windows do not authorize anyone to conduct or participate in activities that are contrary to any statute (e.g. Land, Waste, Water, Wildlife, Forest Practices Code, Industrial Health and Safety, or Canada Fisheries Acts). Any contract between a land/resource developer or tenure holder and any other agency does not affect the Ministry of Water Land and Air Protection’s (MWLAP) mandate to monitor, inspect and when necessary, investigate apparent violations involving land, fish, wildlife or their habitats.

This document has been prepared by Skeena Region Ecosystems Section staff in consultation with the MWLAP Fisheries Branch and the Department of Fisheries and Oceans using the best information available. These measures and timing windows will be revised from time to time as new information becomes available.

2. DESIGNATED ENVIRONMENT OFFICIAL (DEO) RESPONSIBILITY

Under the *Forest Practices Code Act*, The Minister of Environment, Lands and Parks designated Ecosystem Biologists, Habitat Protection Officers and Water Resource Specialists as Designated Environment Officials (DEOs). It is the DEO’s responsibility to establish timing windows and measures, a legal obligation under: the *Timber Harvesting Practices Regulation, Section 21(3)* (temporary stream crossings and other operations in a fish stream), and the *Forest Road Regulation, Sections 13(1)(h)* (crossing in fish streams) and *19, 20(1)(h)* (stream crossings and other operations to adequately manage and conserve aquatic resources). This document fulfills these obligations.

3. DEFINITIONS

“**Stream**” Includes any 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.

“**Changes in and about a stream**”¹ Means any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within the stream, or any activity or construction within the stream channel that has had or may have an impact on the stream.

“**Stream channel**” Means the bed of a stream and the banks of a stream, whether above or below the natural boundary and whether usually containing water or not, including side channels.

“**Works**” Means anything capable of or useful for:

¹ In this document, “changes in and about a stream” equate to “in-stream”

- (a) diverting, storing, measuring, conserving, conveying, retarding, confining or using water, or
- (b) producing, measuring, transmitting or using electricity, or
- (c) collecting, conveying or disposing of sewage or garbage, or for preventing or extinguishing fires.

In addition, “works” means booms and piles placed in a stream, obstructions placed in or removed from streams or the banks or beds of streams; and changes in and about a stream, and includes access roads to undertake any of these works.

4. IN-STREAM WORK WINDOWS

An “In-stream work window” is a time period when there is a lower risk from work activities to aquatic resources, fish and their habitats. It is not to be considered a time period during which there is no risk. The charts below identify work windows for selected species and their dates for each Forest District in Skeena Region.

If a proponent wants to work in or about a stream outside of these “Work Windows,” approval must be obtained from a Habitat Officer.

***Note:** The concept of a “reduced risk work window” evokes quite a bit of disagreement. In many cases, it is more important to stress the best management practices for various activities rather than the “window”. Most windows are based primarily on incubation / fry emergence information – so for many areas where spawning may not occur, the work window may not be as relevant. For instance, in the interior areas of the Skeena Region we have found that winter low flow conditions are often the most suitable for many types of “in-stream” activities – providing that spawning habitat will not be affected.*

Generally this spawning/incubation period would be considered the most sensitive period, however, for some projects in certain situations, there may be concerns with adult migration (or, for resident fish, impacts on adults) as well – which would also affect the timing window for any given project.

For some individual drainages or streams, Work Windows for those species that are different from the district wide Work Windows are also included.

4.1 Reduced Risk Work Windows for Fish and Wildlife for the Skeena Region General

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Lower Taku, Lower Iskut, Lower Stikine, Lower Skeena (all marine environments)	Green Sturgeon Red Listed	No Reduced Risk Work Window	

Throughout	Eulachon Blue Listed	June 15	February 15
Throughout	Coastal Tailed Frog Blue Listed	No Reduced Risk Work window	

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 15	July 31
Throughout	CO	June 15	August 15
Throughout	PK	May 15	August 15
Throughout	CM	May 15	August 31
Throughout	SO	June 15	July 15
Throughout	KO	June 15	July 15
Throughout	ST	August 15	November 15
Throughout	RB	August 15	January 31
Throughout	CT	August 15	December 31
Throughout	DV	May 15	August 31
Drizzle Lake, Mayor Lake	Giant Black Stickleback Red Listed	No Reduced Risk Work Window, Confined to lakes only	

4.2 Reduced Risk Work Windows for the North Coast Forest District

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	June 15	August 31
Throughout	PK	May 15	August 1
Throughout	CM	May 15	July 15
Throughout	SO	June 15	July 31
Throughout	KO	June 15	July 31
Throughout	ST	August 1	December 31
Throughout	RB	August 15	January 31

Throughout	CT	August 15	December 31
Throughout	DV	June 15	August 31

4.3 Reduced Risk Work Windows for the Kalum Forest District (Kalum and Nass Timber Supply Areas)

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	June 15	September 1
Throughout	PK	May 15	August 1
Throughout	CM	May 15	July 10
Throughout	SO	June 1	July 20
Throughout	KO	June 15	August 15
Throughout	ST	August 15	January 31
Throughout	RB	August 1	January 31
Throughout	CT	August 1	January 31
Throughout	DV	June 1	August 31
Throughout	WG	June 1	September 15
Throughout	BT	June 1	August 31

4.4 Reduced Risk Work Windows for the Kispiox/Cranberry Timber Supply Areas Skeena/Stikine Forest District

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	July 1	August 31
Throughout	PK	May 15	August 1
Throughout	CM	May 15	August 1
Throughout	SO	June 15	July 31
Throughout	KO	June 15	July 31
Throughout	ST	September 1	December 31
Throughout	RB	September 1	January 31
Throughout	CT	September 1	December 31
Throughout	DV	June 15	August 31

Throughout	WG	June 1	September 15
Throughout	BT	June 15	August 31

4.5 Reduced Risk Work Windows for the Cassiar TSA (Skeena/Stikine Forest District)

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	May 1	July 31
Throughout	CO	April 1	August 15
Throughout	PK	March 15	July 31
Throughout	CM	April 1	September 15
Throughout	SO	April 1	May 31
Throughout	ST	August 15	November 15
Throughout	RB	September 1	April 30
Throughout	CT	September 1	April 30
Throughout	DV	June 15	August 31
Throughout	WG	June 1	August 31
Throughout	GR	July 15	March 31
Throughout	BT	June 15	August 31
Teslin Lake	Broad White Fish Red Listed	April 30	September 15
Atlin Lake, Teslin Lake, Swan Lake	Least Cisco Blue Listed	April 30	September 15

4.6 Reduced Risk Work Windows for the Bulkley TSA (Skeena/Stikine Forest District)

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	July 1	August 31
Throughout	PK	May 15	August 1
Throughout	SO	June 15	July 15
Throughout	ST	September 15	April 30
Throughout	RB	September 1	May 15

Throughout	CT	September 1	May 15
Throughout	DV	June 1	November 15
Throughout	WG	June 1	October 15
Throughout	BT	June 1	October 31
Babine River	ST, RB, CT	September 15	April 30
Babine River	DV, BT	June 1	October 15
Copper (Zymoetz) River	ST, RB, CT	September 1	May 15
Copper (Zymoetz) River	DV, BT	June 1	October 15

4.7 Reduced Risk Work Windows for the Morice TSA (Nadina Forest District)

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	July 1	August 31
Throughout	PK	May 15	August 1
Throughout	CM	May 15	August 1
Throughout	SO	June 15	July 15
Throughout	KO	June 15	July 15
Throughout	ST	September 1	December 31
Throughout	RB	September 1	January 31
Throughout	CT	September 1	December 31
Throughout	DV	June 15	August 31
Throughout	WG	June 1	September 15
Throughout	BT	June 15	August 31

4.8 Reduced Risk Work Windows for the Lakes TSA (Nadina Forest District)

Location	Species	Reduced Risk Work Window	
		Start date	Finish date
Throughout	CH	June 1	July 15
Throughout	CO	July 1	August 31
Throughout	SO	June 15	July 15
Throughout	KO	May 15	August 31
Throughout	ST	August 1	April 30
Throughout	RB	August 1	March 31

Throughout	CT	August 1	April 30
Throughout	DV	April 15	August 15
Throughout	WG	April 15	October 15
Throughout	BT	April 15	August 15
Throughout	BB	July 1	January 15

5. IN-STREAM WORK MEASURES

Guidelines such as the FPC *Fish-stream Crossing Guidebook* (BCMOF March 2002) and the *Land Development Guidelines for the Protection of Aquatic Habitat* (Chilibeck *et al* 1992) should be consulted for potential culvert and bridge installation options to minimize the risk of damage to fish and fish habitat. However, the additional direction in this document takes precedence over such guidelines and best management practices, where there is a difference.

The following measures must be implemented during the construction, repair or removal of a temporary stream crossing and other operations in a fish stream (THSPR 14(2), WLFMR 68(c), while constructing or modifying a crossing in a fish stream (FRR 9(1)(h), WLFMR 49(1)(h)(i), or during road deactivation works in and around stream crossings (FRR 14, WLFMR 54).

Sections 5.1, 5.2 and 5.3 of this document are applicable to crossings of streams that are not considered to be temporary winter crossings.

5.1 Planning Measures

Planning measures are descriptions, in planning documents, of the types of issues to which construction measures apply. Proponents must:

- (a) document how the works will provide for fish passage, prevent sedimentation, protect fish and maintain fish habitat. Documentation must be available to government agency staff (MOF, DFO, MWLAP) upon request.
- (b) maintain the natural stream channel width and gradient in fish streams.
- (c) correctly classify each stream being worked on according to the *Fish Stream Identification Guidebook*, or varied by a Local Area Agreement.
- (d) not place culverts at lake outlet streams or at spawning beds.
- (e) cross all S1, S2 and large S3 streams with a bridge or other open-bottom structure.
- (f) avoid, where possible, crossing of alluvial fans.
- (g) obtain a fish collection permit for all fish salvage operations. Such a permit can be obtained from DFO or the MWLAP office in Smithers.
- (h) Avoid activities in “sensitive areas” (i.e. spawning areas, high water refuge areas etc.)

- (i) Further information and a link to the Provincial Best Management Practices Guidebook is available through The Ministry of Water Land and Air Protection, Skeena Region web site available at: <http://wlapwww.gov.bc.ca/ske/>

5.2 Construction Measures

Construction measures are activities that are implemented in the field before, during and after completion of the work project. Proponents must:

- (a) in fish streams with gradients greater than 0.5%, embed culverts into the substrate and have material placed in the culvert large enough to resist movement by the natural stream flow. These materials are to provide resting areas to assist fish passage.
- (b) when using rock as rip-rap, ensure that it is durable, clean and not from acid rock quarries.
- (c) ensure that all equipment used on site is in good repair and free of any excess oil and grease.
- (d) locate machinery on, and work from, the stream bank or naturally dry channel rather than within the wetted perimeter of the stream unless authorized by Ministry of Water, Land and Air Protection or the Department of Fisheries and Oceans.
- (e) age wood, if treated with preservatives, for at least 6 months prior to it being used in any stream crossing structure. During the aging process, the wood must be stored at least 100m from a water body. Wood treatment products must meet CSA O80 standards for preservatives and use. Treated wood must not be used below the high water mark.
- (f) completely isolate from fish bearing waters all cast-in-place concrete and grouting until fully set.
- (g) place sediment control structures well in advance of activities that could result in sediment mobilization.
- (h) upon completion of work, remove all temporary bridges, excess fill and other materials, and any culverts, pipe conduits, ditches or other structures that have not been utilized.
- (i) restore the channel and banks at the site to approximate the original condition.
- (j) stabilize all exposed soils and drainage to prevent erosion and stream sedimentation.
- (k) block all ditch lines running into streams or other fish bearing waters. Ditch lines must empty into suitably vegetated overflow areas.
- (l) re-contour disturbed areas, and where stream-side vegetation has been damaged, re-vegetate with an ecologically suitable species.
- (m) clean-up and re-vegetate the work site and associated access after project completion.
- (n) limit equipment crossing of streams to one time across and back.
- (o) release ponded water in a controlled fashion in order to minimize mobilization of sediments.
- (p) ensure that silt fences and hay bales are on-site during construction and are utilized, where and when necessary.
- (q) use filter fabric on bridge surfaces (to cover running planks) to minimize loss of fill/capping material and sediment movement.
- (r) when constructing winter roads, remove all crossings prior to spring thaw.

5.3 Emergency Measures

In some circumstances emergency actions will be required to protect roads, stream environments and crossing structures from catastrophic damage. Should consultation on conservation measures prove impossible due to an emergency need to prevent damage, the extent of emergency activity must be reported (in writing and with a map) to MWLAP and the Department of Fisheries and Oceans (DFO) within 72 hours. In such emergency situations the proponent must:

- (a) stop operations near or within streams during periods of heavy or prolonged rainfall.
- (b) suspend activities and notify Ministry of Water, Land & Air Protection if spawning fish are observed within the area of the work site.
- (c) suspend in-stream work if stream flows exceed the capacity of sediment control measures (settling ponds, silt fence, etc.).
- (d) suspend the use of temporary crossings and all road construction or logging operations in the immediate vicinity of the crossing if, for any reason, sediment is introduced into the stream at the temporary crossing at any time during its use. It is the responsibility of the operator to contact the Contract Supervisor/Engineering Officer and MWLAP/DFO immediately.

In locations where beaver activity occurs, bridges or over-size culverts should be considered for all streams to reduce maintenance requirements and to reduce downstream habitat damage resulting from dam removal. If culverts are used where signs of recent beaver activity are present, measures should be taken to reduce the chance of beavers damming the culvert. Proponents must:

- (a) obtain authorization for removal or modification of beaver dams by written approval issued under the *Wildlife Act*. Such authorization can be obtained by applying to Ministry of Water, Land and Air Protection, Habitat Officers as outlined in section 8.8. below.

6. SUGGESTED PROCEDURES

The above required Work Windows and Measures have application to a number of stream crossing activities. These activities and their suggested procedures are discussed below. They are suggestions only and do not constitute requirements under the *Forest Practices Code Act*.

6.1 Temporary Streams Crossings for Roads of Less than One Years' Duration

The following steps ensure temporary stream crossings are constructed within the terms of approved Cutting and/or Road Permits and comply with the Forest Practices Code.

- (a) Review all documents, in particular, stream-side or riparian management prescriptions.
- (b) Review site plan for permanent bridge structure, if it is available.
- (c) Discuss any item that may require clarification with the Engineering Officer.
- (d) A pre-work conference should be conducted on-site with the Buncher Operator, Road Construction Crew, Contractor, Foreman, and Company or Ministry of Forests

representative to discuss site conditions, prescriptions, installation of a temporary portable bridge or log stringer bridge. MWLAP/DFO should be invited to attend if the crossing is in a sensitive area.

- (e) Prior to construction, the necessary approvals must be received from the Ministry of Forests and MWLAP/DFO if required. Construction must comply with the *Forest Practices Code Act* and *Regulations* and Part 7 of Section 9 (regulations) of the *Water Act*.
- (f) A Contract Supervisor or Forest Officer should be available to be on-site during construction, installation, or removal of the temporary bridge.
- (g) Silt fences and hay bales must be on-site during construction and removal of the temporary bridge and are to be utilized, where necessary.
- (h) Filter fabric must be used on the bridge surface (running planks to cover) to minimize sediment movement.
- (i) The maintenance of stream-side vegetation is a priority. Stream banks on approaches should not be stripped or disturbed, if possible.
- (j) Sedimentation into streams must be minimized. This may be accomplished by placing brush/limbs or man-made fiber mat over exposed mineral surfaces (cuts, fills, and/or road running surface).
- (k) Ideally, the stream will not be crossed with ground based equipment. If required, a designated crossing site will be approved by the Contract Supervisor or Engineering Officer. Other than this crossing, the wheels or tracks of ground based equipment must not be within 5 meters of a stream bank.
- (l) Ditches, water bars, culverts, etc., should be constructed in a manner that will carry water and sediment away from the stream, where possible.
- (m) Any ditch lines or running water that cannot be directed away from the stream or temporary crossing must utilize one or more of the following: silt fences, hay bales, settling ponds.
- (n) The temporary crossing should not be used in wet weather unless absolutely necessary.
- (o) If tracked machines must cross a temporary structure during wet weather, machine tracks must be shoveled out before crossing, if the tracks are holding dirt.
- (p) If for any reason, sediment is introduced into the stream at the temporary crossing at any time during use, it is the responsibility of the operator to cease use of the crossing and all road construction or logging operations in the immediate vicinity of the crossing and to contact the Contract Supervisor/Engineering Officer and MWLAP and DFO immediately.

6.2 Fish Stream Crossing on Winter Roads

The following measures ensure fish stream crossings of winter roads are carried out in accordance with the *Forest Practices Code Act* of British Columbia, *Regulations* and other legislative requirements of Regulatory Agencies.

These measures would only be implemented when streams are not providing fish passage at the crossing site during the time the crossing is in place.

- (a) Construct the crossings with snow and logs in a manner that the crossing can be removed without disturbing the stream channel. All sills must be placed outside the stream channel.

- (b) Remove all crossings prior to spring thaw.
- (c) All removed crossings should be field checked after spring runoff to ensure that safe fish passage can occur.

6.3 Installation of Flat Bottomed Culverts on Fish Streams

The following ensure flat bottomed culverts are installed and removed in accordance with the *Forest Practices Code Act and Regulations*.

- (a) The maximum average velocity in all culverts must not exceed 0.6 m/s to not impede juvenile fish passage. Culvert width must be similar to stream channel width.
- (b) Ditches should not drain directly into the stream, but should be diverted onto stable forested vegetation through cross-drains. Where this is not possible, use filters such as hay bales, silt fences or settling ponds. These filters must be maintained on a regular basis to remain at a working capacity.
- (c) Before start of installation, an attempt to capture fish at the culvert site will occur and if fish are found, they will be moved downstream
- (d) The stream will then be dammed off upstream and water diverted.
- (e) A silt fence will be placed downstream of the culvert site.
- (f) Bury the culvert below the natural stream bed 20% of the vertical rise. Place the culvert at or near the natural stream gradient.
- (g) Fill the culvert bed to the natural stream bed level. If it is not possible to get the material in the culvert, leave it for natural sedimentation to occur.
- (h) Ensure that the culvert is of sufficient length to avoid side slope material entering the culvert or flow channel.
- (i) Pay attention to bedding and back-filling operations, as they are critical for proper installation of culverts. Fill material must be compacted through the entire back-fill process.
- (j) Provide sufficient back-fill over the culvert before any traffic crosses over the culvert.
- (k) Protect the inlet and outlet side slopes of the road sub-grade from erosion and sloughing by armoring the fill slopes with rip rap for a distance of 1.5 diameter on each side of the culvert and toeing into the stream bed. Where deep fills are required, extend the rip rap a minimum of the diameter of the culvert above the height of the culvert.
- (l) When the culvert is opened to water, watch for the need to add more rock armoring.
- (m) Re-vegetate all exposed mineral soil as soon as possible after completing the installation.

6.4 Installation and Removal of Log Culverts on Fish Streams

The following measures ensure log culverts are properly installed and removed in accordance with the *Forest Practices Code Act and Regulations*.

6.4.1 Installation

- (a) Place silt fence downstream of the crossing.
- (b) Side ditches should not drain directly into the stream, but be diverted where possible onto stable forested vegetation that can filter sediments before reaching the stream, either through cross-drains or settling ponds.

- (c) Set up sill logs outside the wetted perimeter of the stream (beyond the top of the bank) to maintain channel width and the natural stream channel. Minimum diameter of sill logs is 50 cm.
- (d) Set the sill logs at an elevation to avoid under scouring. Where high soil bearing capacity is not reached, excavate and back-fill with rock and compact it before sill log placement. Ensure that the excavated material is not deposited in the stream.
- (e) Set the sill logs at the natural stream gradient.
- (f) Make sure the culvert is long enough to support the road fill where the base of road fill just touches the fill containment logs.
- (g) Place the stringers.
- (h) Place the fill containment logs and drift pin them through to the sill log.
- (i) Cover the log stringers and containment logs with a geotextile cloth to prevent fines and road material entering the stream.
- (j) Back-fill material over the culvert until desired road grade is reached, paying attention to make sure material is not pushed into the stream or pushed against the fill containment log.
- (k) Place rip rap at the inlet and outlet to protect against fill erosion, undermining of the sill logs and the erosion of stream banks.

6.4.2 Removal

- (a) Place a silt fence downstream of the crossing, and place geotextile cloth dipper under bridge to capture excess fines.
- (b) Carefully pull back the road fill from the culvert down to the geotextile, to prevent material from entering the stream.
- (c) Once fill is removed from the geotextile, pull the geotextile away from the culvert minimizing any fines entering the stream.
- (d) Carefully remove the stringers to avoid the structure from falling apart and falling into the stream.
- (e) Evaluate sill log and leave in place unless they will obstruct fish passage.
- (f) Re-slope approaches and re-vegetate all exposed mineral soil soon after removal is complete.

6.5 Temporary Portable or Log Stringer Installation and Removal on Fish Streams

The following ensures temporary portable or log stringer bridges are properly installed and removed in a manner that is consistent with the *Forest Practices Code Act and Regulations*. “Portable” refers to a one piece structure with a short term use, while “temporary” means less than five years.

6.5.1 Installation

- (a) Review the bridge design drawings/site plans and environmental concerns before construction begins.
- (b) Where possible, avoid placing approaches at gradients that slope down to the bridge crossing. Drainage onto the bridge must be avoided. If the road slopes down to the

bridge and erosion is expected, place geotextile covered with crush material on the road surface and/or place a cattle guard or similar engineered structure in the roadway to intercept erosion of sediment to the bridge.

- (c) Do not allow ditches to drain directly into the stream. Divert ditch water, where possible, onto stable forested vegetation that can filter sediments before reaching the stream either through cross-drains or settling ponds.
- (d) Place geotextile under the sill log.
- (e) Place bridge.
- (f) Place wooden ballast wall on both sides of the bridge.
- (g) Back-fill against the ballast wall with compacted granular material.
- (h) Place rip rap along the stream bank and upstream and downstream of the bridge where erosion is possible.
- (i) Re-vegetate all exposed mineral soil as soon as possible after construction is completed.

6.5.2 Removal

- (j) Sweep the deck to remove any gravel material on the deck.
- (k) Remove the bridge.
- (l) Remove the two sill logs. (It may be desirable to leave these in place to protect stream banks, depending on the site.)
- (m) Re-slope the road fills and re-vegetate as soon as removal is complete.

6.6 Skid Bridges

The following steps outline responsibilities for installing skid bridges, which may be made from culverts or logs, or which may be a portable steel bridge.

The location and installation of any skid bridge must be approved in the Silviculture Prescription, and is removed at completion of logging. Any changes to skid bridge location require an amendment or written approval from the Ministry of Forests.

Skid bridges are to be located, built (installed) and used in a manner that satisfies Operational Plans and prescriptions. (Pre-Work Conference)

- (a) Identify a suitable location(s) for skid bridges which protect stream channels and stream banks immediately above and below the crossing, and ensure that the location(s) chosen is approved.
- (b) Stream side vegetation should not be disturbed except at the crossing site.
- (c) Ensure that in-stream work, if any, is approved before the work is done.
- (d) Slash and debris must be prevented from falling into the stream channel during installation or use of temporary skid bridges. The use of geotextile or terra-mats (made from used tires) on the bridge surface may be used.
- (e) Skid bridges should not be used during wet weather in order to reduce the risk of causing sedimentation in a stream.
- (f) “Rub trees” should be left standing on the approach to skid bridges so that logs are turned perpendicularly to the stream before skidding over the stream crossing.
- (g) If the installation or use of a skid bridge causes sediment to enter a stream, then operations must stop immediately.

- (h) A site inspection should be scheduled for snow-free conditions after the skid bridge is removed to check the need for further cleanup, water bars, re-contouring, grass seeding or other work.

6.7 Deactivation of Fish Stream Crossings

The following suggested steps ensure deactivation of fish stream crossings are carried out in accordance with the *Forest Practices Code Act, Regulations* and regulatory agencies.

1. Review the latest 1:20,000 fish inventory maps to identify all possible fish stream crossings to be deactivated.
2. Field review all crossings not found on fish inventory maps and carry out a survey as outlined in the single survey stream classification procedure. Also determine the following:
 - (a) if fish bearing, identify the likelihood of fish presence at the time of deactivation.
 - (b) identify if spawning grounds are located at/or downstream of the crossing.
 - (c) identify terrestrial sediment input hazard at the crossing.
3. On fish streams with different sediment hazard ratings, implement the suggested actions identified in the table below.

Table 1. Actions for different sediment hazard Ratings.

FISH PRESENCE	SPAWNING GROUNDS	SEDIMENT HAZARD²	SUGGESTED ACTIONS
Yes	yes	high	stream diversion.
Yes	yes	low	stream diversion
Yes	no	high	stream diversion.
Yes	no	low	normal construction with silt control.
No	no	low	normal construction with silt control.
No	yes	low	stream diversion for salmonids
No	yes	high	stream diversion.
No	no	high	normal construction with silt control.

4. For permanent deactivation with non-vehicle use, apply adequate erosion control materials.
5. For permanent deactivation with vehicle use, protect the stream banks with erosion resistant materials capable of withstanding vehicle use.
6. Before carrying out any deactivation on high-risk streams or spawning beds, contact the Ministry of Water Land and Air Protection and/or Department of Fisheries and Oceans.

² Sediment hazard is calculated using material type stream gradient and flow rate and using surface erosion potential maps.

6.8 Procedures for Nuisance Beaver

A frequent problem associated with forest roads is beaver dams. Although removal of beaver dams is under the purview of the *Wildlife Act* rather than any forestry related legislation, the procedure is included here because of its application to forestry related activities and streams. Beaver ponds are also often excellent fish habitat.

Legal Considerations

Landowners must obtain authorization from the Ministry of Water, Land and Air Protection, Environmental Stewardship Division prior to the removal of a beaver dam. Failure to do so constitutes an offense under the *Water Act*.

Landowners Obligation Prior to Removal of Beaver Dam

- A Sundry Permit under Section 9 of the *Wildlife Act* is not required for beaver dam removal if its removal is for the purpose of protection of the landowner's property from flooding.
- A Sundry Permit under Section 9 of the *Wildlife Act* is required when the purpose to remove the beaver dam is other than imminent flooding and/or nuisance beavers are to be removed from the area. No Sundry Permit is necessary if a Licensed Trapper is contracted to remove nuisance beavers. The open season for beaver trapping in the Skeena Region is October 1 to May 31. Contact the Ministry of Water, Land and Air Protection, Environmental Stewardship Division in Smithers for names of licensed trappers.
- All downstream licensed water users shall be notified prior to the proposed dam removal.
- Authority for ingress/egress through and over private land shall be obtained from all property owners prior to beginning any dam removal. Said authority should be in written form signed by the land owners.
- Your local office of the Department of Fisheries & Oceans shall be contacted for their comments prior to any proposed dam removal.
- It is the proponent's responsibility to indicate fish presence/absence. Default to *Fish Stream Identification Guidebook, Second Edition* under the *Forest Practices Code Act of British Columbia* is recommended. Where fish are present in any of the affected watercourses, fish salvage shall be conducted prior to the removal of the dam.

Procedure to Remove Beaver Dams

- The removal of the dam(s) shall be completed in a controlled manner and undertaken in a series of 20 cm drops in dam height. After each drop in dam height, the subsequent water level and sediment plume shall be allowed to stabilize prior to the next level drop, thereby allowing for a controlled breach and controlled flows downstream.
- When the water level in the reservoir has been lowered to the extent that no undue scour of the stream channel will occur, the dam may then be breached and the dam debris removed with mechanical equipment or by hand.
- All material excavated from the dam(s) is to be side cast/removed from the area in such a manner that it is prevented from re-entering the watercourse.
- Machinery (where used) shall be free of excess oil and grease and have no hydraulic fluid leaks; only the digging bucket from the machinery arm shall enter any watercourse.
- Care shall be exercised during all phases of removal of the dam(s) to minimize sediment introduction to any watercourse.
- All reasonable care shall be exercised to avoid damaging any land, works, trees, streambanks or other property and shall make full compensation to the owners for any damage or loss resulting from the removal of any beaver dam(s);
- In a series of dams only one dam at a time shall be removed; beginning with the most downstream dam and progressing upstream.
- Please contact the Ministry of Water, Land and Air Protection, Environmental Stewardship Division in Smithers, (250) 847-7303, for application forms or if more information is required.

7. SOURCES OF INFORMATION

The following are useful information sources some of which were used to develop these Windows and Measures.

Salmonid Swimming Performance in Relation to Passage Through Culverts. J.C. Wightman and G.D. Taylor, December 1976.

Fish Stream Crossing Guidebook BC Environment, BC Forest Service 2002.

Culvert Guidelines: Recommendations for the Design & Installation of Culverts in British Columbia to Avoid Conflict with Anadromous Fish. Fisheries & Marine Service Technical Report No. 811, B.G. Dane, 1978.

A Review & Resolution of Fish Passage Problems at Culvert Sites in British Columbia. Fisheries & Marine Service Technical Report No. 810, B.G. Dane, 1978.

Guidelines for Land Development and Protection of the Aquatic Environment. Fisheries & Marine Service Technical Report No. 807. Riparian Audit, Skeena Region.

Influence of Forest and Rangeland Management on Salmonid Fishes and Their Habitats.

William R. Meehan Editor.

Indigenous Fish Species Potentially at Risk in BC with Recommendations and Prioritizations for Conservation Forestry/Resource Use, Inventory and Research.

Ministry of Fisheries, Fisheries Management Report No. 105, Gordon Haas, 1998.

Rare Freshwater Fish of British Columbia. BC Environment, S.G. Cannings and J. Ptolemy, 1998.

Riparian Management Area Guidebook. BC Environment, BC Forest Service, 1995.

Fish-stream Identification Guidebook. BC Environment, BC Forest Service, 1995.

Standards and Best Practices for Instream Works. Ministry of Water, Land and Air Protection, March 2004.

Fish Passage Culvert Inspection Manual. WRTC #11, Parker, M. Ministry of Environment Lands and Parks, Ministry of Forests, 2000.

Fish inventory data warehouse URL: <http://srmwww.gov.bc.ca/fish/ric/>

Fish Wizard URL: <http://www.fishwizard.com/>

Reduced Risk Windows for Instream Works. MWLAP, 2005