

FPIInnovations prepared this guide in order to provide forest workers with information on winter stream crossings. FPIInnovations worked in close cooperation with BC Timber Sales, Stuart-Nechako Business Area during the development of this guide. Reference material for this guide included the *Reduced Risk Timing Windows and Measures for the Conservation of Fish Habitat for the Omineca Region* (BC Ministry of Water, Lands and Air Protection, 2004).

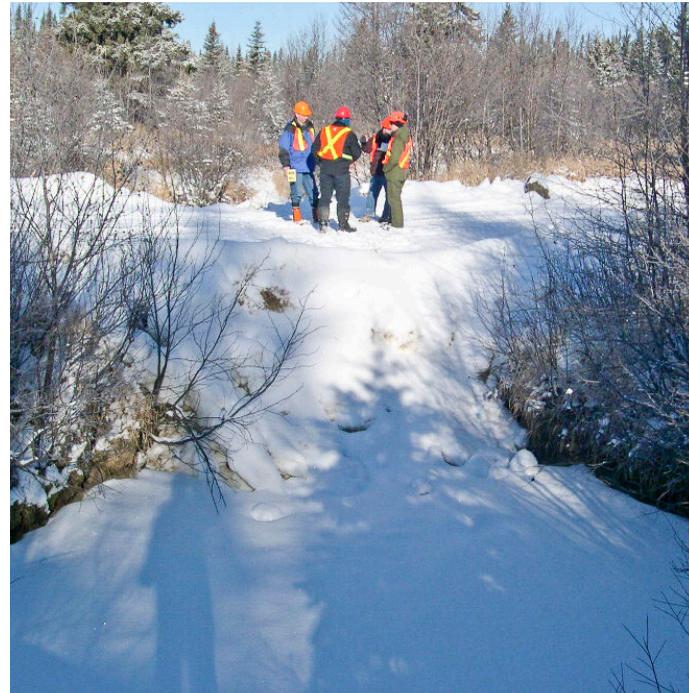
For more information about the use or intent of this guide,

**please contact:**  
**Carol Byers, RFT**  
 carol.byers@gov.bc.ca

For more information about the development of this guide,

**Please contact:**  
**Clayton Gillies, RPF, RPBio**  
 FPIInnovations  
 Tel.: 604 224 3221  
 clayton.gillies@fpinnovations.ca

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## A PRACTICAL GUIDE FOR FOREST WORKERS

The essence of a temporary crossing is that it will be utilized for a short period of time. This guide will help forest workers choose preventative measures that will help maintain stream and stream bank integrity.

### Best practices

Goal is to minimize any damage to the stream channel, banks or vegetation in the vicinity of the work area

#### Plan your work

Choose a crossing location with the following characteristics:

- Narrow stream width
- Straight section of stream; not meandering or braided
- Solid, stable stream banks and bed that are less susceptible to erosion or degradation

#### Crossing structures

- Temporary clearspan is desirable in all cases for protection of stream channel
- A log bundle can be used during frozen conditions or where there is no flow
- A culvert can be used if there is flowing water
- Other structures may be considered provided they adhere to the same principles outlined in this guide



Avoid crossing at wide, braided or meandering section.

Wheeled equipment is not permitted to cross exposed channels. All refueling and servicing must be done outside of the riparian management area.

Choice of allowable crossing structure will depend on stream classification and flow characteristics.

Be aware of the goals set for the riparian management area at/near the crossing.

Crossing of an exposed channel by tracked machines is only permitted where stream banks and channel are stable (i.e. rock or frozen) and there is no risk of damage. If these conditions are met, tracked machines may cross the exposed stream in order to aid with construction of the crossing (see crossing consideration section).

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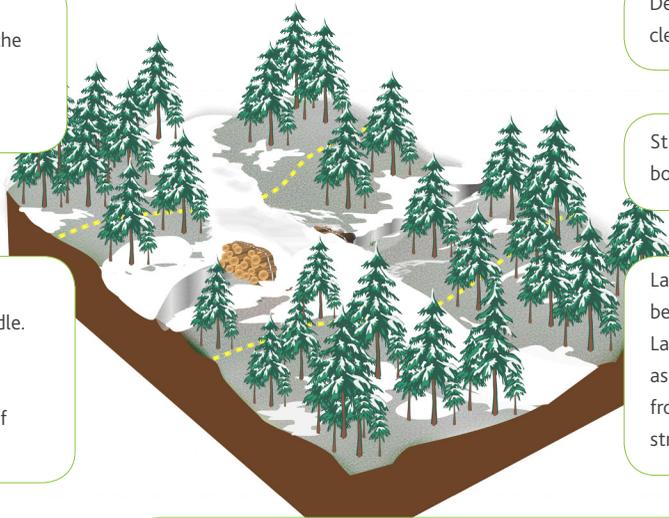
## Temporary Winter Stream Crossings

### A PRACTICAL GUIDE FOR FOREST WORKERS

# CONSTRUCTION AND INSTALLATION OF A LOG BUNDLE

Place a protective layer (typically geotextile) over the stream banks, channel and bundle.

Use clean snow to fill the channel above the log bundle. Mineral soil should not be mixed with snow which is used for the construction of the crossing.



Delimb and top bundled logs, and clean them of excess soil and debris.

Stream must be frozen to bottom of channel with no flow.

Lash logs together so bundle can be lifted into place as a single unit. Lashed logs will aid in deactivation as well as prevent any single log from becoming embedded in the stream bank or channel.

The surface of the winter road at the crossing should be frozen and well-compacted to withstand the anticipated traffic and to prevent any exposure of the underlying structure. Compaction of snow may reduce its thickness up to 70%.

## Deactivation

- Remove crossing when no longer needed. Structure must be removed before stream thaws and develops any water flow, or by April 15th, whichever is first.
- At all times damage to the stream channel and banks must be minimized. Vegetation in the vicinity of the work should be conserved as much as possible.
- Stabilize exposed soils at the crossing site and along the approaches.
- All permanent foreign (non-biodegradable) material is to be collected and removed from the site.
- To aid in the complete removal of geotextile used as a separations layer, it should be specified that the material be of a high grab tensile strength in order to be pulled and gathered without ripping. Grab tensile strength is measured in newtons (N) and for woven geotextile has a typical range of 700 to 1400 N.

- A separation layer made of biodegradable material which can be left in place to degrade may be appropriate for use where retrieval is especially difficult.

All foreign material is to be collected and removed from the site

Preserving the natural vegetation next to the stream helps to protect this highly vulnerable area from erosion and sedimentation.

Redirect ditch or surface flows from reaching the stream.



Cribbing or logs used as abutments which are stable or embedded into the ground may be left in place.

## CROSSING CONSIDERATIONS

### Stream and riparian classification

STREAM WIDTH	STREAM AND RIPARIAN CLASS
Stream is a fish stream or in a community watershed	
>20 m	S1
>5 – 20 m	S2
1.5 – 5 m	S3
<1.5 m	S4
Stream is not a fish stream and not in a community watershed	
>3 m	S5
<3 m	S6

Note that S3 and S4 streams are the primary focus for this winter crossing guide.

### \*Number of stream channel crossings by tracked equipment during construction of crossing

- S4: Up to three one-way crossings
- S3: Up to two one-way crossings

\*Only allowed if stream banks and channel are stable (i.e. rock or frozen) and there is no risk of damage to the stream banks or channel.

## TEMPORARY CLEARSPAN

- Can be used to cross S3 or S4 streams.
- Can be used to cross streams with flowing water
- Can be installed without encroaching on stream channel
- Open bottom provides for debris passage
- Clearspan can provide best protection to stream banks and channel, and helps to preserve riparian vegetation / features
- Remove structure prior to spring melt



## LOG BUNDLE

- Can only be used to cross S4 and S6 streams that have no flowing water
- Installation may only occur once the water course has frozen solid to the bottom
- Bundle must be tightly lashed so as to prevent any loose logs from being placed within the channel
- Lift bundle into place, which will aid to preserve the stream bank from any gouging due to rolling or dragging
- A separation layer is required for use over the banks, channel and bundle



- Use clean snow to place in channel and over entire crossing location
- Logs are the typical choice for use in a bundle; PVC pipe may be considered as an alternative
- Remove structure prior to spring melt
- A culvert amongst a log bundle allows for a larger conduit to be incorporated in the structure which may provide for a fail-safe due to an unanticipated flow event.

## CLOSED BOTTOM CULVERT

- Can only be used for S4 and S6 streams
- Culvert needs to conform to the shape of the channel at crossing location—typically a straight stream reach is chosen.
- Separation layer is required for use over the banks, channel and culvert.
- Use clean snow to place in channel and over entire crossing location.
- Remove structure prior to spring melt.

