



**Whitewater Kayaking
Association of
British Columbia**

PO Box 91549
West Vancouver, BC V7V 3P2
Phone: (604) 515-6376
E-mail: admin@whitewater.org



**Recreational Canoeing Association of
British Columbia**

905 Berkley Road
North Vancouver, BC V7H 1Y3
Phone: (604) 929-2349
E-mail: environment@bccanoe.com

Draft Safety Guidelines for the Construction of Large Woody Debris Structures Affecting Recreational Paddling Streams of British Columbia

Prepared by the

Recreational Canoeing Association of BC
(RCABC)

And the

Whitewater Kayaking Association of BC
(WKABC)

July 2005

Table of Contents

- 2) [Introduction](#)
- 2) [Potential Hazards of LWD Structures to River Users](#)
- 3) [Suggested Process](#)
- 4) [Location of Structures](#)
- 5) [Construction of Structures](#)
- 6) [Communication during the Period of Construction](#)
- 6) [Informing River Users – Post Construction](#)
- 6) [Monitoring Structures – Post Construction](#)
- 6) [Repair or Removal of Damaged Structures](#)
- 7) [Conclusion](#)
- 7) [Contact Information](#)

Introduction

The purpose of this document is to minimize the hazards created when Large Woody Debris (LWD) structures, for the enhancement of fish habitat, are constructed in rivers used by canoeists and kayakers. This may also apply to any river which attracts rafters, swimmers, anglers, or any other in-stream users.

The goals of this document are to:

- 1) Standardize a LWD planning process in which the recreational river use community is included.
- 2) Ensure that agencies and organizations involved in the planning, installation and approval of these structures inform themselves as to the appropriate location and construction of these structures by utilizing the river use community's experience to reduce the hazard posed by these structures.
- 3) Ensure that proponents are held accountable for the installation of these structures; including planning, construction, monitoring, and repair or removal of damaged LWD structures.
- 4) Establish a protocol for communication between the proponents of LWD structures and the paddling community during planning, installation and monitoring.
- 5) Establish a set of guidelines, and a protocol for planning to be used by proponents of LWD structures, which documents consideration of in-stream users when developing LWD structures.

Instream users frequent most of British Columbia's creeks and rivers. Whitewater paddling is growing quickly, and more and more paddlers from across Canada and around the world are travelling to British Columbia to enjoy the richness and diversity of our river systems. The abundance of recreational use on waterways in British Columbia reflects the important social and economic values linked to river use.

The paddling community wishes to contribute to safer and more people-friendly LWD structures, and to work to eliminate poorly designed or poorly located structures. A legacy of poorly implemented structures is debris which can be extremely hazardous, ugly and very difficult to remove, sometimes accumulating in areas that are impossible to access with machinery. LWD structures can be a hazard not only at the time of placement, but may also remain, or change into hazards, in the future. The potential value of installing in-stream LWD must be weighed not only on its costs and its likelihood of success, but also against its potential negative impacts on the navigability of the waterway, and the potential impacts to human life.

The paddling community views many of the installations of LWD as unnatural; this is so due to the location of the structures, the positioning of the structures, the construction, and the materials used. There is a documentable difference between many of the LWD structures, and natural wood in streams. As such we believe these structures must be treated as introduction of unnatural debris on waterways, and that the agencies responsible for their introduction should be accountable for the structures post-construction.

Potential Hazards of LWD Structures to River Users

The single largest hazard to paddlers on British Columbia's streams or rivers is wood debris; in the form of logs (especially with branches), log jams, or root balls. Unlike boulders or other bedrock, wood tends to produce a serious threat to paddlers who are unfortunate enough to come in contact with it. This is well documented in paddling accident records and is one of the major causes of deaths in paddlesports.

Wood debris tends to perch above the riverbed such that there are opportunities for a person to be swept under it by the tremendous force of the water. Attempting to pull one's body up and on top of the debris is extremely difficult, and rarely possible, even in a weak current. Similarly, when wood debris consolidates into log jams, it creates sieves which allow water to pass through while straining and retaining objects underwater; potentially kayaks, canoes, paddlers, or swimmers (paddlers forced to exit from their boat). Either of these above scenarios results in extreme entrapment hazards in which a person may be pinned underwater by the force of the current, resulting in potential death due to drowning.

In whitewater safety training, wood debris is stressed as the greatest hazard that is likely to be encountered on most rivers. Given that this is a known and documented threat to human life, the paddling community has clear concerns regarding the intentional introduction of these structures on streams or rivers, particularly since LWD structures have a history of migration in the river, producing unpredictably changing hazards.

Suggested Process

1) Identifying River Users

British Columbia is a popular destination of Canadian and international whitewater paddlers, it is important to consider the potential impacts of any LWD programs on the greater paddling community. It is also important to communicate and cooperate with the provincial organizations, which represent the broad interests and needs of paddlers.

The proponents of a LWD project need to identify which type of recreational activities are practiced on a proposed river. The best way to identify recreational river usage is to contact the paddling associations directly. Both organizations have designated coordinators or contacts, and regional representatives that will have information on key aspects of the use in the area, items such as:

- Who uses the river (experts, novices, etc).
- What type of craft (typically kayakers, canoeists, rafters, swimmers, anglers, and tubers)?
- Where the normal access points are (referred to as put-ins and take-outs).
- When and why that river, or section of river, is used.
- How popular the river, or reach of river, in question is.

Being frequent travellers on rivers, the paddling community possesses experience-based information on water levels, bank stability, rock migration, natural debris accumulation, fish habitat, and many other valuable observations that may be of assistance.

Whitewater or canoe tripping guidebooks and websites may have good general information on river usage, but are frequently out of date and do not include many of the now popular runs or access points. Guidebooks or websites should not be used as anything other than a general indication of potential use, and most certainly should not be a substitute for dialogue with the provincial associations.

2) Protocol for communication regarding potential LWD Structures

If a LWD project is proposed on a navigable waterway in British Columbia, the paddling community, through the provincial associations, need to be notified and provided opportunity to participate in constructive dialogue regarding the location and construction of any LWD structures. **We believe consultation with instream users before placement of structures is critical.**

Below is a suggested process to follow:

- A. Transport Canada, Navigable Waters, informs proponents of the requirement to consult with the paddling associations regarding LWD structures proposed on navigable waterways.
- B. Transport Canada, Navigable Waters, informs the paddling associations of any proposals.
- C. The paddling associations inform Transport Canada, Navigable Waters and the Proponents whether the river is currently used by the paddling community or has the potential to be used in the future.
- D. If the river is, or potentially will be, used by the paddling community, all potential ways of restoring habitat should be considered so as to determine if LWD structures are the best possible alternative for enhancing fish habitat.
- E. Plans are sent to designated representatives of the paddling community, and communication occurs early in the process.
- F. Representatives from the paddling community meet with the Proponents early in the planning stage.
- G. On site meeting occurs to review plans and provide input, before construction begins.

- H. Designated paddling community representatives are invited to view construction and finalization.
- I. Paddling community endorses construction to Navigable Waters.
- J. Proponents create signage and work with the associations to create awareness within the paddling community of the structures.
- K. Proponents create a monitoring plan to detect damage in a timely fashion and commit to a program for repair or removal of hazardous structures or components.

Location of Structures

Selection of LWD sites must not only be based solely on ease of access, construction requirements, or thoughts related to fisheries issues, but also upon consideration and understanding of in-stream use. The location, in a general sense, and in a more specific definition, can be done so as to minimize the potential affects on river users.

1) General Location

In choosing the general location of the project, or a particular reach of river, the following factors regarding the recreational use of the river need to be considered:

- Popularity of the reach with instream river users
- Is the run currently utilized by instream users, or might it become utilized in the future.
- The skill level of instream users who normally utilize the stretch of river
- The presence of play features, or other features which might attract instream users.
- Are festivals, competitions or other events held on the stretch of river?
- Are there commercial operations (guiding, rafting, instruction, coaching, etc) which occur on the reach?
- In the event of a structure failure with debris washing downstream, what is the character of the river downstream? Will debris be easily recoverable? Will it affect popular runs? Can it become a hazard in areas that are difficult to "scout", such as in a canyon?

2) Surrounding Topography and Shoreline Character

The shoreline and surrounding topography of the structure locations can affect access and safety considerably. Consider the following factors:

- The structures should never be in or near a canyon or any area with difficult egress.
- Paddlers should be able to easily and safely exit from their boats in an area of calm water (eddy) upstream of the structures, either to scout the structures or portage around them.
- Gentle shorelines with access from both sides allows for greater rescue and/or portaging options.
- Stability of exit points upstream of any structures is important at time of construction and in the future.
- Potential debris accumulation which might compound the affect of the structure on instream users should be considered when choosing locations.

3) River Character

It is critical that the character of the river is evaluated at all water levels. With changing flows, features often change dramatically, disappear, or new features may appear creating hazards. Consider the following:

- Is the riverbed and bank stable?
- Does the channel shift course regularly?

- Gradient directly affects current speed and the ability of a paddler or swimmer to reach safety. Narrow channels accelerate flows and increase the difficulty for swimmers or paddlers.
- The flow regime of the stream will contribute to the potential affects on river users. Consider factors such as:
 - Seasonal flow variations
 - Dam control, and releases
 - Moderation of upstream lakes
 - Possible winter flooding issues
 - Normal water levels for paddling use

4) Instream site-specific location

Thoughtful placement of the structure can greatly reduce the risk to the paddler as well as the long-term durability of the structure. Consider the following:

- Choosing locations where river users are less likely to be swept in the event of an upset or a swimmer in the water. In general, better locations are the inside of corners, in areas with easier rapids or calmer areas upstream.
- Locating structures on a straight stretch of river is the safest option. When a river curves around a bend, the current is forced to the outside of the bend, often with greater force and velocity. Boats, swimmers, and debris would thus be directed into structures at such locations as the norm, and fighting the current would need to occur to avoid the structure, for either navigation, or for swimmers.
- Considering the long-term durability, the outside of a bend is generally an unsuitable place for LWD. The durability of a structure in such a location is questionable given the tremendous forces any LWD structure in such a location would be subjected to during high water events. Collection of other debris onto the structure will also magnify the forces involved.
- Choosing locations which allow for adequate sight lines for any paddlers who might descend toward the structure provide increased opportunity for avoidance.

Construction of Structures

The following identifies key safety concerns which instream users know through experience produce hazardous conditions when they are present, either naturally, or otherwise. In general these conditions are associated with life threatening circumstances of a paddler (in a boat) or a swimmer in the water experiencing difficulties which are not usually resolved without outside assistance (entrapment, pinning, and broaching). Removing these conditions leads to less hazardous situations for river users. These hazardous conditions include:

- 1) Undercuts on the upstream faces of any structures. These undercuts promote submersion of any object floating in the water, including boats or people, should they contact the object in question.
- 2) Rough, sharp or porous upstream faces increase the likelihood of entrapment, pinning, or sieving of objects which come into contact with face.
- 3) Open spaces which allow water to flow through dramatically increase the likelihood of hazardous incidents, and the masking of these sieves by higher flows further increases their hazardous nature.
- 4) Restriction of the stream channel, particularly if manoeuvring is required to negotiate the channel, increases the difficulty of navigating the channel, and also increases the potential consequences if navigation is not successful, by introducing sequential obstacles.

5) Cables or other metal articles in a stream exponentially exacerbate the potential for an incident. These objects are strong enough to lodge where other debris would be removed by the current, are difficult to identify as they produce little or no cushion or other indications of their presence, and produce voids which allow for straining of objects, including paddlers or their craft.

Communication during the Period of Construction

Cooperation during the period of planning and construction, between paddlers and builders of LWD structures is necessary to ensure that conditions hazardous to instream users are avoided. Details including maps and schedules should be made available to the paddling community through email, website, signage, letters, or whatever means are appropriate. Alternate access points in order to avoid the area of construction may be part of the discussions in order to avoid hazard or conflict.

Informing River Users - Post Construction

Once the structures are in place, a thorough process to inform river users must also be in effect. Delay between the construction of the structures and the circulation of information on the hazards increases the likelihood of incidents. The communication should include:

- Maps indicating the location of the structures and clearly indicating which area of the river they occupy, in electronic form for easy distribution.
- Warning signage on the riverbank upstream of the structures, and at popular access points.
- Contact information of persons involved in monitoring.
- Digital photos of the structures.

Monitoring of Structures - Post Construction

One of the greatest fears of the paddling community is that the structures are not monitored regularly enough to detect failures in a timely manner. This could result in a new hazard at the original site, or in the event the debris is washed downstream, at an unknown and unexpected location downstream. For example, a structure on an easy run breaks free and washes downstream and becomes lodged somewhere in a more difficult run.

Some suggestions for the monitoring of structures are:

- numbering of the structures so each can be easily identified and reported upon.
- a thorough check of structures after significant high water events.
- regular checks during spring runoff or during rainy season.
- the proponents keep a log of when checks have occurred and a photographic record of the condition of the structures, and are held accountable by a regulatory agency.

Repair or Removal of Damaged Structures

A systematic process needs to be in place to deal with repair or removal of damaged structures which produce hazardous conditions for instream users. The following is a proposal for such a process.

- 1) Routine monitoring occurs to detect damage to a structure in a timely manner and a timeline and distribution list is established for the circulation of monitoring reports.
- 2) Paddling community and Transport Canada, Navigable Waters are immediately notified of the failure.

If the structure, or its components have broken free and migrated downstream:

- a) The location of the debris must be determined immediately and assessed for potential hazard. The paddling community must be part of this assessment of hazard.
- b) Any debris that is determined to be hazardous must be removed as soon as possible. Of particular concern are cables, or pieces of wood which are connected by cable.
- c) The incident must be documented.

Conclusion

This document cannot contain information for every circumstance that may arise. A willingness on behalf of all parties to use common sense and good communication should bring satisfactory resolutions to most situations not addressed herein. The RCABC and WKABC wish to express their willingness to work cooperatively with proponents, and urge them to freely contact us with any concerns or comments.

We feel strongly that the construction of LWD structures in recreational waterways is potentially extremely hazardous. While efforts can be made to minimize these hazards, poorly planned introduction of these structures is a not a matter of a potential incident, but of when such an incident will occur. As has been documented on numerous occasions, wood in the river is a very serious contributor to accidents on the river. Worse, it is the source of migratory hazards whose potential impacts are often compounded.

The wide variety of recreational use of waterways, varying skill levels and craft type, the wide variations in flow regimes, climates, seasonal variations in flows varied topography, and river morphology, all contribute to a complex scenario of use. While the suggested guidelines above address many of the issues, only prior consultation and accommodation of knowledgeable inputs from river users can contribute to a reduction of hazards from any LWD installations.

Contact Information

Recreational Canoeing Association of British Columbia (RCABC)

Website: www.bccanoe.com
Email: environment@bccanoe.com or president@bccanoe.com

The current (April 2005) environment director's name and contact information is:

Roger Warnatsch
905 Berkley Road
North Vancouver, BC
V7H 1Y3
Phone: (604) 929-2349
E-mail: environment@bccanoe.com

Whitewater Kayaking Association of British Columbia (WKABC)

Website: www.whitewater.org
Email: RiverWatch@whitewater.org

The current (April 2005) person responsible for handling the communication on such matters is:

Stuart Smith
River Projects Coordinator
PO Box 5537
Squamish, BC
V0N 3G0
Phone: (604) 815-4113
E-mail: RiverWatch@whitewater.org