

Sol Duc River drowning, Nov. 13, 2006 at Highway 101 bridge west of Sappho.
WSDOT Bridge 101/314 at milepost 203.15.

2009-0367
Handout from Judy Filipe



View of log jam from the bridge. Note square ends of upright logs and their fresh appearance. The blue object in the center is the victim's wet suit.

Nov. 13, 2006 Clallam Co. Sheriff's photo.

**Sol Duc River drowning, Nov. 13, 2006 at Highway 101 bridge west of Sappho.
WSDOT Bridge 101/314 at milepost 203.15.**



Note horizontal log with square cut end and root wad to the left, upon which the victim was trapped. The longer horizontal softwood log cabled to the horizontal log at the time of the drowning is absent.

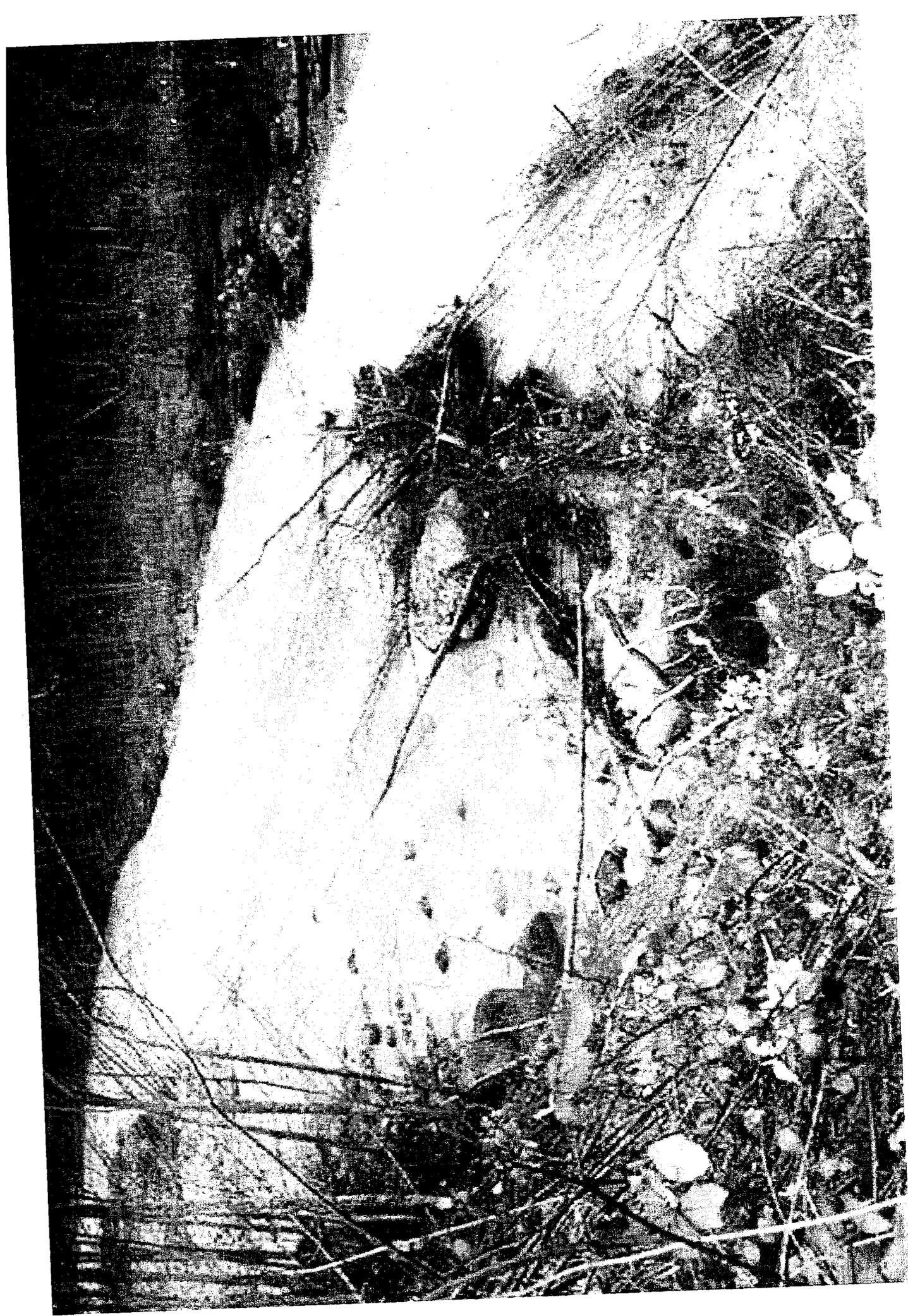
Photo by Merle Watson.



South Fork, Snoqualmie River
The current at the outside bend of a river will sweep people and debris in the water toward this DDES approved project.



South Fork, Snoqualmie River
Close up of the sieve created by a LWD project (low water view)



Raging River
This bank stabilization project in the main current approved by DDES encroaches where summer inner tubers float.

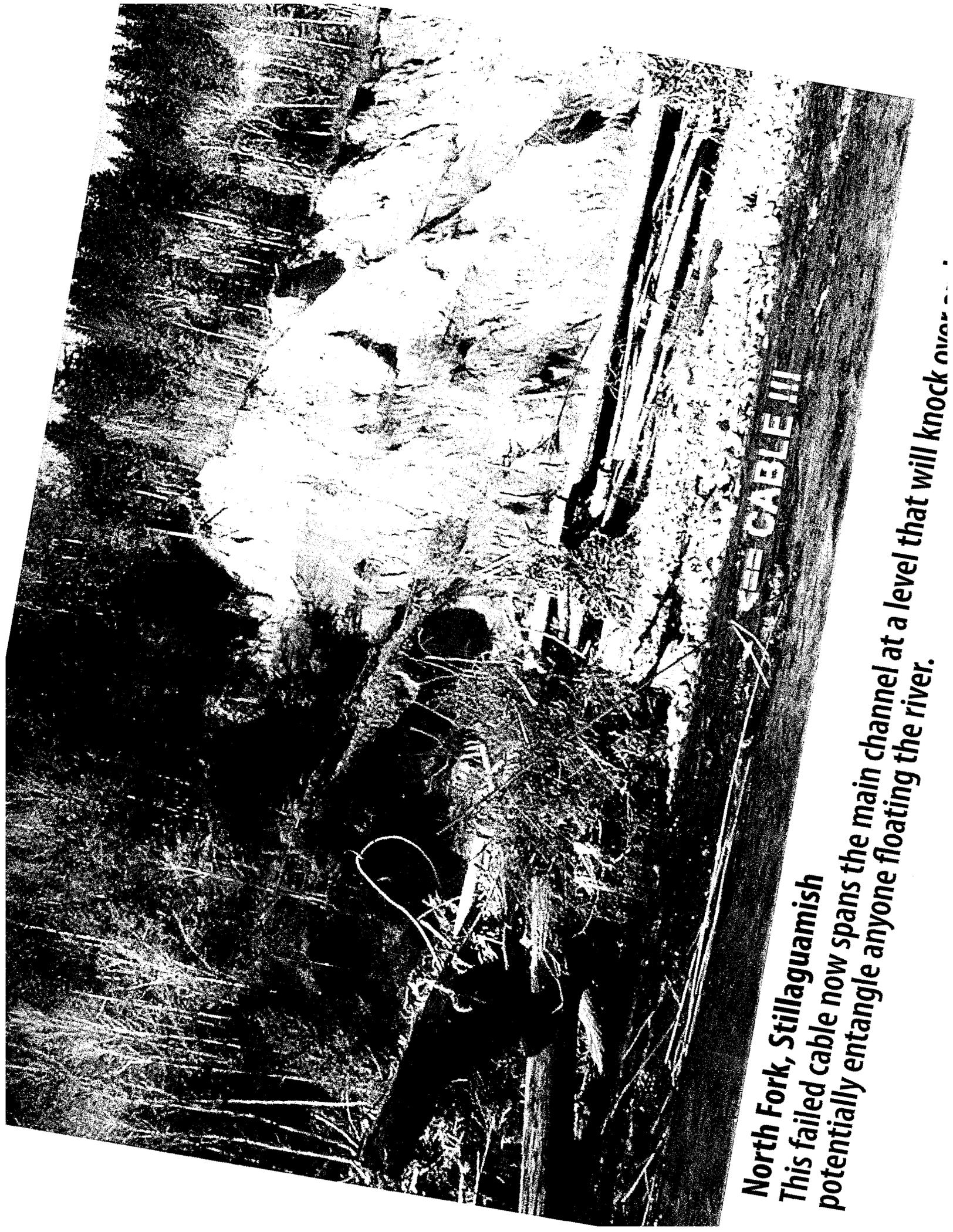


Skykomish River

This tree with rootwad protruding over the river can knock over a boater or inner tuber at low water. At higher water, it can trap them in the pocket beneath the wood.

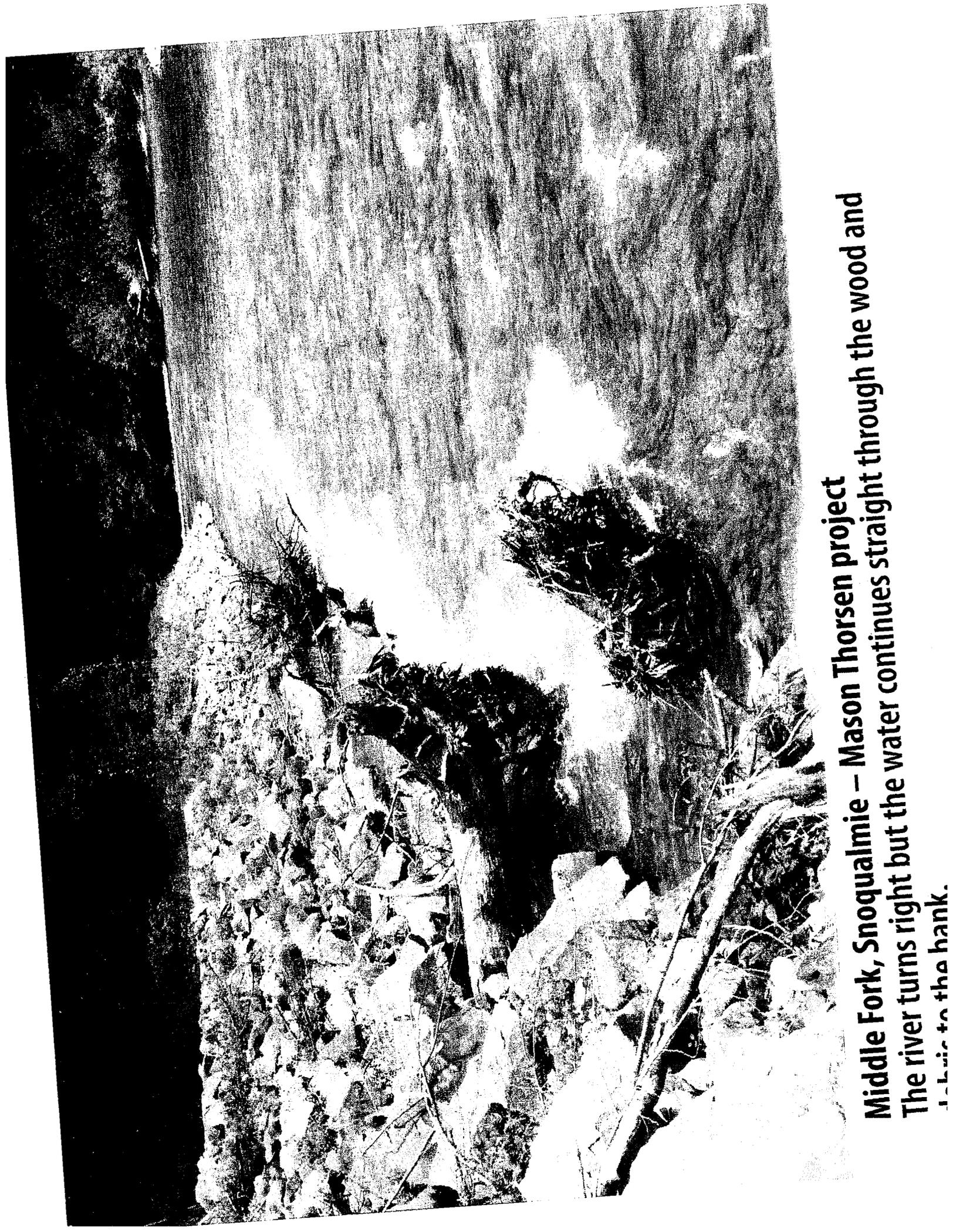


North Fork, Stillaguamish
Large cables are commonly used to secure wood projects.

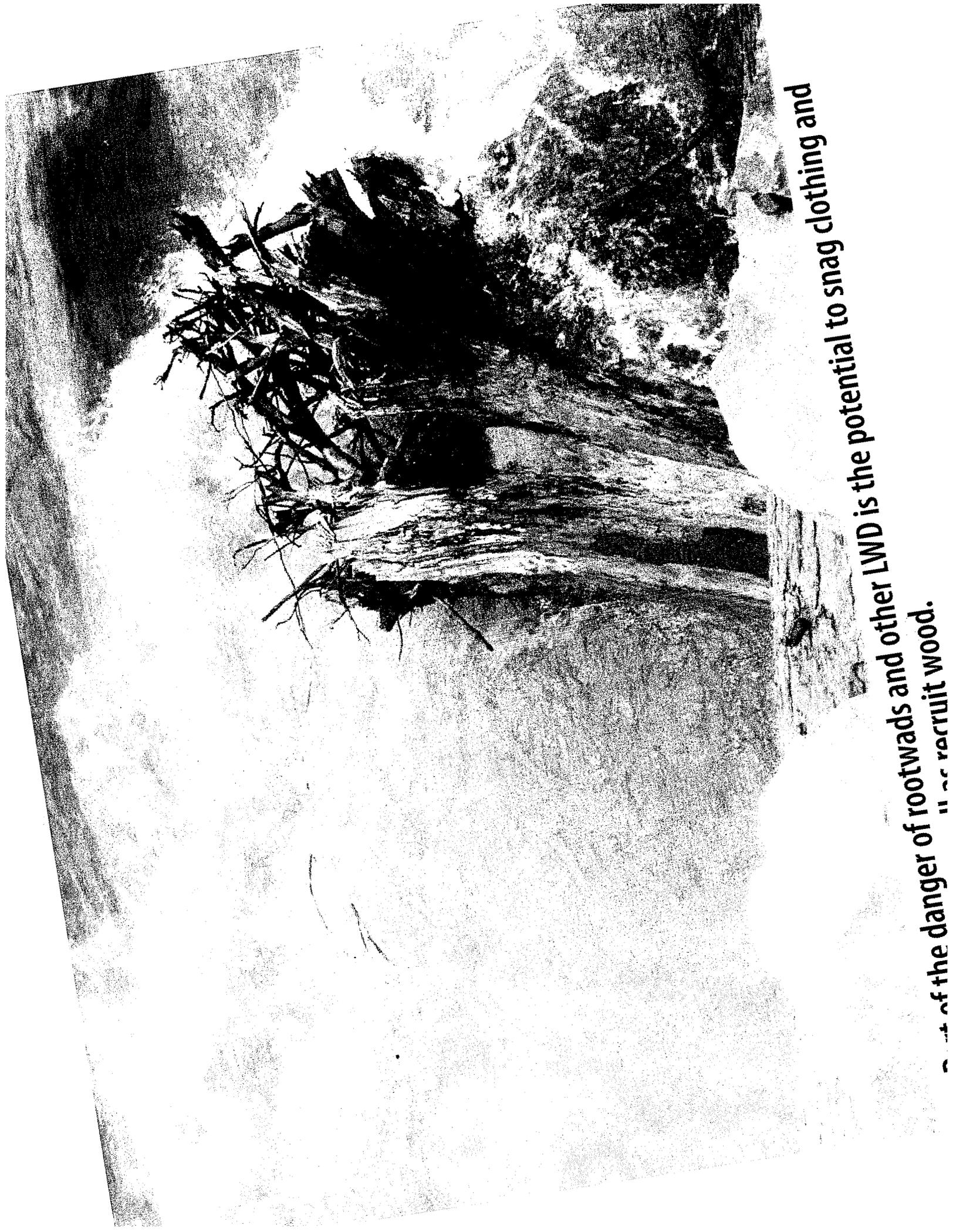


SEE CABLE III

North Fork, Stillaguamish
This failed cable now spans the main channel at a level that will knock over anyone floating the river.



Middle Fork, Snoqualmie – Mason Thorsen project
The river turns right but the water continues straight through the wood and
to the bank.



... of the danger of rootwads and other LWD is the potential to snag clothing and
... recruit wood.

2009-0367
Handout from
Judy Phillips

River Safety Council

September 16, 2008

Councilmember Larry Phillips
Councilmember Larry Gossett
Councilmember Reagan Dunn
Councilmember Jane Hague
Councilmember Dow Constantine
King County Council
Growth Management and Natural Resources Committee
516 Third Avenue, 10th Floor
Seattle WA

Dear Councilmembers:

Thank you for hearing the concerns of our organization and other citizens regarding the need for safety in construction in rivers. The King County WLRD Rivers Section has addressed many of the protocols we believe are important to improve safety in river construction.

We responded to the WLRD Report Addressing Public Safety in Placement of Large Wood in King County Waterways that focused largely on protocols. (March 25, 2008 copy attached)

We appreciate your inquiring further about safety recommendations. We urge you to consider the following:

Placement of large woody debris, and LWD construction for fish habitat restoration can and should be required to be constructed so as not to endanger the public. Nor should dangerous public construction result in depriving river users of the recreational opportunities afforded by our many fine rivers and streams.

We believe it is not only possible, but relatively straightforward to build projects in rivers that protect banks, provide wood for fish enhancement, and ensure public safety. This may entail using rock for the structure and wood for the fish enhancement in another, safer location.

In many or most cases, fish mitigation in rivers can be placed directly across the river from the structures that are being built to prevent or repair damage to levees on the outside bend of a river.

Identify the hazards

Hazardous types of construction

Use of LWD should not include:

- Structures that have openings large enough to entrap hands or feet
- Rootwads and brush in places that the current allows them to function as a sieve or strainer, or close enough to the main current that they snare people and objects
- Wood set adrift by unsecured dumping. It should be placed and anchored where it is desired so it doesn't endanger river users, levees and other construction.

Hazardous locations

Placement of rough, sharp or porous LWD or other construction material should be specifically excluded from:

- Outside of bends where the river current may push users into structures
- Projects in or immediately adjacent to the main current of straight stretches, or other locations in the current where river users may be swept into the project
- In restricted channels
- In canyons or other areas where egress is difficult or impossible
- Overhanging a stream at a level that would pose a threat to river users swept under it
- Projects that impact a significant portion of the river channel
- Sequential projects where the combined effect exceeds the individual risk

Safer locations for LWD placement:

- The inside of river bends where the current is slow
- In eddies and slack water where the current is slow
- Behind large obstacles that deflect the current
- In shallow side channels

Safer techniques:

- Shield LWD with deflector rock or smooth wood in front of entangling wood.
- Pull the ends of the rootwads and LWD significantly closer to the bank behind the deflector so tendrils don't snare anyone or anything in the current
- Deflector rocks or wood should be high enough to break the surface of the water to prevent inadvertent public exposure to the project

With the exception of the shiplapped, (also referred to as shingle-lapped) log structures parallel to the river bank in the lower Green River, wood structures that pose a significant risk to river users are still being constructed.

Rivers and streams affected

Safety measures should apply to any stream or creek with an appreciable current flow without regard to known use by river users. The extent of river usage can never be fully known. However, often inexperienced youth on inner tubes and other minimal floatation devices are frequent users of our streams throughout the state.

The list of rivers used for recreation developed by WLRD is incomplete.

Design requirements

Projects should be designed, and installed under the supervision of licensed engineers who have a professional requirement for public safety.

Furthermore, a project designed by licensed engineers should not be modified by non-engineering licensed individuals who have no legal requirement for public safety. All modifications to a project should be approved by the responsible design engineer or another licensed engineer with competency specific to the type of project.

Monitor regularly and modify existing projects as necessary

A large number of existing LWD projects on King County rivers pose a risk to unway river more than 10 years after Hearing Examiner R. S. Titus required specific safety measures (attached). Some of these projects were constructed in dangerous locations, and with dangerous characteristics that the Boater Safety Advisory Committee (now River Safety Council) warned against.

Revise existing guidelines and adopt best practices

Revise King County web site and design manuals to eliminate dangerous procedures such as those shown in Figure 7.16 (page 7-24) and Figure 8.11 (page 8-27) in Guidelines for Bank Stabilization Projects dated June 1993.

Adopt appropriate standards from the Natural Resource Conservation Service, National Engineering Handbook, Part 654, Stream Restoration Design, Technical Supplement 14J, which recommends limits on wood structures in streams with gradient similar to many of those in Western Washington.

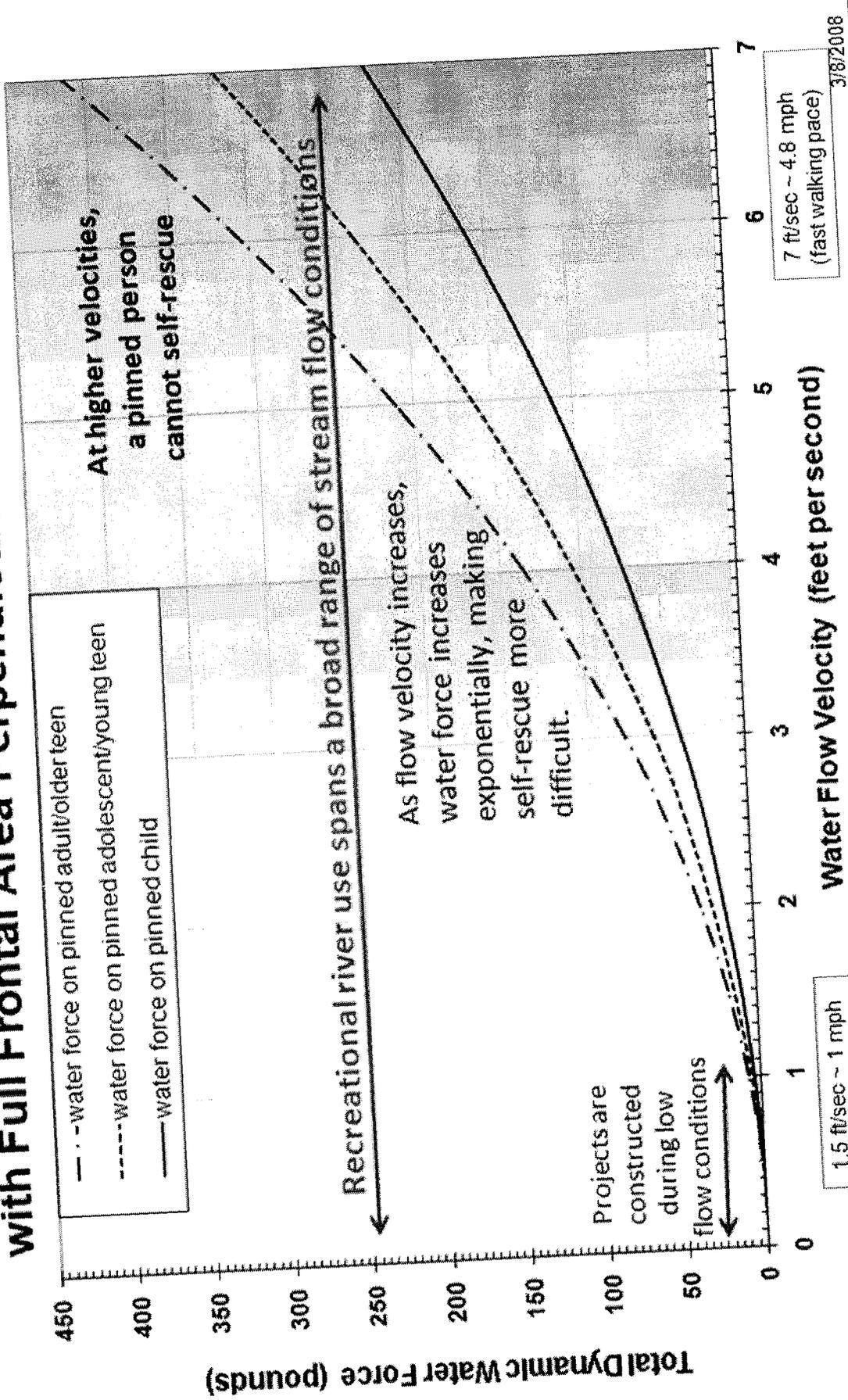
Require all construction within County jurisdiction to the meet the same standards

If expertise does not exist within all departments constructing, approving, or supervising projects in rivers, it is doubly important that standards be clear, mandatory and uniformly enforced.

Thank you for the opportunity to provide specific information for your consideration. Please do not hesitate to contact me if we can provide further information or clarification.

Judith Fillips, Chair
River Safety Council
3405 SE 7th Street
Renton WA 98058
425 228-1784

Total Dynamic Water Force on a Person Pinned with Full Frontal Area Perpendicular to the Flow



3/8/2008

These calculations, provided by the River Safety Council as illustrative of the magnitude of flow induced loads affecting pinned persons, do not replace and can not be used in lieu of licensed engineers performing appropriate calculations to assess risks associated with human designed structures placed in rivers.

Flow Load Calculations - Background

- Flow loads pinning a person against an obstruction in a river are a function of water velocity, water density, shape of the person, body position, area of the body presented to the flow, and clothing worn.
- Because there is a broad range of possible pin positions, body shapes, clothing worn, and flow conditions, there is no single solution for the range of possible pinning load on any one person.
- The calculations presented represent lightly clad persons, fully submerged, and pinned flat against a root wad or other structure.
- Data to calculate body surface areas and determine geometry characteristics necessary to calculate drag coefficients come from:
 - *Physical Characteristics of Children As Related to Death and Injury for Consumer Product Design and Use*
Highway Safety Research Institute, University of Michigan, UM-HSRI-BI-75-5, Final Report, 31 May 1975
 - *Military Handbook: Anthropometry of U.S. Military Personnel*
US Department of Defense, DOD-HDBK-743A, 13 February 1991