

Technical Tip

The Evolution of Equipment for Crew Based Projects

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The instream portion of Nimpkish River Enhancing Environmental Values Program (EEVP) began in the fall of 1995 with Overview and Level 1 assessments of Kilpala, Lukwa, Davie, and Yookwa sub-basins. Instream construction followed in 1997 after the approval of Level 2 prescriptions. Since 1997, six hundred and twenty-nine individual structures have been built at forty-two sites in eleven sub-basins. Many of these structures were built by crews working without excavators or other heavy machinery.

At remote or inaccessible sites the crew constructs large woody debris (LWD) structures more efficiently than heavy machinery. They pack their equipment to the site on a foot trail, eliminating the need for a tote road for machine access. This minimizes impacts on the surrounding riparian forest and increases the portion of the overall budget spent directly on the structures.

A primary objective of the EEVP in the Nimpkish Watershed is to create local employment, which is best accomplished by constructing structures without heavy machinery. Figure 1 shows the size of wood and quality of work in crew-based projects. This particular structure cost \$3,000 to build, with 10% of the cost consisting of helicopter charges to fly anchors to the structure.



Figure 1. A LWD structure constructed by crew labour, supported by helicopter.

The labour crew works by rearranging on-site LWD, reorienting LWD carried to the site by heavy machinery or by moving LWD into the channel from the surrounding riparian forest. The crew packs hand tools into remote sites: the main piece of equipment that the crew uses to move wood is a chainsaw winch. Crews have now used three different winch systems, as outlined and compared in this Technical Tip.

In 1997 the crew used a portable hydraulic winch and “A-frame” supported by a Lewis winch attachment for chainsaws to move wood. The hydraulic winch system had many drawbacks such as:

- The winch, timbers for the “A-frame” and main line were heavy to pack into the site by hand. Often, they were delivered by helicopter.
- Once on-site, the system was cumbersome and time consuming to set-up.
- The winch could only pull along the axis of the main line with a small deflection to each side provided by the choker line. Consequently, the winch had to be set-up for each structure.
- The main line was strung by hand between the A-frame and a large tree on the opposite bank, leaving sag in the line and little vertical deflection. A “Come-along” was used to reduce the sag.
- The main line strung between the “A-frame” and riparian tree provided the support for the lift of the choker line, reducing the capacity of the winch.

The hydraulic winch was best suited to sites with high banks and good riparian trees where a lot of work was required at one spot in the stream. Unfortunately, this is not usually the case in the Nimpkish Watershed.

In 1998, the crews adopted the Lewis Model 400 winch attachment for chainsaws without the portable hydraulic winch. The chainsaw winch had the following benefits:

- It is light and easy to pack into a site.
- It had a 2 ton straight line pull capacity, more when double blocking was used.

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- It is easy to set-up; straps to attach the saw to a riparian tree, blocks to increase the effective pull and direction of pull and choker cable for the log are all that are required.
- The varied angles of pull provided by the blocks allowed the winch to be used to construct more than one structure from each set-up point. The ease of set-up increased the crew's productivity.
- Lighter loads could be pulled at 80 feet per minute, which was much quicker than the hydraulic winch.

There were some problems encountered with the Lewis Model 400 winch. Chronic breakdowns occurred when an integral keyway would break due to a heavier strain and greater workload than the winch was designed to produce. The small drum could only hold 150 feet of $\frac{3}{16}$ inch line, limiting the pull distance. Extension lines and re-rigging were used to lengthen the pull distance leading to line fouling. Basically, the problem with this winch is that it was not designed for heavy, steady use.

As a result, a Zollern winch attachment for a chainsaw was used in 1999 and 2000 (Figures 2 and 3). This winch had the added benefits of:

- An unlimited capacity capstan drum. The haul mainline is wrapped five times around the drum and is coiled on the ground or in a self-spooling line cage attached to the winch. Because the line is not held on the drum, the drum capacity does not limit the length of the cable that can be used. This eliminated the need for extension lines at all but the longest pulls.
- Heavier construction and quality workmanship reduces breakdowns and increases the size of wood that can be moved.
- While rated less than the Lewis winch, a 1.7 ton pull capacity on slow mode or 0.45 ton pull capacity on fast mode, we have found that the Zollern winch is able to pull these weights without breakdown for long periods of time. We recommend double and triple blocking on all heavy pulls.
- We are very satisfied with the performance of the Zollern winch and highly recommend it for any crew based instream project.

We found the Zollern winch was available through Challenger Chainsaw Services Ltd, (604) 857-5334 or other chainsaw distributors.



Figure 2. The Zollern winch with line cage and chainsaw attached.



Figure 3. The Zollern winch without the line cage in the back of a pickup truck.

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