

The Use of Draft Horses in Watershed Restoration

Steve Trask and Bruce Reininger

Editor's Preface:

The above article is in keeping with a recent Forest Renewal BC initiative to provide the Cariboo Horse Loggers Association with \$96,580 to train 15 people in selective harvesting techniques using horses. Horse logging is an alternative harvesting system, especially useful in sensitive areas where traditional logging methods are not possible. In a news release in May, Forest Renewal noted their support for alternative harvesting methods - especially those which meet their investment priorities of creating more jobs from each tree cut and providing training for forest sector workers. The Watershed Restoration Program receives its funding from Forest Renewal and shares as one of its major goals the creation of jobs which benefit forest-dependent communities.

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The use of draft horses in watershed restoration work provides another available tool for resource managers. A number of activities can be effectively and economically carried out using draft horse power including: building instream structures (Figure 1), tree movement (e.g., in areas needing thinning or dominated by alder), and hauling woody debris or boulders to restoration sites. The following are the main advantages to using draft horses in riparian work.

- Material can be deftly manipulated with minimal impact to the sensitive riparian zone and stream channel.
- Since the horses are much lighter than heavy machinery, soil and bar compaction is minimal.
- Larger tote roads are not necessary so little removal of trees is necessary; a width of seven feet is enough for a team of two horses (Figure 2).
- Instream structures can be assembled with little entrance of the horses into the channel, thus substrate disturbance and sedimentation are minimal.
- No threat exists of oil leaks from machinery.
- Remote and roadless areas can be accessed.
- Draft horses are powerful and capable animals.

Rates may be competitive depending on the specific restoration context and the inclusion of environmental costs of heavy machinery use:

1. on flat ground a team of two draft horses can pull approximately their own weight, i.e., 3-4,000 pounds; and
2. approximately four to six structures of average size can be placed within a day.

Oregon Horse Power, LLC (OHP) has been involved in watershed restoration projects for four years. We are a group of four people, two fisheries biologists and two draft horse teamsters. We generally work in fourth order and smaller streams, typically with some riparian canopy consisting primarily of alder. Many



Figure 1. When it is necessary to work instream or beside the channel, draft horses causes relatively less physical disturbance of the streambed and banks.



Figure 2. Skid trails can be narrow, allowing minimal damage to the riparian zone.

Feature

streams are deeply incised such that the stream, even at high flows, may not make contact with the old flood plain, thus preventing dissipation of stream energy. A lack of large woody debris (LWD) results in straight reaches with high water velocities in winter. Stream substrates range from bedrock to very high sand and silt loads. The general lack of woody debris of all sizes has resulted in poor quality overwintering habitat such as appropriate cover and backwater areas for juvenile salmonids. Providing winter habitat for coho is one of our main objectives since it has been identified as the limiting factor in most coastal watersheds.

For instream work, the hauling system we have developed typically works like that described in a previous issue of *Streamline* (*Technical Tips, Vol 2 No.2*). A series of blocks or pulleys are set up on trees near the stream channel, often with the line crossing the channel. In this way the horses pull the particular log in place without actually having to be near the banks. (OHP has produced a video which best demonstrates structure placement. Contact OHP directly to obtain it, or *Streamline* if you wish to borrow it.)

Although horses are capable of moving some very large logs we find our greatest efficiency in skidding and manipulating logs with basal diameters of 60 cm or less. Heavier logs can be moved in the following ways:

- a logging arch designed to lift one end or fully suspend logs up to 1 m diameter
- a quick hitch multiple block system to increase mechanical advantage, and
- an array of load-evening devices that provide quick access to an additional horse team.

Other limitations include excessively steep ground (i.e. uphill skids), and transport of huge logs. Draft horses are especially suited to work in lower order sections of drainages.

Through our ongoing restoration work, we have been developing an approach which is particularly suited to the horses' capabilities, and highly productive in terms of fish habitat. The result of pre-commercial thinnings in upslope areas is a ready supply of smaller trees and coarse woody debris, referred to here as PCT. OHP has experimented with construction of structures made up of this debris as a foundation for a multiple log complex. Six to eight young firs 10 - 20 cm in diameter, 9 - 12 m long and preferably freshly cut are incorporated in bundles below and above a multiple log structure. This highly branching material functions to catch almost every form of organic and inorganic transient material being transported through the system during fall-spring flows. Thus it is effective when combined in structures with LWD, since it

hastens the process of debris accumulation with consequent benefits (Figure 3).



Figure 3. This full spanning structure incorporates PCT and was designed to flood adjacent low lying areas. The small woody debris was caught after just two storm events.

LWD complexes are not cabled into place. They are keyed or 'woven' into adjacent alders, conifers, or boulders, which function to stabilize the structure at high flow. Heavy manila rope (1.6 - 1.9 cm) is sometimes used rather than cable to tie logs together and tie to anchor trees growing on the banks when there is a possibility of structure movement at high flow. The use of rope is consistent with our 'low impact' approach to watershed restoration. The rope will eventually decompose but it has lasted up to four years instream. In the smaller systems we work in, it functions long enough to permit the structure to become well entrenched. The pieces of LWD can form the foundation for many additional pieces of PCT and the natural recruitment of small wood (Figure 4). (*Editor's*



Figure 4. Upstream view of a full spanning structure with PCT and recruited small woody debris.

Feature



Figure 5. Downstream view of the same structure (Figure 4) which has backed-up water to form a pond.



Figure 6. A four-PCT bundle tied to a root extending from the stream bank. Note the deposition of fine material after only half of the winter season had passed.

note: The WRP generally uses cable attachments because of concerns about long-term cost-effectiveness and downstream liability, with the exception of smaller streams as shown in some of the Figures here).

Highly complex, full-spanning jams utilizing combinations of small and medium size wood are placed at some sites where they will cause the water to back up and flood low-lying, off-channel areas, thus they function to reconnect the channel to its flood plain as well as create slow water habitat. A full-spanning structure which includes PCT will typically act like a beaver dam by backing water up into low-lying areas; the more debris caught, the more water is backed up (Figures 3,4, and 5). In addition, some biologists have suggested that the retention of organic material can contribute to the overall condition factor of

overwintering salmonids, increasing their fitness for the spring migration.

A final example of the use of PCT is in silt deposition and potential bar creation (Figure 6, and see the *Feature* article on bar stabilization this issue).

The tradeoffs in terms of the durability and stability of the structure is compensated for by low cost and often immediate benefits. PCT is generally very accessible and can often be obtained at no cost other than yarding and trucking. One horse can quickly and efficiently gather it with no impact to the stand. Up to 100 pieces/day/horse can be lopped and skidded for bunching and incorporating into a log complex. Depending on their placement, the resultant structures may function within the first winter to provide cover, to backwater adjacent areas of the floodplain for overwintering coho habitat, or deflect the stream channel in order to avoid unstable banks or increase channel meander.

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New Streamline Editor

I would like to inform our readers that this issue is my last as Editor of Streamline. I have enjoyed the challenge of creating and editing B.C.'s Stream Restoration Technical Bulletin as well as the many contacts I have had with people involved in the WRP. I am currently pursuing my Doctoral degree in Resource and Environmental Management at Simon Fraser University and unfortunately cannot continue my role as editor, although I will continue with limited input. I would also like to welcome the new editor of Streamline, Donna Underhill, who comes to the job with a wealth of relevant experience. We continue to request our readers' feedback including articles, or suggestions for them, project descriptions (with relevant photos and drawings), as well as information for our "Update" section. Information related to hillslopes and/or riparian silviculture should be sent to:

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