

PROJECT SUMMARY

Ecosystem
Management

Forest Productivity

Public Involvement

Adaptive
Management

The ecosystem management component of the Morice & Lakes IFPA has embarked on several projects that assess biodiversity, ecological attributes, and fish and wildlife habitat. These projects will provide important ecological data that will be used in learning scenario development for the IFPA's Sustainable Forest Management Plan.

Results of Operational Trials to Manage Coarse Woody Debris in the Northern Interior



Fraser Lake Sawmills



Introduction

Coarse Woody Debris (CWD) is defined as "dead woody material, in various stages of decomposition, located above the soil, larger than 7.5cm diameter and not self-supporting" (MoF and MELP, 1998). It plays several major roles in forest ecosystems, including maintaining forest productivity, providing habitat for vertebrates and invertebrates, contributing to soil and slope stability, and providing long-term carbon storage (Stevens, 1997).

In an unmanaged forest, most trees fall and decay in situ, thus contributing to CWD on the ground. In a managed forest, many or most trees are removed during commercial harvesting operations. There will therefore be a decline in the amount of dead wood remaining within managed stands, and a corresponding decline in its ability to fulfil its ecological roles. Recent studies have shown that forest harvesting changes CWD attributes relative to those in unharvested stands (e.g. Lloyd, 2003; Adams, 2002; Densmore et al., in prep.). In particular, while overall CWD volumes are often lower after harvest, there is a marked decrease in volume contributed by large (diameter) and long pieces. This has negative implications for CWD-dependent wildlife, invertebrate and plant species, many of which prefer or require large pieces,

and also for CWD longevity in the ecosystem (small pieces decay more quickly and will not last as long).

In 2002, a pilot study was undertaken jointly by B.C. Ministry of Forests, Houston Forest Products Ltd. and the Forest Engineering Research Institute of Canada (FERIC) to assess the costs and benefits of improving CWD management at the stand level. Its primary recommendation was that to maximize operational practicality and minimize machine damage to retained logs, CWD should be managed within small clumps that include large and/or long logs, together with immature and deciduous trees, stubs and other habitat elements (Lloyd, 2004). In 2003, it was decided to assess the feasibility and cost-effectiveness of these recommendations in a series of three operational trials located in the Morice and Lakes TSAs, in the SBSdk, SBSmc2 and ESSFmc biogeoclimatic subzones. This summary describes the results of these operational trials.

Goals, Objectives and Rationale

This project is guided by the principle in the Forest Practices Code Biodiversity Guidebook which states that “the more that managed forests resemble the forests that were established from natural disturbances, the greater the probability that all native species and ecological processes will be maintained” (Province of B.C., 1995). Thus the primary goal of the project is to leave CWD on site after harvest that resembles CWD found in forests established from natural disturbance. Extensive baseline studies have been undertaken within the Nadina District that compare CWD in post harvest and undisturbed sites (Lloyd, 2003), and a “planning/monitoring matrix” (Lloyd, in prep.) has been devised to determine ecologically appropriate levels for CWD attributes in various site types in the district. The three operational trials are therefore also intended to compare post harvest CWD attributes to the levels considered appropriate based on levels in unmanaged forests in the same site type, as described in the planning/monitoring matrix.

The specific objectives for these three trials are:

- to assess the operational feasibility and cost-effectiveness of harvesting practices that retain clumps of CWD, stubs and immature trees in the SBSdk, SBSmc2 and ESSFmc biogeoclimatic subzones, particularly with regard to maintaining:
 - overall CWD volume
 - volumes of large-diameter CWD
 - volumes of long CWD
 - elevated CWD
 - sources of CWD recruitment (residual and immature trees, and stubs)
- to determine whether increased levels of desired CWD attributes are attained when harvesting crews are given specific instruction in terms of preset target levels, compared to general instruction on clumped retention of CWD, stubs and immature trees; and,
- to provide guidance to the harvesting crews involved.

Methods

One trial area, approximately 30 ha, was located in each of the three subzones. Each trial area was divided into three ~10ha units. In the control unit, no instruction was given to the harvesting crew, and harvesting operations were conducted according to normal practice. In the “targets” unit, the harvesting crews received a one to two hour tailgate training session on best management practices for CWD retention prior to commencing operations. Crews were instructed:

- to leave logs estimated to be classed as grade five (dead and dry lumber reject) or lower intact on the cutblock;
- to maintain clumps of immature trees and patches of natural non-merchantable deadfall intact where possible;

- to fell or stub dead trees estimated as grade five or lower and to place the felled portion in or alongside an existing clump where possible;
- to place the felled pieces together in a new clump -- where no such clump existed nearby -- with stubs or immature trees left as clump markers. Preferred locations for new clumps include areas such as ridges and knobs where skidders would not normally travel.
- as far as possible, to place felled snags and stub tops in an approximately natural orientation (“jackstrawed”, not bunched together) to simulate natural deadfall, incorporating existing downed logs where possible; and,
- to ensure that all retention clumps were marked, usually by stubs or immature trees, for maximum visibility to the skidder operator, so that the clumps could be maintained intact during skidding

Crews were instructed to place primary emphasis on maintaining intact logs greater than 10m long, by attempting to fulfill target objectives for volume and specifically for numbers of long logs. In the “BMP’s” unit, harvesting crews were instructed to follow the same best management practices as for the targets unit, but to “do the best you can” within a reasonable time, rather than meeting predetermined targets. Crews were particularly instructed not to increase the time spent in this study unit to a degree that would be considered unreasonable during normal operations.

CWD was assessed before and after harvest according to methods outlined in the Field Manual for Describing Terrestrial Ecosystems (MoF and MELP, 1998).

Results

Results are currently available for the trial areas in the SBSdk and ESSFmc and are summarized in Table 1.

In the SBSdk, preharvest CWD volumes in the control unit were reduced by 28% after harvest, whereas CWD volumes were almost unchanged in the targets and BMP units. Piece diameters showed little difference before and after harvest. Log length was greatly reduced after harvest in the control unit, whereas in the treatment units log lengths were more similar to preharvest conditions (Figure 1). Piece elevation (height above ground) was reduced in the control unit but remained unchanged in both treatment units. This has implications for decay rates (decay would be slower in pieces that are not in contact with damp ground) and also for wildlife use – small mammals are frequently associated with CWD (e.g. Hayes and Cross, 1987) and elevated pieces provide cover and snow-free spaces (Keisker, 1999). The treatment units also retained more stubs and more large immature trees than the control unit.

In the ESSFmc, CWD volumes increased after harvest on all three units, and piece diameters were relatively similar. Log lengths were greatly reduced after harvest in the control unit, but the volume of long logs was almost unchanged in both treatment units. This indicates that the increase in CWD volume was made up of short pieces, but that the volume of long pieces in the treatment units

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Table 1 Summary of changes to CWD attributes after harvest

CWD attribute	SBSdk	ESSFmc
Volume (total)	Control: reduced (n.s.) ¹ Targets: no change BMP's: no change	Control: increased Targets: increased BMP's: increased
Diameter	Control: slight decrease in volume of large-diameter logs (n.s.) Targets: slight increase (n.s.) BMP's: slight increase (n.s.)	Control: slight decrease in volume of large-diameter logs (n.s.) Targets: slight decrease (n.s.) BMP's: slight increase (n.s.)
Length	Control: large reduction in volume of long logs Targets: slight reduction (n.s.) BMP's: small reduction	Control: large reduction in volume of long logs Targets: no change BMP's: no change
Elevation	Control: fewer elevated pieces Targets: no change BMP's: no change	Control: more elevated pieces Targets: more elevated pieces BMP's: more elevated pieces
Immature/ residual trees	more large (>7.5cm dbh) immature trees in both treatments than in control unit	more large (>7.5cm dbh) and small (<7.5cm dbh) immature trees in both treatments than in control unit
Stubs	more in treatment units than in control unit	same in control and treatment units

¹ n.s. – not statistically significant (P<0.05)

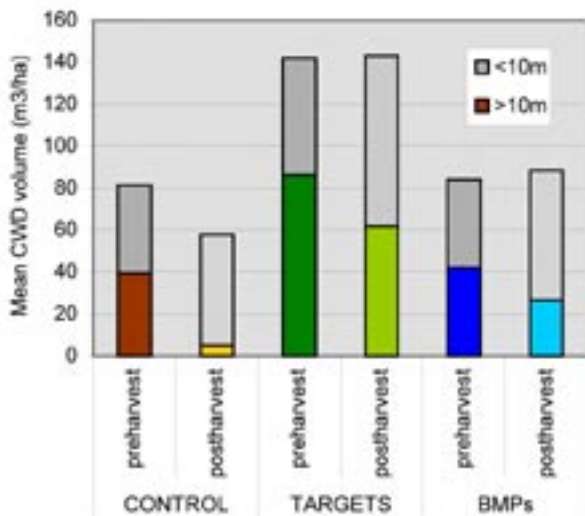


Figure 1 Mean volume of long and short logs in the SBSdk

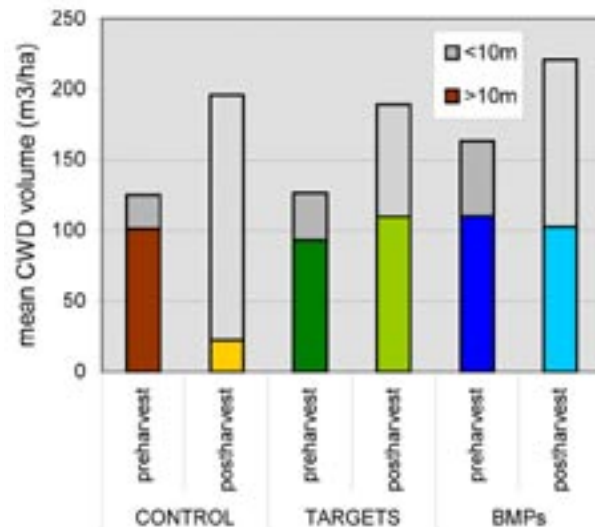


Figure 2 Mean volume of long and short logs in the ESSFmc

remained constant (Figure 2). Piece elevation was similar in all three units, but the treatment units retained more live immature trees than the control unit.

This indicates that the primary change in post harvest CWD attributable to the adapted harvesting practices is a large increase in the volume and number of long logs retained on the cutblock compared to the volume and number remaining on the control units. All treatment units had long log volumes similar to or only slightly less than preharvest volumes. Since reduction in piece size following harvest is widely reported as the major change to CWD

after harvest (Lajzerowicz, 2000; Adams, 2002; Lloyd, 2003; Densmore et al., in prep), this project appears to have been successful.

Overall, there was little difference between the treatment units on either the SBSdk or the ESSFmc site. In the SBSdk, differences are somewhat confounded because the targets unit had more and bigger CWD before harvest, and also because the crews reported that it was more difficult to log. In the ESSFmc, there was no discernable difference between the treatment units.

Cost-effectiveness

None of the three licencees reported increased logging costs attributable to the clump retention (other than operator training time) although changes in operator and machine time could have been masked by terrain differences in the area harvested or other unrelated factors that affect ease of harvesting. Potential costs due to merchantable wood being inadvertently left on the cutblock will be assessed in 2004.

No differences were reported between the two treatment units – i.e. whether or not operators were given targets for volume and numbers of long logs. Differences may exist but were masked by harvesting conditions, which appear to have had a greater impact on overall costs in machine time.

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