
The report "Future logging equipment needs in coastal B.C." (1989-2005) by E.A. Sauder of the Forest Engineering Research Institute of Canada was recently published as FRDA Report 027 by the Canadian Forestry Service in Victoria. The report summarizes a study whose purpose was to identify the areas where the Coastal industry will be operating in the period 1985 to 2005 and the logging equipment and systems it will need to profitably harvest these areas.

The objectives of the study were:

1. to document current cut volumes, age classes (mature or second growth), and cutting areas in Coastal B.C.;
2. to identify, in cooperation with the B.C. Ministry of Forests and Lands and the forest products companies, future cut volumes, age classes and cutting areas;
3. to document the current logging-equipment complement, by subclasses, in Coastal B.C. and any trends in equipment selection;
4. to identify the type and amount of new equipment and systems required to harvest the future stands; and
5. to predict the proportion of future stands that can be profitably harvested with current equipment and systems.

Study data were derived from two questionnaires. The first, a detailed questionnaire, was completed by 27 divisional engineers from industry. The second, a more general questionnaire was completed by a total of 13 individuals, including regional engineers representing industry and resource officers from the Ministry of Forests and Lands.

The report presents the study data as trends that are forecast to occur in three zones of the Coast, the South Zone, Mid Zone and North Zone (Figure 1). No attempt was made to translate these trends to the actual Coast harvest, however, survey respondents are responsible for approximately one-half of the annual allowable cut on the Coast.

The survey indicated that there will be no major change in Coastal production between the years 1985 and 2005, although a peak is expected in 1995. On a regional basis the Southern and Northern Zones will decrease in production while the Mid Zone will increase in production for the period 1985 to 2005.

Five factors indicate the timber supply on the Coast will be more expensive to recover and may not be sufficient to meet future demand.

These are:

1. the isolated nature of the remaining old-growth stands;
2. insufficient inventory data for the remaining old-growth stands;
3. reduced flexibility in operating areas because Small Business Enterprise Programs are becoming area based;
4. timber requirements beyond the current charted licences appear to be insufficient; and
5. less flexibility on changing operating areas or increasing annual allowable cuts.

The report suggests that there will be increased pressure from the forest industry to log second-growth or young stands and less opportunity to pick-up extra volumes from alternate tenures. Equipment utilization is expected to decrease, however, no shift in the balance of production between summer and winter operations is expected.
The report points out that equipment needs will be influenced by the predicted harvests, the projected number of operating days per year and the logging season. South Zone equipment fleets may possibly be reduced or adjacent operating areas consolidated. Rather than increase the equipment fleet, the Mid Zone may increase equipment utilization to increase the harvest. Equipment may have to be added to the North Zone fleet during the 1985 to 1995 period if increased utilization is not sufficient to meet the projected 1995 harvests. Beyond 1995, the North Zone equipment fleet may well decrease.

The majority of survey respondents felt that ground roughness, steepness of sideslopes and elevation of operating areas on the average will not change significantly over the 20-year period. For example, in the South Zone, although there will be more higher-elevation timber, this will be offset by more timber becoming available at lower elevations. The survey indicates that, overall, more timber will be on slopes greater than 50% and less on slopes less than 30%. The South Zone will actually have an increase of timber available on gentler slopes whereas the Mid and North Zones will reflect the overall Coastal trend. In terms of percentage of timber available at different elevations, there will be no shift on the overall Coast, although on the South Zone there will be a shift to lower elevation (<750 m) timber.

Ground-based systems may have greater potential in the South Zone as slope steepness, ground roughness, and elevation of operating areas decrease. Cable yarding will probably remain the dominant system in the Mid and North Zones because terrain features were not forecast to change. Road construction is expected to become easier in the South Zone as increased logging occurs on lower-elevation, previously logged areas. Road construction in the Mid and North Zones is expected to increase in difficulty.

Overall, timber species and size were forecast to change very little on the Coast. The South Zone is the exception where a shift to Douglas-fir and a smaller piece average was forecast. All respondents felt there would be a reduction in recovery over the 20-year period because of lower-quality stands. Stand characteristic changes which are forecast in the South Zone reflect the predicted shift from old-growth to second-growth harvesting. Age and height classes will stay essentially the same in the Mid and North Zones but volume per hectare and piece size are predicted to decline.

The general decline in piece size means that in order to recover the predicted volumes, it will be necessary to handle more pieces than in 1985.

There will also be:

1. an increased utilization of the logs extracted;
2. ground-based extraction systems and mechanical felling will have potential;
3. cable yarders and loaders will be required to have fast cycle times or the ability to handle several pieces at the same time; and
4. full-tree logging will continue in order to separate the extraction and loading phases. Equipment may not decrease in size, yet it would appear the greatest potential for changing equipment fleets will occur in the South Zone.

Timber developed per kilometre of road will decline slightly reflecting the reduction in timber quality and the increase in terrain difficulty. As a result, more road will be constructed in 2005 than 1985 to access basically the same amount of timber. Reconstructed subgrade will form a higher proportion of road construction lengths in all areas, particularly in the South Zone.

Environmental concerns may restrict the use of ground-based equipment in the South Zone. Mechanical felling equipment may have the potential to directionally fell timber beside or within streamside management zones. Road location, road construction, cutblock design and harvesting treatments would be influenced by their impact on aesthetics.

Respondents indicated that the estimated fleet of road-construction equipment will decline over the 20-year period even though more roads will be built and it is expected that more rock will be encountered. This decline is attributed to the use of more productive equipment and because of higher utilization (double shifting). Respondents indicate cable logging will continue to be the dominant harvesting system, but with a slight increase in the volume harvested by ground skidding.

The use of mechanized processing equipment is expected to increase over the 20-year period particularly in the South and Mid Zones. The estimates of the increase are felt to be conservative because mechanized processing is relatively new and most respondents had not fully considered how they could use the concept. The number of log loaders required will decrease over the 20-year period in response to the shift in type of cable-yarding equipment. The mix of log-loading equipment will shift to more hydraulic log loaders and fewer cable log loaders.

The total number of logging trucks is expected to decline and there will be a shift from off-highway and highway-size pole trailers to highway-size multi-axle trailers. Hauling distances will remain the same or decline in the South and Mid Zone, and increase slightly in the North Zone.

The report indicates that there appears to be major potential for using mechanical felling, ground-skidding, and processing equipment in Coastal B.C. However, the equipment must be capable of handling rough terrain, moving large windfalls, and operating on slopes averaging 50 percent.
Survey results indicate that the greatest impediments to utilization of new equipment are:

1. a lack of understanding of new systems, techniques and equipment;

2. the concern that the current labour contract limits the introduction of new contract operations;

3. the impressions that the future harvest volumes will be insufficient to meet the demands;

4. that existing equipment can recover the majority of the timber; and

5. a lack of demand for fibre that could be obtained from low-quality timber.

These impediments can be combined with the natural resistance to change and the need to supervise new equipment more intensively than conventional equipment.

This report indicates the future harvest levels will be more difficult and more costly to achieve. Equipment development, progressive thinking, monetary incentives and cooperation between management and labour will be required to overcome the terrain and timber characteristics that will make future logging more difficult.

Copies of this 44 page report, *Future logging equipment needs in coastal British Columbia (1989 - 2005)* by E.A. Sauder, are available while supplies last, from:

Canadian Forestry Service
Pacific Forestry Centre
505 West Burnside Rd.
Victoria, B.C.
V8Z 1M5

Please quote FRDA report #027 when ordering.