Coastal Timber Harvest Monitoring Protocol

Coast Region FRPA Implementation Team -Resource Planning Working Group

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1. Introduction

The 2011 discussion report "Summary of Cedar Management Considerations for Coastal British Columbia" recommended that government and licensees jointly develop and apply a protocol to monitor and assess harvest profiles. The following protocol was developed by the Resource Planning Working Group of the Coast Region FRPA Implementation Team (CRIT) in response to the recommendation. It describes a consistent methodology for using the most appropriate information to produce a standardized report for comparative purposes. The outputs are intended to help resource managers focus on the most relevant information about harvest profile performance and to identify harvesting trends or outcomes that require additional analysis.

2. Objective

The objective of this protocol is to provide anyone monitoring timber harvesting with a clearly defined procedure for compiling and reporting information about the distribution of timber harvest by tree species (the timber profile) and for comparing these distributions to timber supply assessed in the timber supply review (TSR) base case forecast for Crown lands in the Coast area (West Coast and South Coast Regions). A similar analysis for or including TFL Crown and private lands would require the release of forest cover and TSR outputs by the licensee.

3. Uses

The protocol can be used to compile information to answer the following questions regarding annual harvest activity for a specified area;

- How much timber was harvested in the year, how does it compare to previous years?
- How does the volume harvested compare to the allowable annual cut (AAC)?
- How much of a particular tree species (or tree species group) was harvested?
- How does the volume harvested for a tree species compare to previous years?
- How does the volume harvested for a tree species compare to total volume available for that species on the timber harvesting land base?

4. Scale

This protocol was designed to assess annual harvest levels for western redcedar and yellow cedar relative to base case harvest flow projections in TSR. However, it can be used to assess the timber harvest of any tree species (or groups of species) of interest.

The protocol has been demonstrated successfully at the region and management unit scale (see Appendix I - Mid Coast TSA Case Study) but can also be used at a variety of other scales (e.g. for a single watershed, a specific Forest Act tenure, traditional territory). It can be used to assess timber harvest and forest inventory condition at a single point in time or as a means of measuring

trend over time. The temporal scale is limited by availability of sufficient and reliable data, but some components allow for assessment back to 1985.

5. Material

The protocol relies on data from the following five sources to describe actual harvest performance and to compare it to the available supply for a specified area and time period:

1) scaled timber volume from the BC Government Harvest Billing System (HBS)
2) Vegetation Resource Inventory (VRI) or equivalent forest cover inventory from 2001
3) harvest depletions inventory (i.e., cutblock and reserve boundaries)
4) the timber harvesting land base (THLB) determined in the most recent TSR
5) past and current AAC determined by the chief forester

Source 1 above (HBS) data is stored within a relational database maintained by the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO); however certain fields within the tabular reports can be cross referenced to specific locations (e.g., a TSA). Sources 2, 3 and 4 are spatially referenced and must be manipulated using a geographic information system (GIS) to derive harvest and inventory profile information. A description of each of the above sources and data manipulation methods is provided in the Appendix 2 – Technical Supplement to the Coastal Timber Harvest Monitoring Protocol.

6. Procedure

The following procedures were devised as a means of assembling the best available information about the profile of timber actually harvested from an area and comparing that to the timber profile assessed in the timber supply review (TSR) base case forecast.

Harvest profile information is compiled from two sources: 1) scaled volumes reported in HBS and 2) VRI data spatially intersected with cutblock boundaries. Both sources are distinctly used to develop quantitative profiles of the volume harvested each calendar year, sub-divided by tree species and management unit. Although HBS data can be further sub-divided by timber grade, waste class and cutting authority, and VRI/cutblock data can be further sub-divided by stand attributes or other spatial themes with GIS analysis, the prototype example is focussed on describing harvest profile by year harvested, tree species group and management unit.

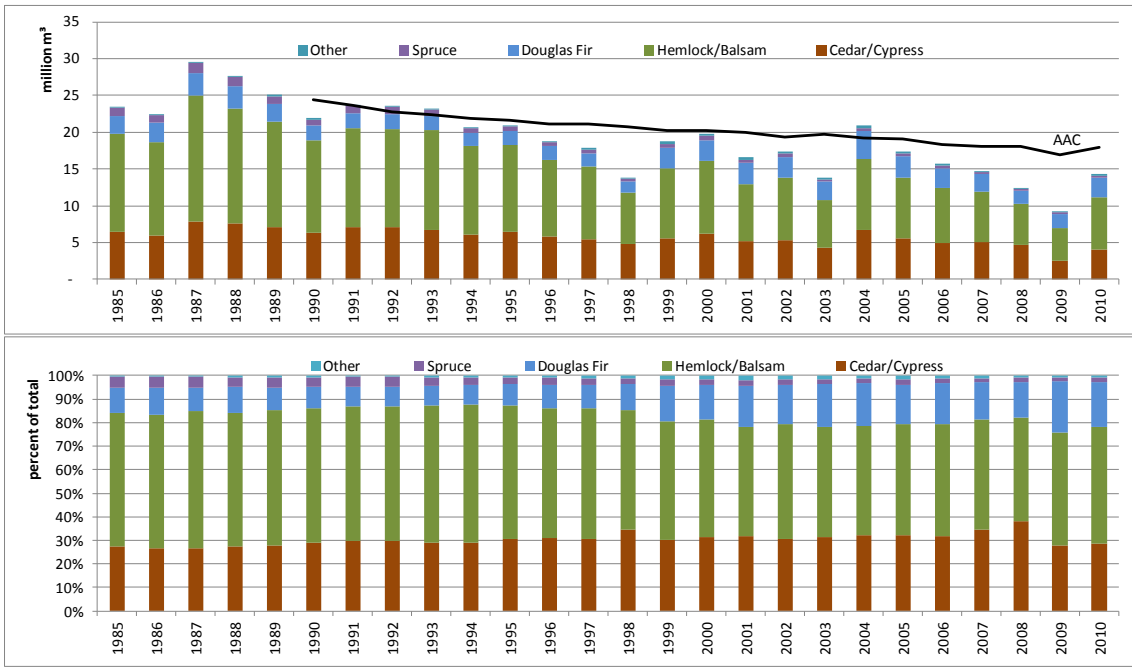
<u>HBS harvest profile</u>

The following steps are used to prepare actual harvest profiles:

1) Acquire HBS billed volume data for scaled dates from January 1, 1985 to December 31 of the last assessment year for all timber volumes, species and grades billed to Crown land including waste and reject, but excluding Christmas trees, and timber from non-tenured and federal lands broken down by the following HBS attributes: scale year, region (Coast), district, timber mark, management unit type, management unit ID, file type, selling price zone, waste indicator, waste type, scale species, scale grade.
2) Group billed volumes by desired groups (e.g. species: red cedar/yellow cedar, Douglas fir, hemlock/balsam, spruce, other conifers and other deciduous).

3) Summarize harvest volume by scale year, group and management unit (further subdivision by licences or cutting authority is also possible) and generate a stacked column chart as illustrated in Figure 1a of Appendix 1 – Mid Coast TSA Case Study. Place the target group of primary interest (e.g., species) at the bottom of the stacked columns in the chart.

Figure 1a. HBS billed volume – Coast Region– 1985 to 2011



4) Compare total billed volume to the AAC for each year and calculate the unharvested portion of the AAC (i.e., AAC less total scaled volume).

5) Sub-divide the AAC in each year by group (i.e. species) using a prorate calculated from the mature volume in the THLB from the most recent TSRs (normally TSR2 and TSR3

6) Generate a stacked column chart depicting the volume harvested each year by group, and unharvested portion of AAC to contrast to the anticipated amount for the target group (e.g. redcedar/yellow cedar) from TSR2 and TSR3 as illustrated in Figure 2 of Appendix 1. Place the target group of primary interest (e.g., species) at the bottom of the stacked columns in the chart.

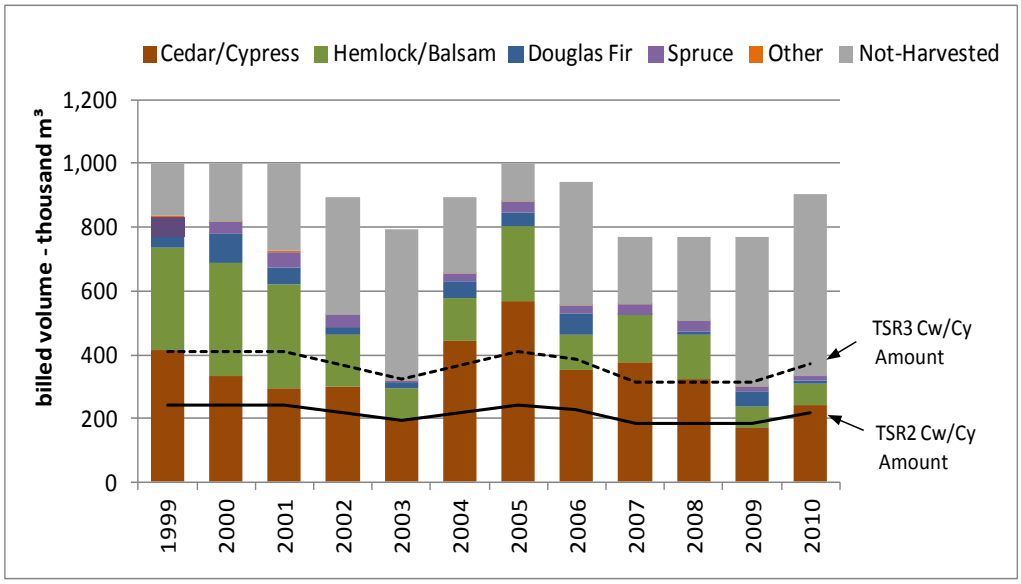


Figure 2. HBS billed volume compared to redcedar/cypress anticipated from TSR2 / TSR3– Mid Coast TSA

Cutblock inventory harvest profile

The following steps are used to prepare actual harvest profiles:

1) Acquire forest cover resultant for the district(s) from Forest Analysis and Inventory Branch (FAIB) – this is a consolidated spatial resultant of the 2001 VRI forest cover, harvest depletion layer (cutblock boundaries) and THLB layer. These data are for spatial polygons and linkable to the VRI growth result projections table.

2) Undertake quality assurance checks of the forest cover resultant to remove duplicate cutblock polygons and lands not applicable to assessment and to recalculate the area of the resultant polygons. Export to the project database.

3) Acquire the VRI growth results tables for the districts from FAIB – this is a simple database table containing projected forest attributes and volume estimates for each resultant projected to each year from 2001 to the present. Export to the project database.

4) Run database queries (as described in Appendix 2 – Technical Supplement to the Coastal Timber Harvest Monitoring Protocol) to summarize the total volume by group (e.g. species) and harvest year area for the assessment area and generate a stacked column chart depicting the volume harvested each year by desired group, and unharvested portion of AAC and contrast bars to a line plotting the anticipated volume from TSR2 and TSR3for the target group (e.g. redcedar/yellow cedar) as illustrated in Figure 4 of Appendix 1.

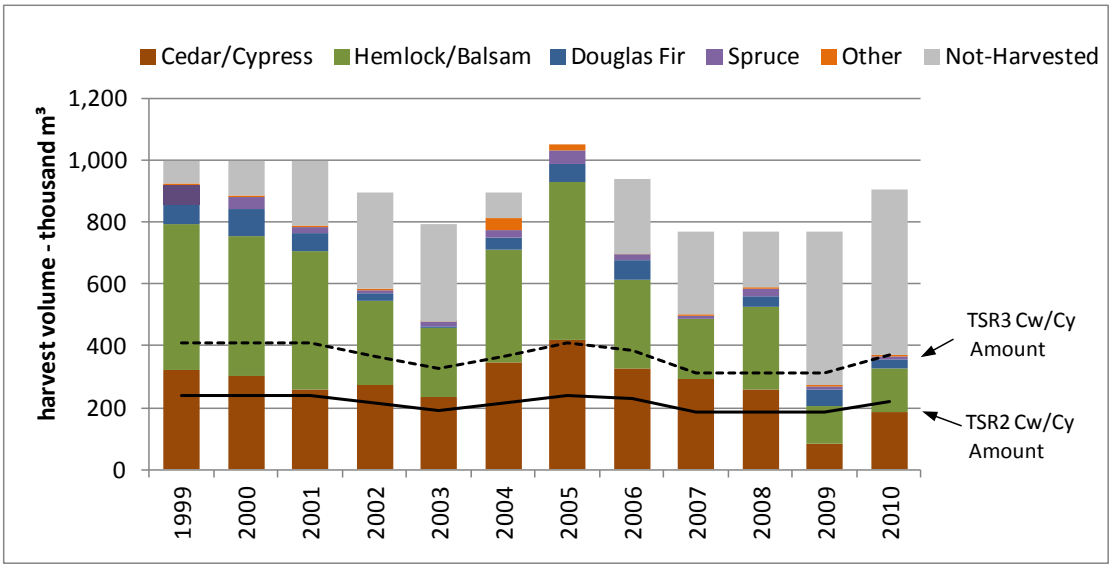


Figure 4. Harvest volume broken down by species using cutblock inventory– Mid Coast TSA with reserve area filtered to exclude retention for biological and visual quality objectives.

Compare HBS and Cutblock /Inventory harvest profiles

1) Generate a bar chart contrasting the total annual HBS scaled volume and total cutblock/inventory volume for principle groups (e.g., redcedar/yellow cedar and hemlock/balsam) as illustrated in Figure 5 of the Appendix 1.

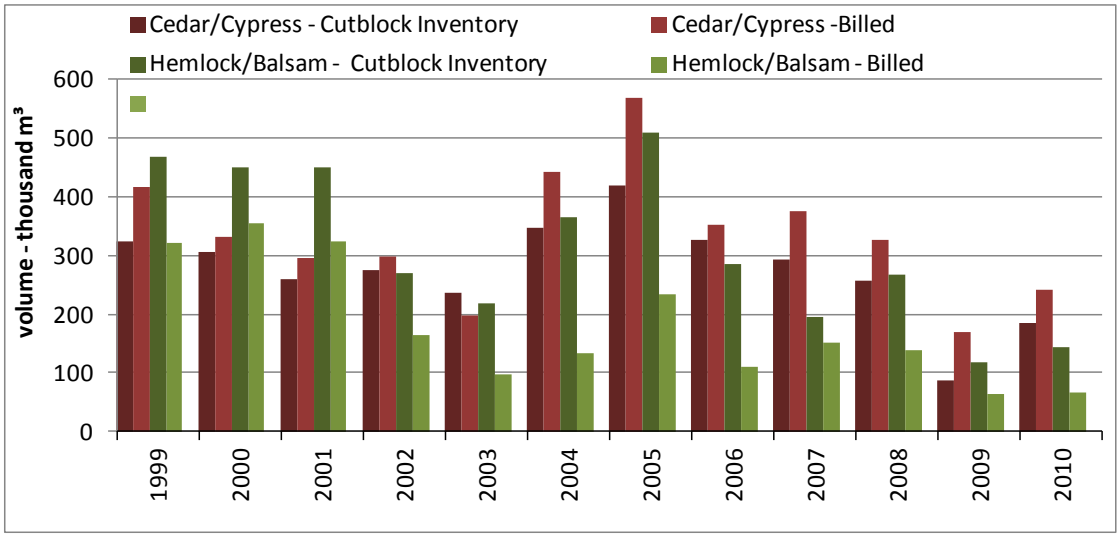


Figure 5. Cutblock inventory volume compared to HBS billed volume– Mid Coast TSA

7. Limitations

The following factors should be considered when interpreting results of the above data and outcomes:

Concerning HBS data

- HBS does not allow volumes to be linked to individual cutblocks or openings since timber marks may span more than one cutblock/opening and an opening may include more than one timber mark.
- HBS volumes can be divided by waste type (avoidable waste and unavoidable waste); the protocol specifies volume for all waste classes though users may choose to deduct unavoidable waste.
- HBS volumes can be divided by management license type (i.e., using HBS *file type);* the protocol excludes file types for private and federal lands.
- HBS scale date may be later than actual harvest date since billing date may lag behind the actual harvest date. This is complicated by the fact that openings can be harvested over a number of years. Users should consider this when interpreting year-to-year fluctuations in annual scale volumes.

Concerning Cutblock Data

- The consolidated harvest depletion (cutblock boundary) is updated by FAIB annually (calendar year). This layer integrates information from multiple sources giving priority to most reliable sources (as ordered here):
    - RESULTS Openings – a spatial layer containing the boundaries of areas that had been harvested with silviculture obligations or natural disturbance with intended forest management activities.
    - Vegetation Resource Inventory
    - Forest Tenures Administration Cutblock layer - a spatial layer that records cut blocks boundaries reported by licensees within harvesting authorities.
    - Change Detection for Spatial VRI – spatial boundaries from a change detection process using Landsat TM imagery used to evaluate the currency of VRI files.
- Cutblock boundaries often include unharvested reserve areas, as small patches or single tree retention. Although information has been improved to account for these areas in recent years, many mapped cutblocks prior to 2010 include unrecorded reserves. Depending on the extent and size of reserves in the study area, this may be a confounding factor when cutblock inventory volumes are compared to HBS volumes.
- Cutblock boundaries do not align with inventory stand polygon boundaries. Cutblocks may be placed in a manner that avoids difficult terrain or low value portions of inventory polygons. Therefore, the volume, species or other attributes from the VRI polygons may not fully represent the actual cutblock attributes where the inventory polygon is not completely included within the cutblock. This may be a confounding factor when cutblock inventory volumes are compared to HBS volumes.

Concerning VRI Data

- VRI data describes the condition (species, age, height, crown closure, volume) of forested inventory polygons on Crown lands.
- FAIB does not hold inventory data or some TFLs and may not be able to apply the protocol in such cases. TFL holders are responsible for forest cover inventories within TFLs and, in some cases, use a configuration that is different from VRI.
- Although VRI volume and stand attributes may be sufficiently accurate for a population of stands, the VRI may not be sufficiently accurate at the stand level to allow direct comparison with cruise information or scale returns.
- The general process used in the VRI to estimate timber volume is quite different than scaling methods. The summarized VRI inventory volumes for a group of cutblocks often does not equal the sum of scale returns from the same cutblocks (i.e., due to sampling error, net factoring method, taper factors, utilization standards). These differences make it difficult to discern reasons for trends indicated on Figure 5 above.

Assessment Scale

- Although this protocol and appended case study describe an assessment at the TSA level, the assessment using the cutblock inventory data could be applied over smaller or larger areas (e.g., woodlot, watershed, landscape unit, BEC variant, Forest Licence, TFL, traditional territory, TSA, or district).
- When assessments are made using administrative units (i.e., TSA) the analyst should be aware that boundary changes are likely to occur over the 10 year assessment period due to consolidation or subdivision of management units.

8. Contact information for additional information

This protocol has been developed by the Resource Planning Working Group of the Coast Region FRPA Implementation Team (CRIT). For additional information regarding this protocol contact;

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9. References

Summary of Cedar Management Considerations for Coastal British Columbia Discussion Draft, Discussion paper prepared by West Coast Region, Ministry of Natural Resource Operations and Forest Analysis and Inventory Branch, Ministry of Forests, Mines and Lands, March 2011.

Cedar Management Strategy Work Plan Proposal, Coast Region FRPA Implementation Team Resource Planning Working Group, November 2011