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# Cruise Design

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**2**

## **2.1 Cruise Objective**

The objective of the timber cruise is to obtain an unbiased estimate of the volume and quality of timber on a cutting authority area to a specified confidence interval or sampling intensity. The area cruised may be one or multiple cutblocks that will be appraised in one cutting authority and subject to one appraisal.

The information from the cruise is applied as follows:

1. For scale-based sales, the cruise provides the basis for determining the stumpage rate while the amount invoiced is based on the scale.
2. For cruise-based cutting authorities, both the estimate of the stumpage rate and invoicing are based on the cruise.
3. In special cases, such as salvage sales, small sales and right-of-way sales, cruising standards may be varied by the Regional Executive Director in accordance with Chapters 4 and 6 of the *Coast Appraisal Manual* and *Interior Appraisal Manual*.

## 2.2 Cruise Plans

It is *mandatory* for licensees and Timber Sale Managers to submit plans to the District Manager prior to the commencement of a timber cruise. Plans are required for new or amended cruises. The District Manager does not approve cruise plans.

The plan is submitted to MFR staff to allow for the development of field quality assurance schedules and to provide a basis for comparison against the final appraisal map.

Cruise plans must contain the items specified in:

- Section 3.1.7,
- Forms section - FS 693 and 694, and
- Figure 2.1.

The cruise plan is a professional document that forms the basis for the statistical sample. It identifies the population to be sampled and the design that will be used to meet the minimum cruise standards. The cruise plan is the key document that provides assurances to the MFR that the data supplied to the appraisal was collected in an unbiased manner, however, like any plan, unforeseen circumstances may necessitate a change to the plan.

Changes to a cruise plan should be rare and minor in nature and must be undertaken to affect unforeseen issues that affect good forest management or other minor operational issues.

The submitting forest professional recognizes that changes to a plan, such as a change in area or the removal of a plot(s) is biased and will have assessed the impact of the alterations against the principles of sampling identified in these standards. The submitting forest professional will submit a record of all relevant information that was used to develop the original cruise plan and final appraisal map. This model is consistent with the direction of professional reliance.

The District Manager will review each change on a case by case basis and determine if the change meets the intent of providing good forest management or addressing unforeseen minor operational issues.

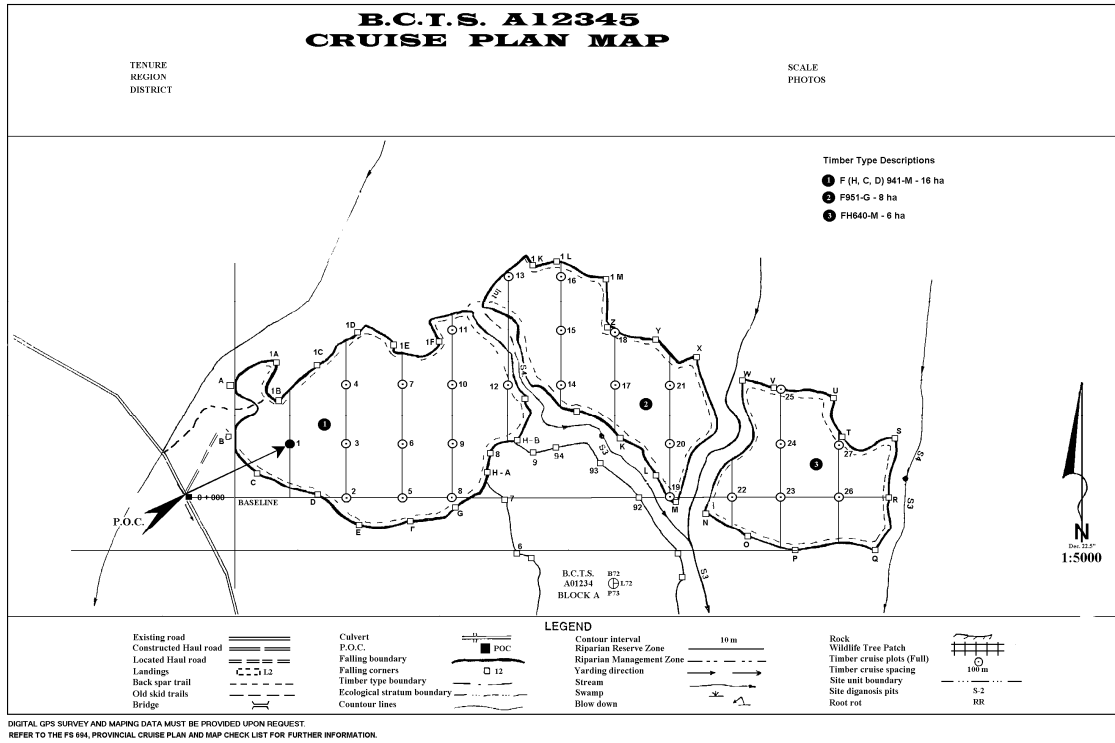


Figure 2.1 Sample Cruise Plan Map.

## 2.3 General Conditions - Scale and Cruise Based Cutting Authority Cruises

- All species listed under Section 6.3.2 of this manual shall be cruised,
- The merchantability specifications are identified in Chapter 6,
- Unless otherwise specified, the sampling error objectives are based on full measure and count plots,
- All plots must originate from the harvest area. Plots in areas 100 percent reserved from cutting must not be used in the compilation.
- If the minimum tree count can not be achieved with a BAF 2 prism, then the minimum tree count requirement may be waived. See section 2.4.1.
- The minimum tree count requirements include tree classes 1, 2, 3, 5, 7, 8, 9 and not tree classes 4 and 6. See section 2.4.1.
- There are no minimum tree count requirements if the minimum sampling error standard has been achieved.
- Fixed area plots require an average of at least 8 trees per plot.
- The minimum requirement for the establishment of a full measure plot is as follows:
  - i. cutting authorities < 250 ha: a 200 meter grid or 4.0 hectares per plot.
  - ii. cutting authorities > 250 ha: a 250 meter grid or 6.25 hectares per plot.
- Count plots may be establish on the full measure plot grid.
- For each timber type, measure tree data is required for every species recorded in the count plots.
- Cruises are the responsibility of the district that contains fifty percent or more of the cruise area.

## 2.4 Sampling Error Objectives

### 2.4.1 Scale Based Cutting Authorities

- These standards apply to both clearcut and partial retention harvest systems.
- Unless otherwise stated, the scale-based cutting authority sampling error objective is 15.0 percent at 2 standard errors based on the total stand net merchantable volume prior to any partial harvest reductions.
- Rights of Way - see section 2.6.4 for the cruising procedures - cruises must:
  - i. Meet the 15% sampling error requirement using fixed or variable radius plots, or
  - ii. Sample at least 2.5% of the R/W area using fixed area plots.
- Helicopter Single Stem – the options are:
  - i. 100% cruise of the cut trees,
  - ii. Achieve at least a 15% sampling error on the cut trees at 2 SE using variable radius plots, or
  - iii. Sample using 2 variable radius measure plots/ha and at least 2.0 cut trees/plot.

**The sampling error requirement will be waived if the following conditions have been met:**

1. **For cutting authorities of 20 ha or larger in size:**
  - a. A 100 metre by 100 metre systematic grid has been established and a maximum of one count plot to one full measure plot has not been exceeded and an average of at least 4.0 trees per plot has been met.
  - b. A 70 metre by 70 metre systematic grid has been established and a maximum of one count plot to one full measure plot has not been exceeded and an average of at least 2.0 trees per plot has been met.
  - c. A 50 metre by 50 metre systematic grid has been established and a maximum of one count plot to one full measure plot has not been exceeded and an average of at least 1.0 trees per plot has been met.

**2. For cutting authorities less than 20 ha in size:**

- a. A 100 metre by 100 metre, systematic grid of full measure plots has been established and an average of at least 4.0 trees per plot has been met.
- b. A 70 metre by 70 metre, systematic grid of full measure plots has been established and an average of at least 2.0 trees per plot has been met.
- c. A 50 metre by 50 metre, systematic grid of full measure plots has been established and an average of at least 1.0 trees per plot has been met.

**2.4.2 General Cruise Based Cutting Authorities**

The following standards apply to all cruise based cutting authorities.

1. 8% at 2 S.E. on all plots, and
2. If count plots are used, then a 2 S.E. of 12% on full measure plots must be achieved.

All other scale based standards apply, except that the sampling error can not be waived.

For further guidance, refer to the Provincial Cruise Based Policy at the following Internet site:

<http://www.for.gov.bc.ca/tasb/manuals/policy/resmngmt/rm8-16.htm>

## **2.5 Sampling Patterns – General Conditions**

Samples established within cutting blocks from previous operational cruises may be used in new sampling plans if they meet the standards in this manual.

All possible sample points that can be established in the harvest area must be cruised.

Plots cannot be moved.

### **2.5.1 Sampling Patterns**

In systematic sampling, plots are established at fixed intervals with a minimum of two full measure plots per timber type. The sampling grid spacing must be the same within each timber type.

The preferred method of establishing plot locations is to use a computer (GIS) generated grid covering a large geographic area such as a watershed or a landscape unit. If a grid system is not available, then a local grid must be established using the following procedure:

- i. Project a line due south from the block's most western point and another line due west from the block's most southern point. Starting at the intersection of these two lines, lay the local plot grid on the map oriented in cardinal directions (N-S & E-W) to determine the plot locations. You can start at any identifiable tie-point and tie-in to the nearest plot.
- ii. If count plots are used in the cruise design then the plot closest to the point of commencement must be a measure plot.

A square or staggered grid may be established. The option selected must be used consistently for the cutting authority. Refer to Figure 2.1 for an example of a square grid.



















































































