Growth and Yield Monitoring
For Post Harvest Regenerated Stands

Field Manual for Weyerhaeuser's
Edson and Drayton Valley
Forest Management Areas

Prepared for

Greg Behuniak, RPFT
Weyerhaeuser Company Limited
Grande Prairie, Alberta

Project: WCG-011

November 8, 2005

Weyerhaeuser
The future is growing™

Table of Contents

List of Tables

List of Figures

1. WEYERHAEUSER'S GYM PROGRAM – BACKGROUND

1.1 GYM PROGRAM GOAL

Weyerhaeuser intends to establish approximately 86 new growth and yield monitoring (GYM) plots on a 3.33 km grid[1] in post-harvest regenerated (PHR) stands in the Pembina FMA. This grid will be linked to the National Forest Inventory (NFI) 20 km grid and will allow each GYM plot established on the NFI grid to serve as a permanent sample plot (PSP) in the provincial and federal inventory and monitoring programs.

1.2 GYM PROGRAM OBJECTIVES

Weyerhaeuser's GYM plots will monitor critical G&Y indicators to track progress towards meeting Detailed Forest Management Plan (DFMP) G&Y targets and validating timber supply assumptions. The GYM plot objectives are to:

1. Monitor change in volume, species composition, stand top height, site height, and site index.
2. Provide data on competition and succession that can be used to link early stand performance to late stand conditions.
3. Provide data on stand height, volume growth, seedling mortality, and ingress that can be used to develop new or calibrate existing G&Y models for PHR stands.
4. Provide data that could be used to develop relationships between ecological classification and stand development.

1.3 GYM FIELD MANUAL OBJECTIVES

The objective of this manual is to introduce field personnel installing the GYM plots to the field measurements required to implement the GYM field program.

1.4 TARGET AND SAMPLE POPULATION

The target population consists of all PHR stands within Weyerhaeuser's Pembina FMA areas harvested 1960 or later. The target population consists of 88,045 ha (16% of the combined land bases) and will expand over time as fire-origin stands are harvested and regenerated. The target population includes all cutlines, unmapped residual patches, and other unmapped features within PHR stands and these features will be included in plots.

1.5 GYM PLOT OVERVIEW

GYM plots will be established following reforestation of cutblocks and re-measured at years 5, 10, 15, 20, 25, 30, 40, 50, etc. Weyerhaeuser expects that there will be 122 GYM plots established by 2018. Plots are to be established once initial reforestation activities are completed. The initial backlog of plots will be established in 2006, 2007, and 2008.

GYM plots will consist of a 0.04 ha Large Tree Plot (≥5 cm DBH), a 0.01 Sapling Plot (≥1.3 m in height to 4.99 cm DBH) and a 0.005 ha Regen plot (10 cm to 1.3 m height). DBH and height measurements will be recorded for all trees in the Large Tree and Sapling plots. Site tree data will be collected on the 0.04 ha Large Tree Plot. Trees will be tagged in the Large Tree and Sampling Plots.

[1] Note that the phrases "grid point" and "plot center" are equivalent. Both are used in this manual.

2. BEFORE GOING TO THE FIELD

2.1 OFFICE REVIEW

It is important that the crew complete the following tasks before going to the field:

1. Review silviculture records and fill in block history.
2. Ensure plot packages are complete. Plot packages should contain at a minimum:
   - Orthophoto coverage (1:5,000 preferred)
   - 8.5X11 forest cover maps at 1:5,000, 1:10,000, or 1:20,000 scale showing plot location, polygon boundaries, and enough information to identify a Point of Commencement or tie point on the map (i.e., roads, creeks, etc)
   - Plot cards.
3. Field crews should ensure they have all appropriate field equipment.

A target and backup plot should be prepared the night before going to the field. This will ensure early, efficient departure in the morning and easy transition should there be a reason not to sample the target plot. The general information should be filled out on the tally form the night before going to the field or on route to the plot.

2.2 FIELD EQUIPMENT

Field crews should ensure that they have all of the following field equipment:

- 2 compasses adjusted for declination
- 1 metric scale
- Photographs and or maps of the plot vicinity, and access to the plot
- 1 30-meter tape
- 1 50-meter chain
- 5 cans of orange paint (more if long distance into the plot)
- 2 cans of blue paint (for plot buffer)
- Paint stick to mark breast height
- 1 axe and case
- 10 conduit posts 5' in length (13 for edge plots)
- Nails
- Tally sheets
- Tree tags with wires
- Pencils increment borer
- 1 Suunto clinometer
- 1 tally board
- Wedge prism: 5 square meters/ha
- Flagging tape (light poly)
- Metric calipers
- 1 metric diameter tape
- 1 pocket stereoscope
- 1 GPS
- Cable and crimps for tagging trees
- Crimper

2.3 SAFETY & SURVIVAL EQUIPMENT

A crew will ensure they have the following equipment **for all plots**:

- CSA approved hardhats and all other required PPE.
- First aid kit (pocket variety)
- Safety glasses
- 1 portable radio
- Gloves
- CSA approved ATV helmets

For all helicopter plots in the winter season:

- 2 sleeping bags
- 1 tent
- Freeze dried food
- Cooking utensils
- 1 orange helicopter location marker
- 1 inflatable splint
- Water-proof matches
- Canned fuel
- Stove
- First aid kit

3. PLOT ESTABLISHMENT PROCESS

3.1 PLOT LOCATION

There are two methods that can be used to access the plot location. The grid point can be accessed directly using Trimble or Lecia GPS units (note that the Garmin or Magellin GPS models are not suitable for this purpose). Conversely, the traditional method of using a Tie Point (TP) and a Point of Commencement (POC) and following the appropriate distance and bearing into the plot can also be used. Some examples of possible TP's and POC's are:

- Survey lines and seismic line intersections
- Definite points on lake shores (i.e. points, creek mouths, etc.)
- Man-made structures such as cabins which are shown on the detailed type map
- Creek junctions (but not irregularities in the water course)
- Intersection of definite type boundaries identifiable on the ground (e.g. as between burn and timber, open muskeg and timber)

The tree closest to the start point should be blazed with an axe (30 cm sq.) and painted on all four sides at breast height and at the stump. A metal tag identifying the project, plot number, bearing, and distance to the plot should be attached to the tree at breast height. The four closest trees to the start point tree should also be blazed, and painted, again both at breast height and at the stump. The blaze and paint should face the start point tree.

Once at the grid location, the plot stake must be installed at that point and not moved unless there is an obvious mapping or GPS error (Section 3.6). This is different from the PSP program where plot stakes can be moved to suitable stand conditions. If the grid point (plot center) is located close enough to the edge of the stand that an entire plot can not be establish, a partial plot (known as an edge plot) will be established following the procedures detailed in Section 3.7.

3.1.1 Oil and Gas Cutlines

Existing oil and gas cutlines crossing PHR stands are included in the target population for sampling. If a cutline crosses a portion of a GYM plot, it is included in the plot; however, the cutline is to be mapped by placing posts along the edges and recording sufficient distances and bearings so that the area of the cutline can be calculated. The forms include fields to note those trees that are growing on cutlines allowing the block to be compiled either with or without the cutline area.

3.2 GYM PLOT SIZES

The GYM Plot is comprised of a Large Tree Plot with nested Sapling and Regeneration plots located in the NW corner (Figure 1). All three plots must be established regardless of whether there are trees meeting the plot criteria.

Large Tree Plot (0.04ha): Used to measure trees ≥5 cm DBH
Sapling Plot (0.01ha): Used to measure trees ≥1.3 m in height and ≤5.0 cm DBH
Regen Plot (0.005ha): Used to measure trees ≥0.10 m in height but <1.3 m in height

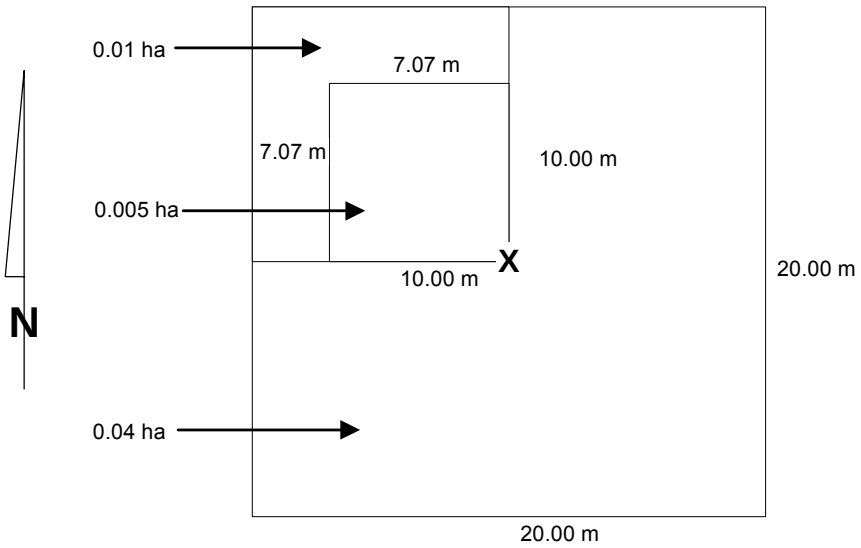


Figure 1. GYM plot layout showing the grid point (X) and the Large Tree, Sapling, and Regen plot boundaries.

3.3 GYM PLOT BUFFERS

The objective is to ensure that the GYM plots represent the forest conditions on the land base over time. Typically, GYM plots are not buffed and are not protected from harvesting. The one exception to this is that the GYM plots are buffered from oil and gas activity.

A primary and secondary buffer zone will be established to protect GYM plots from industrial activity (other than harvest operations). The primary buffer zone is defined by trees just outside the main plot boundary painted with a 30 cm square blue paint blaze located 2-3 m up the stem of the trees and facing away from the plot. The secondary buffer zone, also blue in color, will be established in the following manner:

1. Using a hip chain, travel 42.43 m at 315°, from the center post and establish the NW corner of the buffer.
2. Travel 60 m at 90°, painting the perimeter trees facing away from the plot to establish the N face of the buffer.
3. Travel 60 m at 180°, painting the perimeter trees facing away from the plot to establish the E face of the buffer.
4. Travel 60 m at 270°, blazing the perimeter trees facing away from the plot to establish the S face of the buffer.
5. Travel 60 m at 360°, blazing the perimeter trees facing away from the plot to establish the W face of the buffer.

3.4 GYM PLOT LAYOUT

3.4.1 GYM Plot Identification

At each grid point, a metal stake is driven into the ground at plot center and painted orange. A witness tree should be located near the grid point and marked with a single band of orange paint at stump height and two bands at 2.0 m. A metal tag identifying that it is a GYM Plot Centre Tree, plot number, sampling

date, cruisers initials, and distance and bearing to the grid point must be attached to the witness tree. The witness tree does not have species or height restrictions, but should be the cruisers choice of the tree located closest to plot centre that will be present over time. At point locations where witness trees are unavailable, the cruiser should note in the plot cards that a witness tree was not identified, and then the tag with GYM Plot, plot number, sampling date, and cruisers initials should be attached to the plot center stake.

3.4.2 GYM Plot Establishment Procedures

All three plots must be laid out prior to beginning data collection, regardless of whether trees are present in the three plot types. A crosshead and two tapes can be used to establish the plot and subplot corners with a very high degree of accuracy. During all stages of plot set-up, it is very important that the measuring tapes are straight, not caught on any thing that may interfere with the line between two points, and are horizontal.

1. Using a compass, determine the line (315°) from plot center to the NW corner and install a post 14.14 m from plot center along this axis (this acts as the NW corners of the Large Tree and Sapling Plots).
2. On the same line, install the NW corner of the Regen Plot 10.0 m from plot center. Sight the cross head on the established corners and check frequently throughout set up.
3. Using a compass, determine the line (225°) from plot center to the SW corner of the Large Tree Plot and install a post 14.14 m from plot center along this axis. However, before installing the SW corner post, check the west side dimension of the Large Tree Plot (20.0m). When satisfied that both distances are correct, install the SW corner post.
4. Before removing the tape between the NW and SW Large Tree Plot corners, install the SW corner of the Sapling Plot 10.0 m from either plot corner. Verify that the Sapling Plot SW corner is exactly 10.0 m west of the plot center.
5. Before removing the tape between plot center and the SW corner of the Sapling Plot, install the SW corner of the Regen Plot 7.07m from plot center along this transect.
6. Using a compass, determine the line (45°) from plot center to the NE corner of the Large Tree Plot and install a post 14.14 m from plot center along this axis. Before installing the NE corner post, check the north side dimension of the Large Tree Plot (20.0 m). When satisfied that both distances are correct, install the NE corner post.
7. Before removing the tape between the NW and NE Large Tree Plot corners, install the NE corner of the Sapling Plot 10.0 m from either plot corner. Verify that the Sapling Plot NE corner is exactly 10.0 m north of the plot center.
8. Before removing the tape between plot center and the NE corner of the Sapling Plot, install the NE corner of the Regen Plot 7.07m from plot center along this transect.
9. Using a compass, determine the line (135°) from plot center to the SE corner of the Large Tree Plot and install a post 14.14 m from plot center along this axis. However, before installing the SE corner post, check the east and south side dimensions of the Large Tree Plot (20.0 m). When satisfied that all distances are correct, install the SE corner post.

When all corners are installed, hang a string line around the perimeter of the Large Tree Plot, taking care when determining whether trees are in or out.

3.5 TAGGING AND NUMBERING TREES

3.5.1 Large Tree and Sapling Plots

All trees 5.0 cm DBH or greater in the Large Tree Plot and 1.3 m height or greater in the Sapling Plot must be tagged. Once the three plot types are established, use flagging tape to divide the Large Tree Plot into four sectors along cardinal directions. Lay the plot out by sector following the general pathways identified in the diagram provided in Figure 2.

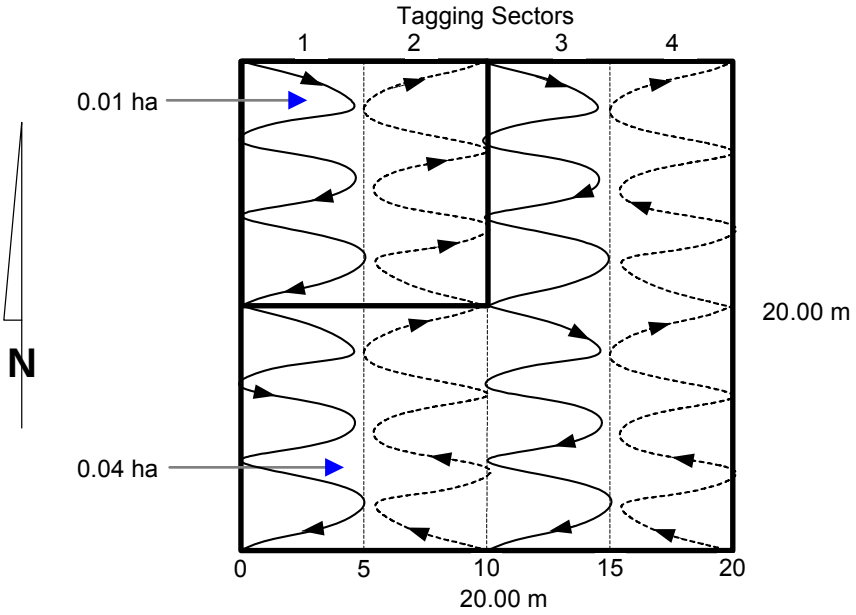


Figure 2. GYM plot layout showing the layout procedures for the Large Tree (0.04 ha) and Sapling (0.01 ha) plots.

Cruisers can tag trees as they make their way through the plot, or at the start prior to recording tree measurements. Beginning in the NW corner, start tagging trees in the Large Tree and Sapling Plots (both plots at once, just note the different tagging limits as you move through the plots). In sector one move alternately west to east, east to west while proceeding south through the sector. Repeat this process as you work through sector's two to four.

Where possible, place tree tags just below breast height on the bole of the tree; or where a bole is not yet steady, place the tag on a stout branch just below breast height. All trees are tagged using light aircraft cable that is looped loosely around the bole or branch of the tree and crimped to secure; no trees shall be tagged using nails. Leave enough room when crimping the cable to allow for diameter growth. The tags should face the surveyor as the person travels the sector to help facilitate the same divisions when the plot is revisited.

When revisiting plot locations, one of the first steps is to ensure that the tree tags are still on the trees before beginning data collection. If not, then these trees must be retagged prior to plot establishment and given new tags as per the procedures for missed trees. Missed trees and in-growth are numbered as a continuation of the last number previously used. Note on the tally sheet the trees they are beside to help relocation during plot re-measurement.

Shrubs such as alder, willows and other shrubs are not tagged. Leaning trees should be measured along the lean. Trees forked below breast height are measured and recorded as two separate stems, both of which are tagged. Trees forked above breast height are treated as a single tree. Condition codes should be used in these instances to indicate stem conditions.

3.5.2 Regen Plot

Trees in the Regen Plot are not tagged and numbered. Where there are a large number of trees, a dot of paint can help identify those trees that have been tallied.

3.5.3 Planted Trees

If cruisers are certain they can identify all planted trees, then all planted trees in the Large Tree Plot should be tagged and identified as planted (tags will not have a number, they will simply say "planted"). Use pigtails on trees below 1 m tall and tag trees over 1 m.

Planted trees falling within the Regen Plot will be tallied as planted. When planted trees reach tagging size (1.3 m in the Sapling Plot and 5 cm DBH in the Large Tree Plot) they will be numbered and recorded as planted on the tally sheet. The silviculture history records will identify whether the planted trees contained genetically improved stock.

3.6 MAPPING AND GPS ERRORS

The GYM Plot center must be installed in PHR stands. Grid points are selected for plot establishment by overlaying current inventory maps with the 3.33 km grid and choosing the grid points that fall in PHR stands. It is possible that mapping or GPS errors could result in the field crew arriving at the plot location and discovering they are not in the stand type indicated on the map (e.g., the GPS location could be in a fire-origin stand.) If this happens, the plot should be established according to its location on the map. Tie points, distances and bearings used to locate the plot should be recorded on GYM form 1.

3.7 EDGE PLOTS

A partial plot is established when a plot center is located in a PHR stand, but part of the plot is in a fire-origin stand (or other area outside the target population such as a clearing, roadway etc.). This is done to ensure that the edges of PHR stands are sampled. If edges are not properly sampled, it can lead to significant bias. The two main sources of bias:

1. Avoiding the edge – by avoiding the edge you assume that the edges are the same as the interior of the polygon. In most cases, this is not true.
2. Method caused bias – this is an artifact of the sampling technique that results in edge trees not being sampled with the correct probability.

The first type of bias can be corrected by allowing plots to overlap the stand edge and only establishing the portion of the plot that falls in the target population. The second type of bias can be corrected using a technique known as the "walkthrough method".[2] Details of both are provided below. *In the initial phase*

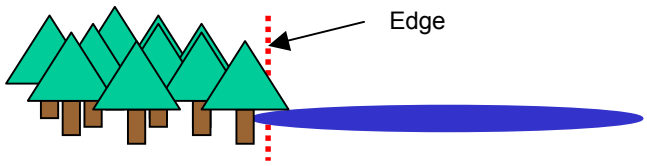
[2] Ducey, M.J., Gove, J.H., and Valentine, H.T. 2004. A walkthrough solution to the boundary overlap problem. For. Sci. 50(4):427-435.

of GYM plot establishment, both methods will be used and evaluated before a final decision is made on exact procedures.

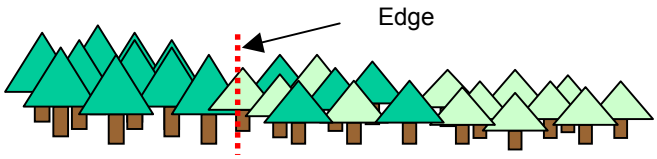
3.7.1 Types of Edges

In general, edges can be categorized into three types:

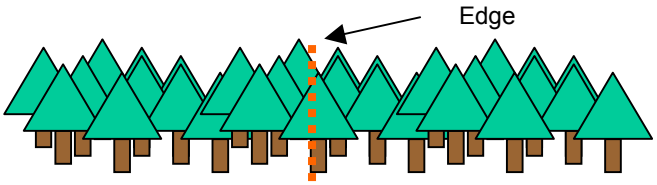
1. Hard edges are a forest next to a clear-cut, lake, swamp, or road.



2. Soft edges are a gradual change in stand differences. These differences could be a result of soil, slope or aspect variation within a forest producing different plant communities.



3. Imaginary edges include legal boundaries, zoning differences or usage differences.



3.7.2 Edge Plot Layout

When the entire Large Tree Plot does not fit within the target stand, the Sapling and Regen Plots should be shifted and centered on plot center (Figure 3, Figure 4). The plot should be laid out as described below and sufficient measurements taken along the plot boundaries and from the center point to map out the actual size and shape of the partial plot established in the PHR stand.

The key information is the actual area of established plots as these areas are then used to weight the recorded information in the analysis. Note that in the directions below, one or more of the corner posts will be outside the target stand.

1. Using a compass, determine the line (315°) and install the NW corners of the Large Tree, Sapling and Regen Plots 14.14 m, 7.07 m and 5.0 m respectively from plot center along this axis.
2. Using a compass, determine the line (225°) and install the SW corners of the Large Tree, Sapling and Regen Plots 14.14 m, 7.07 m and 5.0 m respectively from plot center along this axis. Before installing the SW corner posts, check the west side dimensions of all plots. When satisfied that both distances are correct, install the SW corner posts.
3. Using a compass, determine the line (45°) and install the NE corners of the Large Tree, Sapling and Regen Plots 14.14 m, 7.07 m and 5.0 m respectively from plot center along this axis. Before

installing the NE corner posts, check the north side dimensions of all plots. When satisfied that both distances are correct, install the NE corner posts.

4. Using a compass, determine the line (135°) and install the SE corners of the Large Tree, Sapling and Regen Plots 14.14 m, 7.07 m and 5.0 m respectively from plot center along this axis. Before installing the SE corner posts, check the east side dimensions of all plots. When satisfied that both distances are correct, install the SE corner posts.
5. Map the edge by installing additional posts and recording distances and bearings to these posts as well as between the posts. Place sufficient posts so that the edge is marked by straight lines between posts. This detail is required for two reasons: (1) the plot area inside the target stand needs to be calculated and (2) when the plot is re-visited the crew needs to determine exactly where the edge was defined. Finally, string hip chain between the edge posts so that the edge line is clearly defined.

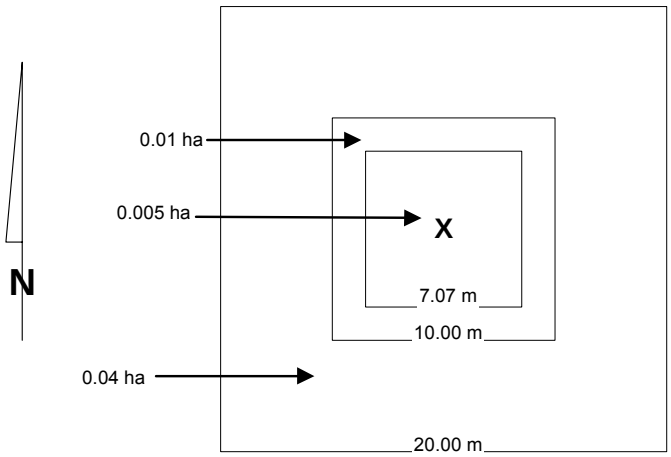


Figure 3. Edge plot layout. All three plots are centered on the grid point. All corner posts should be established (if possible) even though some will be outside the target stand.

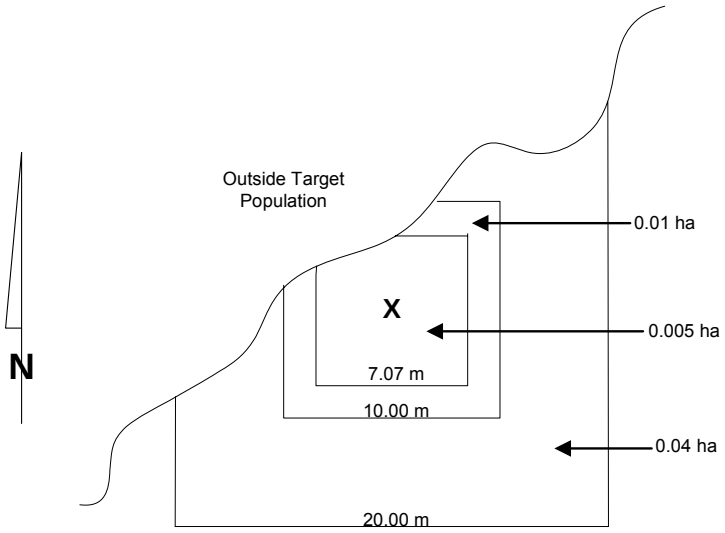


Figure 4. Example of an edge plot showing the actual plot areas inside the target stand.

3.7.3 Walkthrough Method

The walkthrough method consists of double counting trees that are closer to the edge than the plot center on a line between plot center and the tree. The following procedure is summarized from Table 1 in Ducey *et al.* 2004.[2]

Step 1: Is it possible that the tree is closer to the edge than the plot center?

No – tally the tree normally

Yes – proceed to step 2.

Step 2: Measure the direction and distance (x) from the plot center to the tree. Continue in the same direction and measure the distance between the tree and the edge (y). Is y less than x?

No – tally the tree normally.

Yes – proceed to step 3.

Step 3: If you go the distance x from the tree along the same direction do you end up outside the target stand? In most cases the answer will be yes if y is less than x, but in some cases with irregular boundaries you may walk outside the block and back inside again.

No – tally the tree normally

Yes – record the tree as an edge tree.

Figure 5 illustrates potential stand boundaries and the correct outcomes. In these examples, the orange lines are the stand boundaries, and the green circles are the plots. In diagram 1, the tree in question is closer to the stand edge than it is to the sample point. Following the direction from the plot center to the tree, the walkthrough point would land outside the block. This tree would be tallied as an edge tree. In diagram 2, the tree in question is closer to the block boundary than it is to the sample point; but the block boundary loops back so that the walkthrough point is within the block. This tree would be tallied normally. In diagram 3, the tree in question is closer to the stand edge than it is to the sample point, but not along the same direction as between the plot center and the tree. This tree would be tallied normally.

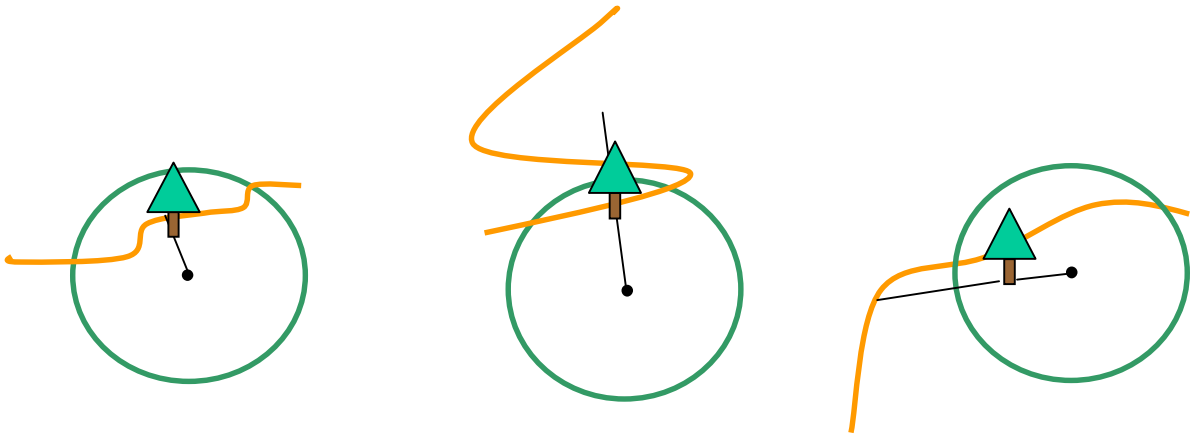


Diagram 1 Diagram 2 Diagram 3

Figure 5. Illustrations of potential edge trees. Only the tree in diagram 1 would be counted as an edge tree.

3.8 DESTRUCTIVE SAMPLING PLOT

The purpose of this plot is to allow the felling of deciduous site trees to obtain ages for site index estimates. If the Large Tree Plot contains deciduous site trees, then a 0.04 ha Destructive Sampling Plot is subjectively located outside the GYM Plot buffer in an area that is similar in site and stand composition to the GYM plot. Note that posts are only temporary to guide the surveyors in determining the destructive sampling plot boundaries. The Destructive Sampling Plot should be laid out using the following procedure.

1. Using a compass, determine the line (315°) and install the NW corner of the Destructive Sampling Plot 14.14 m from plot center along this axis.
2. Using a compass, determine the line (315°) and install the SW corner of the Destructive Sampling Plot 14.14 m from plot center along this axis. However, before installing the SW corner post, check the west side dimension (20 m) of the plot. When satisfied that both distances are correct, install the SW corner post.
3. Using a compass, determine the line (45°) and install the NE corner of the Destructive Sampling Plot 14.14 m from plot center along this axis. However, before installing the NE corner post, check the north side dimension (20 m) of the plot. When satisfied that both distances are correct, install the NE corner posts.
4. Using a compass, determine the line (135°) and install the SE corner of the Destructive Sampling Plot 14.14 m from plot center along this axis. However, before installing the SE corner post, check the east side dimensions of the plot. When satisfied that both distances are correct, install the SE corner posts.

Deciduous site tree measurements to be taken in the destructive sampling plot are described in Section 4.4.2.1.

4. RECORDING PLOT DATA

4.1 OVERVIEW

It is extremely important that all measurements are taken very accurately and that plots are marked and recorded so that they can be relocated in future. Check cruising will be an integral part of this system (sample check cruise criteria is provided in Appendix II).

All Data Cards must be filled out legibly and completely in the field. There are three separate Data Cards for recording data. These are:

1 - Plot Header Card
2 - Large Tree and Sapling Plot Data Card
3 - Regeneration Plot Data Card

All plots will require that all three plot cards be completed. In plots where there are no trees in any of the plots, the cruiser should record this in the comments section of the Plot Header Card.

4.2 PLOT CARD SUMMARY

4.2.1 Plot Header Card – GYM FORMS 1 & 2

- Administrative Fields
- Access Considerations
- Driving Directions to Plot
- Distance and Bearings from Point of Commencement to Tie Point to Plot Centre Administrative Fields
- Location Information
- Legal Information
- Plot Type
- Plot Witness Trees
- General Site Description
- Block History
- Plot Comments
- Plot Sketch

4.2.2 Large Tree and Sapling Plot Card – GYM FORMS 3 & 4, 5 & 6

- Administrative Fields
- Site Index Tree Data (GYM FORM 3 only, heights and conifer ages)
- Plot Comments
- Tree Measurement Data (species, DBH, height, height to live crown, code codes)

4.2.3 Regen Plot Card and Plot Comments – GYM FORMS 7 & 8

- Administrative Fields
- Plot Comments
- Tree Measurement Data (species, height)
- Brush Competition

4.3 PLOT HEADER CARD

4.3.1 Purpose of the Plot Header Card

The purpose of this sheet is to provide general information about how the location is accessed, plot location, and stand history. This information aids cruisers visiting the plot for the first time, revisiting the plot, and for the data analysis phase.

4.3.2 GYM FORM 1 – Plot Header Card

GYM No: The plot number uses the Meridian, Township, Range, and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 is numbered "6 067 10 01").

Declination: Record the local compass declination used to access the plot location.

Directions to Plot: These are located on the front of the Plot Header Card. The access notes start with a known point and notes kilometer markings of physical features (i.e. road junctions and bridges) with specific instructions (Description) on what to do at each location. This information is useful for crews revisiting the plot location during future re-measurements and for plot audits.

Access Considerations: This includes general comments about access to the plot, including mention of helicopter, quad, and boat access.

Point of Commencement to Tie Point: The POC is a tie point identifiable on orthophotos used to access the tie point into the Plot Center. Distance and bearing is recorded from the POC to the tie point (TP) and should be recorded in the GPS.

TP to Plot Center: The cruiser must identify the precise distance and bearing from a point identifiable (TP) on the orthophoto or forest cover maps to the plot center. The distance and bearing must be followed exactly so that the plot is located at the actual grid point on the landbase. The tie point location should also be recorded in the GPS unit.

4.3.3 GYM FORM 2 – Plot Header Card

GYM No: The plot number uses the Meridian, Township, Range, and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 will be numbered "6 067 10 01").

Meas No: This identifies the number of times this plot has been measured. The initial visit is Meas No. 1, the second visit is Meas No. 2, etc. If the plot is established prior to harvest, this measurement should be labeled 0.

Date: The measurement date is recorded using a 6-digit number that is a combination of day (2 digits), month (2 digits) and year (2 digits) (e.g. July 1, 2005 is recorded 070105).

Company: Identifies the name of the consultant company installing the plot.
Cruiser Initials: The initials of the cruisers installing the plot.

NFI Plot: This identifies whether the sample location is on the NFI grid (Yes), or not (No). *If NFI plot numbers are provided by ASRD, an appendix with these numbers will be added and then they could be entered here.*

Location Information: The following seven fields pertain to plot location.

General Location: Identifies the general location of the plot. e.g., at 18 km on the Trout Lk main.

Legal Information:

- Twp.:
- Rge:
- Mer.:
- Sec.:
- L.S.:

GPS Location: Record both the map based Easting and Northing and the actual Field Easting and Northing.

Plot Type: This identifies whether data was recorded on the Regeneration, Sapling, or Large Tree Plots. Record a √ in plot types where data was recorded.

Null Plot: Sometimes trees will not be found in any of the plots at the plot location. In this case, it is important to note that the plot is empty and provide reasons why the plot is empty (i.e., plot lands on a mainline, large rock outcrop, etc).

Plot Centre Witness Tree: The witness tree identifies the plot location and is used to locate the metal pin at plot center. The witness tree is flagged and painted so that it can be seen from a distance. A metal tag with plot information including plot identifier and distance and bearing from the witness tree to the plot center is nailed to the witness tree. If the witness tree is located far from the plot center, the location of the witness tree can also be recorded in the GPS unit. The cruiser will record the species of the tree (Tree), and the azimuth (Az.) and distance (Dist.) from the witness tree to the grid point.

Block History: This includes the Stand Number, Harvest Yr., and Silviculture Records. Where possible, silviculture records identifies whether the stand regenerated naturally or was planted, was planted with genetically improved stock, underwent juvenile or commercial spacing, has been fertilized, or any other silviculture information that the cruiser deems worth recording.

General Site Description:

- **Elevation:** This is recorded using the GPS.
- **Slope Pos.:** The slope position where the majority of the Large Tree Plot is located.
- **Slope % (Percent Slope):** The average slope, in percent, of the Large Tree Plot is recorded (2 digit).
- **Aspect:** The average aspect (direction facing away from the slope) of the Large Tree Plot is recorded in degrees in 3 digit field. e.g. Due west is recorded as 270
- **Moisture Regime:** Xeric (water removed extremely rapidly in relation to supply), Mesic (water removed somewhat slowly in relation to supply – available soil moisture represents climatic inputs), or Hygric (water removed slowly enough to keep soil wet for most of the growing season).
- **Nutrient Regime:** Good, medium or poor based on an assessment of the indicator vegetation or soil properties.

Plot Comments: General comments regarding the plot (and adjacent stand) are recorded here (e.g. cutline through plot, insects or disease present, general poor vigour, explanations for why trees are not

growing as well/better than expected etc.). These comments provide information to analysts and those reviewing plot cards about the plot and stand characteristics.

Plot sketch: A small, hand drawn sketch showing plot location and location of site trees should be drawn (inc. distances to site trees). If a partial plot is established, the stand boundary should be sketched on the map and distances to particular points noted. Other relevant plot features should be identified including cutlines, stream, road, and boulder locations, canopy layers, or other information that the cruisers deem important.

4.4 LARGE TREE AND SAPLING PLOT DATA CARD

4.4.1 Purpose of the Large Tree and Sapling Plot Data Card

The purpose of this card is to record tree data on all trees taller than breast-height within the Large Tree and Sapling Plots. There are two versions of this card; GYM FORM's 3 and 4 and GYM FORM's 5 and 6. GYM FORM 3 contains fields for recording site index data for coniferous and deciduous species. GYM FORM's 4, 5, and 6 are identical and contain fields for recording tree data for both the Large Tree and the Sapling plot.

4.4.2 GYM FORM 3 – Large Tree and Sapling Plot Data

GYM No: The plot number uses the Meridian, Township, Range and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 will be numbered "6 067 10 01").

Meas No: This identifies the number of times this plot has been measured. The initial visit is Meas No. 1, the second visit is Meas No. 2, etc. If the plot is established prior to harvest, this measurement is labeled 0.

Date: The date of measurement is recorded using a 6-digit number which is a combination of day (2 digits), month (2 digits) and year (2 digits). e.g. July 1, 2005 is recorded 070105.

Company: Identifies the name of the consultant company installing the plot.

Cruiser Initials: The initials of the cruisers installing the plot.

4.4.2.1 Site Index Overview

Site trees are the four largest DBH trees of each species (to a maximum of three species) that are healthy and free from defect trees in the Large Tree Plot. Where three or more species exist on the plot, the species selection criteria is determined by:

- Selecting the species that make up the dominant or co-dominant component of the tree canopy, and
- Basing the choice on the block declaration following table:

Declaration	Site tree species selection
Conifer	Give preference to conifer species
Conifer Deciduous	Pick 2 conifer and 1 deciduous
Deciduous	Give preference to deciduous
Deciduous Conifer	Pick 2 deciduous and 1 conifer

For each of the target species where the four largest DBH trees are not suitable for estimating site index, the cruiser can go down the diameter list (in numeric sequence) until all dominant or co-dominant trees within 80% of the plots largest DBH have been assessed. Thus, if the largest tree has a 16 cm DBH, then the range of the diameter list starts at 16cm and goes as low as 12.8 cm DBH. If there are no suitable site trees in this range, then site index data is not collected from the grid point.

A site tree that is suitable for estimating site index must be:

- Dominant or co-dominant
- Have at least three whorls above breast height (conifer only, for growth intercept measurements)
- Free of suppression above breast height
- Free of repression
- Live, standing, and healthy,
- Without disease or damage affecting more than 5% of the total height growth
- Not wolf, open grown, left over from the previous stand, or a veteran
- Vigorous with a full crown.

There are three ways to estimate site index.

1. **Young conifer trees (less than age 20):** The growth-intercept method is used to estimate site index on young conifer trees.
2. **Other Conifer trees (20 years and older):** On other conifer trees, height and cored breast height age are used to estimate site index.
3. **Deciduous trees:** Deciduous trees will not be cored in the Large Tree Plot. If the Large Tree Plot contains deciduous site trees, then an additional 0.04 ha Destructive Sampling Plot will be established to determine deciduous tree ages. Site tree data is recorded in the site tree portion of GYM form 3.

Growth-Intercept: The Growth-Intercept (GI) method requires a minimum of three full years of growth above breast height to determine site index. Where possible, the cruiser should use more than three years growth to produce more accurate predictions of site index. To determine the GI, the cruiser:

1. Measures the total distance (Lgth on the cards) between the first and fourth, fifth, or sixth whorls above breast height (choose the maximum available). The distance between each whorl (internode) must be undamaged so that the true growth potential of the site is being reflected in the measurement.
2. Records the number of years of height growth measured; it will be 3, 4, or 5 years (No whorls on the cards).
3. Determines the average distance between the whorls measured (Avg (m/yr) on the cards.

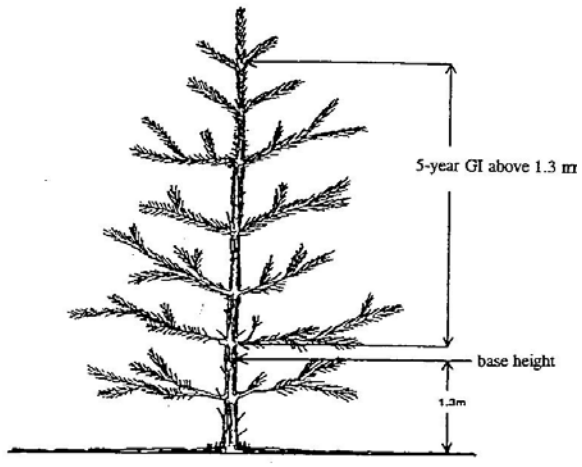


Figure 6. Example of 5-year growth intercept measurement.[3]

Conifer Height/Age: Site index is estimated by measuring the total height and breast height age of the tree. Tree cores must be taken at breast height (or within the same internode as breast height) and include pith. All tree cores must be recounted with a microscope.

Deciduous Height/Age: The proposed methodology is to subjectively locate another 0.04 ha plot (Destructive Sampling Plot) that is as similar to the Large Tree Plot as possible (similar in ecosite, species composition and tree sizes) outside the plot buffer. In this plot, if available, select four suitable deciduous site trees of each deciduous species identified as site trees in the Large Tree Plot (follow the methodology outlined above). These trees will be measured for height and felled to collect a section at breast height to determine breast height ages. This methodology needs to be field-tested and is subject to change.

Note that the choice of site trees may change over time. At each measurement, the cruisers must make independent choices of site trees. This is very important for testing the application of stem analysis based site curves.

Comments: The comments section is for cruisers to provide comments on individual tree growth performance. This section should also be used to identify the trees that were rejected as site trees and include a brief explanation of why the trees are unsuitable for estimating site index.

4.4.2.2 Site Tree Data Collection – Growth Intercept Method

Sector: The plot sector (1, 2, 3, or 4) (as identified in Figure 2).

Cutline: Record whether (Y/N) the chosen site tree is on a cutline.

Tree No: The tree number is recorded in this 4-digit code (enter right justified).

[3] From Huang, S. 1996. Growth intercept models for assessing the site potential of young lodgepole pine stands in Alberta. Alberta Environmental Protection, Land and Forest Service, Forest Management Division. 97 pp.

Sp: The tree species is recorded using a 2-character abbreviation.

DBH (cm): The DBH (1.3 m from point of germination) is taken using a diameter tape. If there is swelling at breast height, record diameter at 1.4 m. If there is still swelling then record diameter at 1.2 m, 1.5 m, 1.1 m, 1.6 m, etc. It is very important that DBH's not measured at breast height are identified as such (with actual height that diameter was taken) in the Comments section of the Large Tree Plot card.

No wrls: The number of whorls occurring above breast height. A minimum of 3, and preferably 5 whorls are needed to determine the GI.

Ttl Length (cm): The total length of the distance between the whorls measured.

Length (Avg) (cm/yr): The average distance between the measured whorls. Thus, if the total length between the 1st and 5th whorls is 95 cm, the Lgth (Avg) is 19 cm.

SI (m): Site index will be derived using chosen equations. Tables may be developed for field crews to estimate SI in the field to check measurements. If these are not available site index will be calculated when the plot data is compiled.

4.4.2.3 Site Tree Data Collection – Height-Age Method

Plot: (T) for Large Tree Plot or (D) for Destructive Sampling Plot

Sector: The plot sector (1, 2, 3, or 4) (Figure 2).

Cutline: Record whether (Y/N) the chosen site tree is on a cutline.

Tree No: The tree number is recorded in this 4-digit code (enter right justified). Selected Site Trees in the Destructive Sampling Plot should be numbered consecutively starting from 1.

Sp: The tree species is recorded using a 2-character abbreviation.

DBH (cm): The DBH (1.3 m from point of germination) is taken using a diameter tape. If there is swelling at breast height, record diameter at 1.4 m. If there is still swelling, then record diameter at 1.2 m, 1.5 m, 1.1 m, 1.6 m, etc. It is very important that DBH's not measured at breast height are identified as such (with actual height that diameter was taken) in the Comments section of the Large Tree Plot card.

Height (m): Height is measured and recorded to the nearest 0.1m for every tree in the Large Tree Plot. When a tree is leaning, height measurements must be taken from the angles of the tree unaffected by height (i.e., not the angle where the tree is leaning to or away from the tree measurer).

BH Age: This field is used to record the breast height age of conifer site trees and deciduous site trees in the Destructive Sampling Plot. All conifer trees must be cored within the whorls surrounding breast height (1.3 m). All cores must contain piths. All ages (from coniferous cores and deciduous sections) must be

recounted in the lab using a high power microscope. This field will be left blank for deciduous site trees within the Large Tree Plot.

SI (m): Site index will be derived using chosen equations. Tables may be developed for field crews to estimate SI in the field to check measurements. If these are not available site index will be calculated when the plot data is compiled.

4.4.3 GYM FORMS 4, 5, and 6 – Tree Data

GYM No: The plot number uses the Meridian, Township, Range, and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 will be numbered "6 067 10 01").

Meas No: This identifies the number of times this plot has been measured. The initial visit is Meas No. 1, the second visit is Meas No. 2, etc. If the plot is established prior to harvest, this measurement is labeled 0.

Date: The measurement date is recorded using a 6-digit number that is a combination of day (2 digits), month (2 digits) and year (2 digits). (e.g., July 1, 2005 is recorded 070105).

Company: Identifies the name of the consultant company installing the plot.

Cruiser Initials: The initials of the cruisers installing the plot.

Plot: This field denotes whether the tree is in the Large Tree Plot ("T") or Sapling Plot (S) and is used by the analyst to denote the plot expansion factor associated with the measured tree.

Sector: The plot sector (1, 2, 3, or 4) (Figure 2).

Cutline: Record whether (Y/N) the tree is on a cutline.

Tree No: The tree number is recorded in this 4-digit code.

Edge Tree: Record whether (Y/N) tree is an edge tree (only applicable for edge plots).

Sp: The tree species is recorded using a 2-character abbreviation.

Planted: Record whether the tree is planted (P), natural (N) or unknown origin (U).

DBH (cm): The DBH (1.3 m from point of germination) is taken using a diameter tape. If there is swelling at breast height, record diameter at 1.4 m. If there is still swelling then record diameter at 1.2 m, 1.5 m, 1.1 m, 1.6 m, etc. It is very important that DBHs not measured at breast height are identified as such (with actual height that diameter was taken) in the Comments section of the Large Tree Plot card.

Ht (m): Height is measured and recorded to the nearest 0.1 m for every tree in the Large Tree and Sapling Plots. When a tree is leaning, height measurements must be taken from the angles of the tree unaffected by height (i.e., not the angle where the tree is leaning to or away from the tree measurer).

Ht to L.C.: Will be measured and recorded on every 5th tree, commencing with tree #1, and continuing with trees 5, 10, 15, 20,etc. Crown heights are not required on deciduous trees. Crown heights are required on any "5th" residual stem encountered within the entire plot.

Crown Class: The position of a stem's crown with respect to the general level of the plot canopy is recorded using a single character code and must be recorded for each tree. The following crown classes are recognized:

D – Dominant: crown extends above the general level of the canopy
C – Codominant: crown forms the general level of the canopy
I – Intermediate: crown is below but extends into the bottom of the general level of the canopy
S – Suppressed: crown is entirely below the general level of the canopy
O – Open-Grown: used only in special situations for trees in very open stands
R – Residual: tree from previous stand.
X – No Crown Class: used for stems for which it is inappropriate to record a crown class e.g. trees with severe lean, broken top, broken stem, standing dead

In plots where the crown is not yet closed, the Crown Class definitions become more difficult to apply (but must still be applied). In these cases, use the level of light reaching each tree to determine Crown Class.

Condition Codes: The condition codes listed in ASRD "PSP Manuals Master Condition Code List March 2005" will be used.

4.5 REGEN PLOT DATA CARD

4.5.1 Purpose of the Regen Plot Data Card

The role of this card is to record tree data within the 0.005 ha Regen plot.

4.5.2 GYM FORM 7 – REGEN PLOT DATA

GYM No: The plot number uses the Meridian, Township, Range and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 will be numbered "6 067 10 01").

Meas No: This identifies the number of times this plot has been measured. The initial visit is Meas No. 1, the second visit is Meas No. 2, etc. If the plot is established prior to harvest, this measurement is labeled 0.

Date: The date of measurement is recorded using a 6-digit number that is a combination of day (2 digits), month (2 digits) and year (2 digits) (e.g. July 1, 2005 is recorded 070105).

Company: Identifies the name of the consultant company installing the plot.

Cruiser Initials: The initials of the cruisers installing the plot.

Plot Type: On this form all trees will be denoted “R” for Regen Plot.

Cutline: Record whether (Y/N) the tree is on a cutline.

Tree No: The tree number is recorded in this 4-digit code (enter right justified). Note that the tree is not tagged.

Edge Tree: Record whether (Y/N) tree is an edge tree (only applicable for edge plots).

Sp: The tree species is recorded using a 2-character abbreviation.

Planted: Record whether the tree is planted (P), natural (N) or unknown origin (U).

Height (m): Height is measured and recorded to the nearest 0.1 m for every tree in the Regen Plot.

Crown Class: The position of a stem’s crown with respect to the general level of the plot canopy is recorded using a single character code and must be recorded for each tree. The following crown classes are recognized:

D – Dominant: crown extends above the general level of the canopy
C – Codominant: crown forms the general level of the canopy
I – Intermediate: crown is below but extends into the bottom of the general level of the canopy
S – Suppressed: crown is entirely below the general level of the canopy
O – Open-Grown: used only in special situations for trees in very open stands
R – Residual: tree from previous stand.
X – No Crown Class: used for stems for which it is inappropriate to record a crown class e.g. trees with severe lean, broken top, broken stem, standing dead

In plots where the crown is not yet closed, the Crown Class definitions become more difficult to apply (but must still be applied). In these cases, use the level of light reaching each tree to determine Crown Class.

Condition Codes: The condition codes listed in ASRD “PSP Manuals Master Condition Code List March 2005” will be used.

4.6 VEGETATION - ECOSITE DATA CARD

4.6.1 Purpose of the Vegetation - Ecosite Data Card

The purpose of this card is to record the ecosystem classification and percent cover of non-tree vegetation within the 0.04 ha Large Tree Plot.

4.6.2 GYM FORM 8 – VEGETATION - ECOSITE DATA

GYM No: The plot number uses the Meridian, Township, Range and Section that the plot is located in. It consists of 1 digit for Meridian, 3 digits for Township, 2 for Range and 2 for Section, in that order. (e.g., the plot in Township 67- Range 10- W-6-Meridian Section 1 will be numbered "6 067 10 01").

Meas No: This identifies the number of times this plot has been measured. The initial visit is Meas No. 1, the second visit is Meas No. 2, etc. If the plot is established prior to harvest, this measurement is labeled 0.

Date: The measurement date is recorded using a 6-digit number that is a combination of day (2 digits), month (2 digits) and year (2 digits). (e.g. July 1, 2005 is recorded 070105).

Company: Identifies the name of the consultant company installing the plot.

Cruiser Initials: The initials of the cruisers installing the plot.

Shrub Layer: Record the percent cover (A = <1%, B = 1-5%, C = 6-20%, D = 21-50%, E = >50%) of the listed shrubs present in the 0.04 Large Tree Plot.

Mosses/Lichens: Record the percent cover (A = <1%, B = 1-5%, C = 6-20%, D = 21-50%, E = >50%) of the listed mosses and lichens present in the 0.04 Large Tree Plot.

Herb Layer: Record the percent cover (A = <1%, B = 1-5%, C = 6-20%, D = 21-50%, E = >50%) of the listed herbs present in the 0.04 Large Tree Plot.

Grasses/Sedges: Record the percent cover (A = <1%, B = 1-5%, C = 6-20%, D = 21-50%, E = >50%) of the listed grasses and sedges present in the 0.04 Large Tree Plot.

Natural Subregion: Record the natural subregion (3 letter code) that the plot is in.

Ecosite (Map): Record the mapped ecosite for the location of the plot.

Ecosite (Field): Record the ecosite observed in the field.

APPENDIX I – FIELD CARDS

Weyerhaeuser Canada

GYM FORM 1

PLOT HEADER CARD

GYM No.	

PLOT LOCATION

Declination	

Access Considerations:	
Directions to Plot:	
Km	**Description**

Directions to Plot cont'd:	
Km	**Description**

POC to Tie Point:	
Tie Point to Plot Centre:	
Tie Point GPS Location:	

Weyerhaeuser Canada

GYM FORM 2

PLOT HEADER CARD

GYM No.	Meas. No.	Date dd/mm/yr			Company	Cruiser Initials	NFI Plot
							Yes / No

LOCATION INFORMATION					General Location:							
Legal Information					GPS Location				Plot Type			
Twp.	Rge.	Mer.	Sec.	L.S.	Map (Easting/Northing)		Field (Easting/Northing)		Tree	Sapling	Regen	Null Plot

Plot Center Witness Trees			General Site Description				Block History	
Tree No.	Az.	Dist.	Elevation		Aspect		Stand No:	
			Slope Pos		Moisture		Harvest Yr.:	
			Slope %		Nutrient		Silv Records:	

PLOT COMMENTS

	Plot Sketch

Weyerhaeuser Canada

GYM FORM 3

LARGE TREE AND SAPLING PLOT DATA CARD

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

SITE INDEX TREE DATA

Growth Intercept Method

Sector	Cut Line	Tree No	Sp.	DBH (cm)	No wrls	Ttl Lgth (cm)	Lgth Avg (cm/yr)	SI (m)

Height Age Method

Plot (T/D)	Sector	Cut Line	Tree No	Sp.	DBH (cm)	Ht. (m)	BH Age	SI (m)

COMMENTS

Weyerhaeuser Canada

GYM FORM 4

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

LARGE TREE AND SAPLING PLOT CARD

Plot (T/S)	Sector (1,2,3,4)	Cut Line	Tree No.	Edge Tree	Sp.	Planted (P/N/U)	DBH (cm)	Ht. (m)	Ht. to L.C. (m)	CC	Condition Codes	Comments

Plot Type: Large Tree Plot contains trees ≥ 5.0cm DBH. Sapling Plot contains trees over 1.3m and < 5.0 cm DBH

Weyerhaeuser Canada

GYM FORM 5

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

LARGE TREE AND SAPLING PLOT CARD

Plot (T/S)	Sector (1,2,3,4)	Cut Line	Tree No.	Edge Tree	Sp.	Planted (P/N/U)	DBH (cm)	Ht. (m)	Ht. to L.C. (m)	CC	Condition Codes	Comments

Plot Type: Large Tree Plot contains trees ≥ 5.0cm DBH. Sapling Plot contains trees over 1.3m and < 5.0 cm DBH

Weyerhaeuser Canada

GYM FORM 6

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

LARGE TREE AND SAPLING PLOT CARD

Plot (T/S)	Sector (1,2,3,4)	Cut Line	Tree No.	Edge Tree	Sp.	Planted (P/N/U)	DBH (cm)	Ht. (m)	Ht. to L.C. (m)	CC	Condition Codes	Comments

Plot Type: Large Tree Plot contains trees ≥ 5.0cm DBH. Sapling Plot contains trees over 1.3m and < 5.0 cm DBH

Weyerhaeuser Canada

GYM FORM 7

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

REGEN PLOT DATA

Plot	Cut Line	Tree No.	Edge Tree	Sp.	Planted (P/N/U)	Ht. (m)	CC	Condition Codes	Comments
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									
R									

Weyerhaeuser Canada

GYM FORM 8

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

SHRUB LAYER		Code
Green alder	ALNUCRI	
Red osier dogwood	CORNSTO	
Labrador tea	LEDUGRO	
Dwarf bilberry	VACCCAE	
Blueberry	VACCMYR	
Bearberry	ARCTUVA	
Honeysuckle	LONIINV	
Black current	RIBELAC	
Red current	RIBETRI	
Prickly rose	ROSAACI	
Wild raspberry	RUBUIDA	
Thimble berry	RUBUPAR	
Buffalo-berry	SHEPCAN	
Bog cranberry	VACCVIT	
White meadowsweet	SPIRBET	
Snowberry	SYMPALB	
MOSSES/LICHENS		
Feathermoss	PLEUSCH	
Stairstep moss	HYLOSPL	
Knight's plume	PTILCRI	
Haircap moss	POLYCOM	
Peat moss	SPHASPP	
Green dog lichen	PELTAPT	
Reindeer lichen	CLADSPP	

HERB LAYER		Code
Common horsetail	EQUIARV	
Meadow horsetail	EQUIPRA	
Woodland horsetail	EQUISYL	
Cloudberry	RUBUCHA	
Wild sarsaparilla	ARALNUD	
Running raspberry	RUBUPUB	
Oak fern	GYMNDRY	
Pink wintergreen	PYROASA	
Heart-leaved arnica	ARNICOR	
Aster sp.	ASTESPP	
Bunchberry	CORNCAN	
Fireweed	EPILANG	
Wild strawberry	FRAGVIR	
Twin-flower	LINNBOR	
Lily-of-the-valley	MAIACAN	
Tall mertensia	MERTPAN	
Palmate coltsfoot	PETAPAL	
Bishop's cap	MITENUD	
GRASSES/SEDGES		
Hairy wild rye	ELYMINN	
Marsh reed grass	CALACAN	
Sedge sp.	CARESPP	

Code	% Cover
A	< 1
B	1 - 5
C	6 - 20
D	21 - 50
E	> 50

Natural Subregion	Ecosite (Map)	Ecosite (Field)	Comments:

Weyerhaeuser Canada

GYM FORM 8

GYM No.	Meas. No.	Date dd/mm/yr	Company	Cruiser Initials

PLOT COMMENTS

APPENDIX II – G&Y MONITORING PLOT ACCURACY STANDARDS

Approximately 5 % of all plots will be check-cruised. Plots to be check-cruised will be chosen randomly and field checked within the same field season as the original measurement. The following standards will be considered as the minimum in accuracy expected on the Growth and Yield Monitoring Plots (GYMP). Because certain items are more important than others in GYMP's all standards are weighted according to their importance level (Table 1).

Table 1. Check cruise importance rankings.

Rating Symbol	Relative Weighting
XXX	Extremely Important
XX	Very Important
X	Important

Table 2. Plot accuracy standards.

Item	Maximum Allowed Deviation From Check Cruise	Importance Level
Plot Number	0	XXX
Date	0	XX
Cruiser Initials	0	X
Plot Established in Correct Ground Location	± 80 meters	XXX
Diagonal to corner posts - Bearing or Alignment	± 10 cm if corner is visible from center	XX
Distance From Center to Corner posts	± 5 cm unless significant brush is found between center and corner	XXX
Hardwood Age & Softwood Age (1 site tree of each species will be audited.)	± 10%	XXX
Growth Intercept length	0	XXX
Correct Number of Trees Tagged and Tallied	± 0.5%	XXX
5% of trees audited for:		
DBH (see Table 3)	± 1% but with the following minimums: • Smooth barked trees which may include aspen, poplar, balsam fir, pine - 2 mm • Rough barked trees which may include spruce, tamarack, and birch = 3 mm	XXX
Species	0	XXX
Height	See Table 4	XXX

Table 3. Maximum allowable DBH deviations.

Check Cruise	Maximum Allowable Tree DBH Deviation	
Diameter (mm)	Smooth Barked Tree (±mm)	Rough Barked Tree (±mm)
< 51 (Saplings)	1	1
51- 250	2	3
251- 350	3	3
351- 450	4	4
451- 550	5	5
551- 650	6	6
651- 750	7	7
751- 850	8	8
851- 950	9	9
951-1050	10	10
1051-1150	11	11

Table 4. Maximum allowable height deviations.

Height (m)	Max Deviation (m)
1.3- 2.0	0.1
2.1- 4.0	0.2
4.1- 6.0	0.3
6.1- 8.0	0.4
8.1-10.0	0.5
10.1-12.0	0.7
12.1-14.0	0.8
14.1-16.0	0.9
16.1-18.0	1.0
18.1-20.0	1.1
20.1-22.0	1.3
22.1-24.0	1.4
24.1-26.0	1.5
26.1-28.0	1.6
28.1-30.0	1.7
30.1-32.0	1.9
32.1-34.0	2.0
34.1-36.0	2.1
36.1-38.0	2.2