

## Standard Operating Procedure 16

### Measuring Coarse Woody Debris and Stumps

#### Overview

This SOP describes the tasks required to measure Coarse Woody Debris (CWD) and stumps within the Large Tree Plot.

#### Glossary of definitions:

**Coarse Woody Debris (CWD):** Dead woody material substantially detached from the parent tree and in contact with the ground, and which is  $\geq 10$  cm in diameter in both of two perpendicular directions (hence comprises large branches and logs). It does not include cut or uprooted trees that have been "hung up" on other trees: these will be considered as tree stems.

**Diameter at breast height (DBH):** The stem diameter of a tree measured at breast height. For the purpose of Ground Plot measurement, diameter at breast height implies diameter measured outside or over bark (dob). On sloping ground breast height is measured on the uphill side of the tree.

**Level of decay:** One of three stages of decay that will influence, over time, how much wood or carbon remains within a piece of CWD, or in a stump:

**1) Sound.** Intact with little evidence of decay (essentially hard, solid wood). Logs generally circular in cross section, and can support their own weight. Leaves, twigs and branches may still be present, and bark is generally intact.

**2) Moderate stage of decay.** Some sections may be pulled away by hand. Bark has generally become detached, and any branches have mostly fallen off. Logs still largely circular in cross section, but hollows are developing at ends and where branches have detached. Stumps beginning to hollow out at top. In wet forests, moss may exceed 50% cover on the wood.

**3) Advanced stage of decay.** Mostly rotten and hollow, and although the outer 'shell' may sometimes appear solid the inner material is able to be crumbled in the hand. Log unable to support its own weight and has collapsed to be elliptical in cross section. Stumps mostly collapsed. Other plants may be growing on the decaying wood (in wetter forest types), and there may be high moss cover.

**Lignotuber:** Large, woody, rounded swellings located at the base of a stem, tree trunk or stump.

**Stump:** The remnant basal portion of a tree, less than 1.3 m in height but  $\geq 10$  centimetres diameter at the top. Taller basal portions will be considered as tree stems. Stumps include dead lignotubers.

#### Equipment list

Clip board and pens

CWD and Stumps Form

Diameter tape

SOP 16 Measuring Coarse Woody Debris and Stumps (version 1.0)

Tape measure (minimum 15 m)

Caliper for CWD diameter (preferably with foldable jaws)

#### Procedure:

This SOP assumes that the Large Tree Plot has already been set-up as per SOP 13: Measuring a Large Tree Plot.

#### Coarse Woody Debris

*Identify all individual pieces of CWD in the plot.*

Determine for each potential piece of CWD whether it meets the size requirement, i.e. whether it is  $\geq 10$  cm in diameter in both of two perpendicular directions. If fallen limbs or logs are branched, all subsidiary branches that meet the CWD size criteria should be included, regardless of whether they are touching the ground or held up in the air.

*Measure diameter of each piece of CWD.* Using a diameter tape or caliper, allocate each piece of CWD (or portion thereof) within the Large Tree Plot to a diameter category (10 cm increments, as per the Field Form). Pieces that taper in diameter, such that two or more diameter classes are represented within the same piece, shall be treated as two or more pieces. For pieces that are clearly not cylindrical in cross section, estimate the average diameter from the longest and shortest dimensions.

*Estimate the level of decay of each piece of CWD.* Using the three-class system assign a decay level: (1) sound; (2) moderate stage of decay; or (3) advanced stage of decay (see Glossary, 'Level of decay', for definition).

*Measure the length of each piece.* Using a tape measure, measure the length of each piece of CWD (in metres, to the nearest 0.1 m).

If a piece of CWD extends outside the plot, only include that portion that remains within it. If the end of a piece is sharply tapered, broken or hollow, estimate a value for length that will result in an appropriate (approximate) volume being calculated.

#### Piles of slash

It is too difficult to estimate individual lengths of CWD when they are contained within a pile of logging slash. Thus, an approximate volume of the CWD contained therein will be calculated from the estimated pile dimensions.

*Estimate the average dimensions:* Using a tape measure, measure the height & width & length (in metres, to the nearest 0.1 m) of the slash pile.

*Estimate the average level of decay of pieces in the slash pile:* Using the three-class system, estimate the average level of decay of CWD in the slash pile.

## Stumps

*Identifying tree stumps:* Identify all stumps less than 1.3 m in height but  $\geq$  10 centimetres diameter at the top, with the majority of their cross-section within the Large Tree Plot (refer to Figure 16.2 for procedure on borderline stumps).

*Measuring stump diameter:* Using a tape or caliper, measure the top diameter of each stump to the nearest cm. For stumps that are clearly not cylindrical in cross section, or partially hollowed out, estimate the average diameter from the widest and narrowest dimensions (to give an estimated diameter that will result in an appropriate volume calculation).

*Estimate the level of decay of each stump:* Using the three-class system: (1) sound; (2) moderate stage of decay; or (3) advanced stage of decay (see Glossary, 'Level of decay', for definitions) allocate a level of decay to each stump.

*Measure and record the height of the stump:* Using a tape measure or height pole, measure the height of each stump (in metres, to the nearest 0.1 m). If the top of the stump is sharply tapered, broken or hollow, estimate a value for height that will result in an approximate volume being calculated.

*Measuring a coppicing stump:* Stumps are generally dead; however, if the stump of a cut tree is alive and coppicing, then the stump is measured if it is < 1.3 m in height but  $\geq$  10 cm diameter at the top.

If the coppicing stems are < 10 cm diameter they should be measured as part of the Small Tree Plot if they are within the boundary of the plot (refer to SOP 14: Measuring a Small Tree Plot). If the coppicing stems are  $\geq$  10 cm diameter they should be measured as part of the Large Tree Plot (refer to SOP 13: Measuring a Large Tree Plot). Refer to Table 16.1, Appendix 16.2 for the correct allocation of stems and stumps.

## Data and Information:

*Complete the Identification section at the top of the Coarse Woody Debris and Stumps Form:* Fill in the Sample Point Identification Code, Bioregion, the SOP version number, Date, Contractor Company Name and the Names of each Contractor Field Crew member present, in the <sample\_point\_ID>, <bioregion>, <SOP version>, <date> and <contractor\_company> fields. Against each <field\_crew\_member\_number> fill in the Contractor Field Crew member surname

<field\_crew\_member\_surname> and first name <field\_crew\_member\_firstname>. The Contractor Field Crew Leader should be the first name recorded in the Identification section of the form. The crew member who enters information on the form (i.e. the scribe) checks the box <Scribe> next to their name.

*Record LTP slope adjusted radius:* In the slope adjustment section of the CWD and Stumps Form, record the slope adjusted LTP radius in the <LTP Radius> field.

*Record the length of each CWD piece:* In the Coarse Woody Debris section of the CWD and Stumps Form, record the length of each separate CWD piece in the form field that corresponds to the appropriate <Diameter Class> and <Level of decay>.

If there is no CWD within the Large Tree Plot write words to that effect on the Coarse Woody Debris section of the Coarse Woody Debris and Stumps Form, so that an audit of the data will not confuse an absence of data for a failure to assess the parameter.

*Record the dimensions of any piles of slash and its average level of decay:* In the Slash Pile section of the Coarse Woody Debris and Stumps Form, record in metres (to the nearest 0.1 m) the height of the slash pile in the <Height> field, the width pile in the <Width> field and the length of the slash pile in the <Length> field. Record the average level of decay of the slash pile in the <Level of decay> field.

If there is no pile of slash within the Large Tree Plot write words to that effect on the Slash Pile section of the Coarse Woody Debris and Stumps Form.

*Record the height of each stump:* In the Stumps section of the Coarse Woody Debris and Stumps Form, record the height of each stump in the form field that corresponds to the appropriate <Diameter Class> and <Level of decay>.

If there are no stumps within the Large Tree Plot write words to that effect on the Stumps section of the Coarse Woody Debris and Stumps Form.

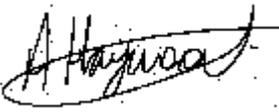
*Record any comments:* Record any additional information relating to the plot in the <Comments> field.

*Complete the Field Form Check section at the bottom of the form:* The Contractor Field Crew Leader initials the <Team Leader Initials> field, enters the date <Date checked> and writes down any comments about data verification in the <comments> field.

*Complete the Data Entry Check section at the bottom of the form:* the Field Crew member who enters the data into the Working Database writes their surname in the <Contractor Surname> field and the date data entry was completed for the form in <Date entered>.

An example filled *Coarse Woody Debris and Stumps Form* is given in Figure 16.1, Appendix 16.1.

Version (current)	Version (previous)	Author	Date	Summary of changes
1.0		Arn Tolsma		
1.0		NB29	15/08/2010	Edited Arns SOP – Recreated Field Form in xls
1.1	1.0	mw0a	04/07/2011	Amendments made post field season 1

<b>Endorsed</b>		<b>Date</b> <b>18/02/2011</b>
<b>Name:</b>	Andrew Haywood	
<b>Position:</b>	Manager, Knowledge Unit	
<b>Division/Branch:</b>	Forests and Parks Division / Management and Operations Branch	

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#### Appendix 16.1

**Figure 16.1:** Example Coarse Woody Debris and Stumps Form

IDENTIFICATION			
Sample Point ID	PE2875N2430	SOP 16: Measuring Coarse Woody Debris and Stumps	
Bioregion	SEC	SOP version	1.0
Date (DD/MM/YYYY)	17/06/2010	Contractor Company	Company Name Ltd
Field Crew Member #	Contractor Field Crew Member Surname	Contractor Field Crew Member First Name	Scribe
1 (Team Leader)	Smith	Jo	<input checked="" type="checkbox"/>
2	Jones	Kim	<input type="checkbox"/>
3	Williams	Alex	<input type="checkbox"/>
4			<input type="checkbox"/>
5			<input type="checkbox"/>

Slope Adjustment LTP Radius (m.cm)	11.3
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COARSE WOODY DEBRIS			
Record length of each separate piece of CWD (m.cm)			
Diameter Class	Level of Decay		
	1 - Sound	2 - Moderate decay	3 - Advanced decay
10-20 cm		0.8, 0.5, 1.0, 2.0, 2.0, 2.0, 2.5	1.8, 2.5, 2.2, 1.8, 2.0, 1.0, 1.5, 6.1
20-30 cm		0.6, 2.5, 6.2, 2.2, 3.0	7.0, 2.5
30-40 cm		2.5, 1.2	3.5
40-50 cm			
50-60 cm			
60-70 cm		5.3	
70-80 cm			
80-90 cm			
90-100 cm		0.8	
greater than 100cm			

SLASH PILE							
Height (m.cm)	-	Width (m.cm)	-	Length (m.cm)	-	Decay Class	-

STUMPS			
Record height of each separate stump (m.cm)			
Diameter Class	Level of Decay		
	1 - Sound	2 - Moderate decay	3 - Advanced decay
10-20 cm			
20-30 cm			
30-40 cm			0.6
40-50 cm			
50-60 cm			
60-70 cm			
70-80 cm			
80-90 cm			
90-100 cm			
greater than 100cm			

**COMMENTS**

No slash piles in this plot.

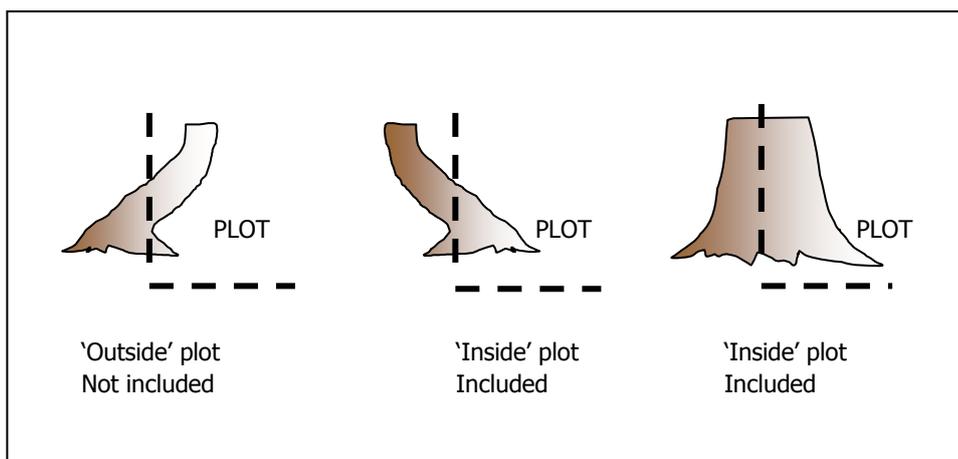
  

<b>Field Form Check</b>			
Team Leader Initials	JS	Comments	
Date checked (DD/MM/YYYY)	17/06/2010		
<b>Data Entry Check</b>			
Date entered (DD/MM/YYYY)	22/06/2010	Contractor Surname	Williams

## Standard Operating Procedure 16 Measuring Coarse Woody Debris and Stumps Appendix 16.2

**Table 16.1:** Allocating stumps or stems to their correct measurement plot.

Category	DBH	Height	Treated as:	Procedure
Dead Stem or Stump	< 10 cm	≥ 1.3 m	Small Tree	SOP 14
	< 10 cm	< 1.3 m	Understorey	SOP 15
	≥ 10 cm	< 1.3 m	Stump	SOP 16
	≥ 10 cm	≥ 1.3 m	Large Tree	SOP13
Live Stump with coppice stems	Stump ≥ 10 cm	Stump < 1.3 m	Stump	SOP 16
	Stems < 10 cm	Stems ≥ 1.3 m	Small Tree	SOP 14
	Stems ≥ 10 cm	Stems ≥ 1.3 m	Large Tree	SOP 13



**Figure 16.2:** Examples of borderline stumps.