

## SOP 8: Coarse Woody Debris

Version 1.33 (February 2021)

Time estimate: 10 minutes

### Overview

Coarse woody debris includes downed trees and large branches on the ground. As logs deteriorate on the ground, they provide special habitat for many animals, fungi, bryophytes, and other forest organisms. The amount of coarse woody debris is an important indicator of ecological health or integrity. Unlike managed forests with high levels of timbering, the forests on the lands of the National Park Service include extensive areas where most trees contribute to coarse woody debris at the end of their lives instead of being harvested. In addition to being a special wildlife resource, coarse woody debris also contributes to forest fuel loads. Knowing about forest fuel loading on the landscape can enable better understanding of wildland fire risk.

For measuring coarse woody debris, use the 40.0 meter crossed tapes that were laid out in an east/west and north/south direction when establishing the plot, as described in SOP 3: Site Selection and Plot Establishment. During plot revisits, you will need to use the 30m tape to add 10 meters to the west and east ends of the east/west transect, as the tapes were laid out differently than they were during plot establishment.

### Step by Step Instructions

Starting at one end of either the 40.0 meter east/west (X axis) or north/south (Y axis) crossed tapes, tally each piece of coarse woody debris that intersects with the line. To be tallied in this protocol, the CWD piece must be  $\geq 7.5$  cm diameter and  $\geq 1.0$  m long. CWD also includes dead trees leaning  $>45$  degrees from vertical, measured along the bole (tree trunk).

### CWD does not include:

- a. Woody pieces  $<7.5$  cm (3.0 inches) in diameter at the point of transect intersection.
- b. Woody pieces  $<1.0$  m in length.
- c. Dead trees leaning 0 to 45 degrees from vertical as these are recorded as snags, not CWD.
- d. Trees showing any sign of life.
- e. Stumps that are rooted in the ground (i.e., not uprooted).
- f. Bark that is no longer attached to a bole or limb. Bark attached to a piece is counted.
- g. Roots or main bole below the root collar.
- h. Very decomposed logs reduced to slightly elevated 'humps' on the ground without structural integrity, and less than 12.7 cm (5.0 inches) in height from the surrounding forest floor.
- i. The top of a dead tree if it is partially broken and leaning over horizontal to the forest floor, and there is less than a 50% breakage of the leaning dead top with the appropriate lean.

On the datasheet record the transect (X or Y) that the piece intersects, where the tape running east/west is the X transect and the tape running north/south is the Y transect. With the aid of a Biltmore stick (or DBH tape if more convenient) record diameter to nearest centimeter where the piece intersects the transect and also assign it a decay class (Table 8.1). Do not use a meterstick to measure the CWD diameter.

Some tips on using the Biltmore stick:

- a. Keep the stick perpendicular to your reach
- b. Hold the stick the right distance from your eye (25 inches is standard)
- c. Do not move your head when reading the far end (this causes a shift in the intersect with the piece of wood you are measuring)

If the log is hollow and could provide cover or habitat for a small mammal then record it as hollow by writing “yes” in the “Hollow?” column on the datasheet, otherwise “no”. Finally, in the notes column record anything unusual about the transect placement or the pieces of CWD. If the tree species of the CWD can be easily identified, record that information in this space. Use this space to identify which pieces of CWD are connected to each other, or which diameters were measured from the same piece of CWD, if the same piece crosses a transect more than once.

On occasion a transect may be less than 40.0 meters in length. This can happen when the transect would extend outside the park boundary or within a maintained right-of-way where CWD would be cleared. In those cases, the shortened transect length should be recorded in the appropriate field on the top of the field form.

Once finished with the first transect of 40.0 m length, proceed to the second transect that was laid out and record all coarse woody debris along that transect as well.

Also, don’t forget to put your initials on the top of the datasheet, as the data taker.

**Table 8.1. Coarse woody debris and snag decay classes adapted from Pyle and Brown (1998) and U.S. Forest Service (2005).**

| <b>Class</b> | <b>Bark</b>                                        | <b>Log shape and integrity</b>               | <b>Color of exposed wood</b>                           | <b>Texture of rotten portions</b>                                                           | <b>Primary surface substrate</b>                                                                                     | <b>Branches and twigs</b>                                 |
|--------------|----------------------------------------------------|----------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| 1            | Firmly attached                                    | Round and solid. Freshly fallen, intact logs | Fresh color, not stained by weathering                 | Intact, no rot or conks. Stem decay absent.                                                 | Sound, tight bark                                                                                                    | Branches retain many small twigs                          |
| 2            | If present, decayed, faded and not firmly attached | Round and solid                              | May be bleached and relatively smooth (like driftwood) | Mostly intact, sapwood partly soft and starting to decay, but can't be pulled apart by hand | Decayed bark and hard wood - impenetrable with fingernail or pen point, may be case hardened with power wood beneath | Branches retain some small twigs, often with peeling bark |

|   |                                                             |                                                                                                                                            |                                  |                                                                     |                                                                                                                              |                                                                         |
|---|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 3 | Generally absent, except in <i>Betula</i> and <i>Prunus</i> | Round and firm, piece supports its own weight                                                                                              | Reddish-brown, or original color | Hard, large pieces of sapwood can be pulled apart by hand.          | Soft wood - will spring back if compressed, easily penetrated with fingernail or pen point                                   | No small twigs, but branch stubs will not pull out                      |
| 4 | Absent                                                      | Oval or flattened, no longer a solid piece, though some hard chunks remain. Piece does not support its own weight, but maintains its shape | Reddish or light brown           | Soft, small blocky pieces, a metal pin can be pushed into heartwood | Very spongy wood - responds to finger pressure and may exude moisture. Powder wood flows through fingers like coarse sawdust | No small twigs, branch stubs pull out                                   |
| 5 | Absent                                                      | Quite flat or flat with some rounding. Piece no longer maintains its shape, but spreads out on the ground, is at least 12.7 cm high        | Red-brown to dark brown          | Soft, powdery when dry                                              | Loosely aggregated powder wood                                                                                               | No small twigs. Branch stubs and pitch pockets have usually rotted down |

## Equipment List

Biltmore stick and/or DBH tape

Chaining Pin

30 m tape

2 x 50 m tapes, also used for plot set up

## Completing Field Data Forms

A detailed list of field descriptions for each field on the field data form associated with this SOP, (Figure 8.1) can be found below in Table 8.2.



**Table 8.2.** Field data form field names and descriptions.

| Field Name                                        | Field Description                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SOP 8: Coarse Woody Debris</b>                 |                                                                                                                                                                                                                                                                                                                                                                          |
| Data Taker Initials                               | Initials of individual collecting the data. In some cases there will be one person calling out data, while another records. Data taker initials should be the one with greatest knowledge and experience overseeing the calls being made.                                                                                                                                |
| Reviewed by                                       | Initials of individual who reviewed completed data sheet for SOP 8 elements. Ideally this should be someone other than individual who recorded data on this portion of datasheet.                                                                                                                                                                                        |
| Transect X length <i>and</i><br>Transect Y length | Default length is 40m. However, in some instances a transect may be shortened if it intersects a restricted area such as a road or regularly mowed area or if it hits the park boundary. This field will be pre-populated on revisit forms, correct/update if necessary.                                                                                                 |
| Transect                                          | Circle X or Y, where X is the tape measure running east/west and Y is the tape measure running north/south.                                                                                                                                                                                                                                                              |
| Diameter                                          | Measure diameter of CWD with aid of Biltmore stick or DBH tape (in cm) to nearest cm.                                                                                                                                                                                                                                                                                    |
| Decay Class                                       | Assign the piece to one of the five decay class categories listed on the bottom of the datasheet.                                                                                                                                                                                                                                                                        |
| Hollow                                            | If the log is hollow and could provide cover or habitat for a small mammal then record it as hollow by writing yes on the datasheet, otherwise no.                                                                                                                                                                                                                       |
| Notes                                             | Record anything unusual about the transect placement or the pieces of CWD. If the tree species of the CWD can be easily identified, record that information in this space. Use this space to identify which pieces of CWD are connected to each other, or which diameters were measured from the same piece of CWD, if the same piece crosses a transect more than once. |

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## Revision History

Version numbers are incremented by decimals where minor grammatical changes or textual clarifications are incremented by hundredths (e.g., 1.01, 1.02, 1.03, ..., etc.) and moderate changes, such as equipment updates or changes in methodology that do not impact analysis are incremented by tenths (e.g., 1.1, 1.2, 1.3, ..., etc.). Whole number increments (e.g., 1.0, 2.0, 3.0,

..., etc.) are reserved for major revisions. Of course, differentiating between what is moderate vs. major may not always be clear, but it is anticipated that with a little “common sense” and discussion protocol leads can adequately document and track revisions through time to the benefit of future data users. It should be noted that prior to 2020 all revisions were incremented by tenths.

### Revision History Log

| Version # | Date      | Revised by            | Changes                                                                                                                                                                                                                                                                                                               |
|-----------|-----------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1       | 01/15/12  | B. Moore and R. White | <ul style="list-style-type: none"> <li>- Minor editorial changes adding clarification following initial field season</li> <li>- In addition to Biltmore stick, added DBH tape as an acceptable method of measuring diameter if more convenient</li> <li>- Reminder to add data taker initials on data form</li> </ul> |
| 1.2       | 9/27/12   | B. Moore and R. White | <ul style="list-style-type: none"> <li>- Minor editorial changes to reduce confusion after 2012 field season.</li> </ul>                                                                                                                                                                                              |
| 1.3       | 4/7/18    | C. Bledsoe            | <ul style="list-style-type: none"> <li>- Changed “Time allotted” to “Time estimate”</li> <li>- Added tips on using Biltmore stick</li> <li>- Minor editorial changes to reduce confusion and incorporate plot revisits.</li> </ul>                                                                                    |
| 1.31      | 3/24/2020 | B. Moore              | <ul style="list-style-type: none"> <li>- Moved Revision History to end of SOP and added more detailed list of changes made to date</li> </ul>                                                                                                                                                                         |
| 1.32      | 8/10/2020 | B. Moore              | <ul style="list-style-type: none"> <li>- Address grammatical changes and clarifying comments made by IMD regional program manager</li> </ul>                                                                                                                                                                          |
| 1.33      | 2/19/2021 | B. Moore              | <ul style="list-style-type: none"> <li>- Added image of field data form and table of field data form descriptions (moved from SOP 14)</li> <li>-</li> </ul>                                                                                                                                                           |