



**Oregon Department of Forestry**  
State Forester's Office  
2600 State Street  
Salem, OR 97310-1336  
[www.oregon.gov/ODF](http://www.oregon.gov/ODF)

**USDA Forest Service**  
Pacific Northwest Research Station  
620 SW Main St, Suite 502  
Portland, OR 97205  
<https://www.fs.usda.gov/pnw/>



May 14, 2019

Oregon Department of Forestry (ODF) and USDA Forest Service, Forest Inventory Analysis (FIA) responses to Representative Shelly Boshart Davis' questions regarding Forest Carbon Report Presentation presented to the Joint Committee on Carbon on March 11, 2019.

1. It appears that in the Forest Carbon report that was presented in front of the Joint Committee on Carbon Reduction by the Department of Forestry and the Forest Inventory Analysis that the 'down woody debris' carbon pool declined substantially; however, when I searched Palmer et al. (2018), there didn't appear to be any 'down woody' flux data available in the report or in the supplemental tables. How was down woody debris calculated and where are the tables from which the data came from?
  - Palmer et al. (2018) did not attempt to include estimates of change for down wood. The only estimates of change included in that report are based on FIA's procedure to estimate growth, removals, and mortality for live and dead trees. The estimates of down wood were limited to current volume and biomass.
  - Down wood is measured in the field and compiled using standard forestry procedures (<https://www.fs.usda.gov/treesearch/pubs/13615>). Change estimates are based on the difference in field measurements at two points in time. Inventory estimation procedures are documented in the FIADB Population Estimation User Guide, found at: <https://www.fia.fs.fed.us/library/database-documentation/index.php>.
  - All of the plot measurement data including tables with raw and compiled down wood measurements are found at: <https://www.fs.fed.us/pnw/rma/fia-topics/inventory-data/index.php>.
2. There appears to have been a large decline in down woody debris across all ownership classes. Can you help me understand why there would be such a drastic decline in down woody debris in what appears to be such a short sampling timeframe?
  - Using Table C62 for down wood stocks and Table B9 for flux, and converting the latter figures from CO<sub>2</sub>e to C to match units, our estimates indicate a decline of 1.2% in down wood carbon per year, or a 12% decline over a 10 year period for the state as a whole. The estimates range from an increase of 0.8% per year on National Forest reserved (not statistically significant) to a decline of 2.7% per year on private corporate. We don't have decades of measuring down wood to know how these changes over the last 16 years compare with previous time periods, but we analyzed the data a few different ways to try to understand the changes better. The largest

decreases (75%) occurred in undisturbed stands, which occupied 67% of the landscape, for a loss of 0.26 MT CO<sub>2</sub>e per acre per year. Across owners, this rate was highest on private corporate lands, with a loss of 0.72 MT CO<sub>2</sub>e per acre per year on undisturbed forest. The decrease on undisturbed stands indicates that the input of mortality trees to down wood is less than the output of decaying down wood. Indeed, the carbon in mortality trees was higher across all owners than on private corporate lands (0.86 vs. 0.47 MT CO<sub>2</sub>e per acre per year). Since the standing dead tree pool was essentially unchanged on all ownerships that would indicate less input to the down wood pool from mortality. While the amount of cut trees was much higher on private lands than on public lands, logging slash that is not removed or burned tends to be small and decay quickly.

3. If there were active forest management on some of the sites that were measured for down woody debris, it could mean that much of the woody debris that was measured in the first measurement cycle was moved into piles and according to the presentation, piles were not measured. Could this be the cause of the drastic decline in woody debris across ownership classes?
  - Down wood piles were measured, but were not included in the report because field estimates are highly variable and problematic (pile density is often over-estimated; we have corrected the problem but earlier estimates are not reliable). Nevertheless, the data are compiled and available in our databases and even with an over-estimate, suggest that the piles make up 0.49% of down wood mass in Oregon. Unless management behavior has changed substantially from 2001-6 and 2011-16 such that the abundance of piles would change drastically (we could look into this too), excluding them would not seem to explain any estimated declines in down wood.
4. Once the woody debris decomposes, one would assume that this decomposed material then becomes a part of the forest floor carbon pool, but that pool did not appear to grow substantially when flux was calculated. What happens to the woody debris once it is no longer measured as part of the woody debris pool?
  - At some point down wood that decayed enough to leave the down wood pool would become part of the forest floor duff and litter, and eventually organic soil. Of course, the carbon content in forest floor and soils is also controlled by inputs and outputs, in this case decay of new and old material added to the forest floor. Studies do suggest that as undisturbed forests age for 100 or 200 years, forest floor carbon does increase, but it does not appear to be very rapid and not something we would be able to detect in a short (10-year) remeasurement period.

5. We heard during the presentation that there is still more data to be collected by FIA over the next couple of years; is there much geographic variation within the plot data that was presented? How would this influence the flux tables if at all?
  - The additional data to be collected by FIA includes completing remeasurement of all the plots. At the time of this analysis we have remeasured 60% of all plots. By 2020 all plots will be remeasured. There is no geographic variation in the data: every year one-tenth of the all the plots are measured in a spatially-balanced distribution across the state. The additional data from remeasured plots will improve the certainty in our estimates of flux by reducing sampling error across all forested acres and ownerships on a statistically uniform basis across the state.
6. Considering the small diameters of the material measured in the down woody debris pool (Christensen et al 2019), one would presume that less carbon is stored in down woody debris once it has burned. How are recently burned plots taken into consideration when it comes to down woody debris?
  - For large pieces of down wood (>20”) we record the percent of log charred and any changes in size caused by combustion. For smaller pieces of down wood the primary way a recent fire would be reflected as a loss of carbon is by simply less remaining down wood to measure on the plot due to material incinerated in the fire. Burned areas are included in the estimates in proportion to their abundance in the state.
7. How are private landownerships divided between the 'corporate' and ' non-corporate' designations in the presentation?
  - FIA defines these ownership classes as:
    - Corporate forest land—An ownership class of private forest lands owned by a company, corporation, legal partnership, investment firm, bank, timberland investment management organization (TIMO), or real estate investment trust (REIT).
    - Noncorporate forest land—Private forest land owned by nongovernmental conservation or natural resource organizations; unincorporated partnerships, associations, or clubs; individuals or families; or Native Americans.

#### Literature Cited

Christensen, G. A., Gray, A. N., Kuegler, O., Tase A. N., and Rosenberg, M. 2019. AB 1505 California Forest Ecosystem and Harvested Wood Product Carbon Inventory: 2017 Reporting Period Final Report. Report completed through an agreement between the U.S. Forest Service (Agreement No. 18- CO11052021-214) and California

Department of Forestry and Fire Protection (Agreement No.8CA04056).

Palmer, Marin; Kuegler, Olaf; Christensen, Glenn, tech. eds. 2018. Oregon's forest resources, 2006-2015: Ten-year Forest Inventory and Analysis report. Gen. Tech. Rep. PNW-GTR-971. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Woodall, C.W.; Monleon, V.J. 2008. Sampling protocol, estimation, and analysis procedures for the down woody materials indicator of the FIA program. General Technical Report NRS-GTR-22. Newtown Square, PA: USDA Forest Service Northern Research Station. 68 p.