Pablo Ramos, Paulino Villarreal, Lily F. Pitcher, and Helene C. Muller-Landau. 2025. Annual woody debris dynamics census data for the 50-ha plot on Barro Colorado Island, Panama. Smithsonian Research Data Repository. https://doi.org/10.60635/C3C884

Abstract
This data package contains the annual woody debris census data starting 2009 for a spatially stratified sample of the 50-ha plot on Barro Colorado Island, Panama. The aim of this census is to quantify the volume and mass of standing and fallen coarse woody debris (abbreviated CWD, pieces at least 200 mm in diameter) and standing fine woody debris, (abbreviated FWD, pieces less than 200 mm in diameter). Censuses took place in 100 subplots, each 40 x 40 m. Fallen woody debris were censused using the line-intersect method in four 40-m transects divided into 10-m subsections. Standing woody debris was censused with area-based methods, with CWD censused in the entire subplot, and FWD censused in a circular area in the center with a 5 m radius. Methods followed the ForestGEO CWD Dynamics protocol, included here. File structure and details about data processing are given in the readme file. This version of the data includes censuses through 2024, excluding 2011 when no census was conducted.

Files:

CWD40_fallen_09to24.txt contains fallen CWD data
CWD40_standing_09to24.txt contains standing CWD data
FWD40_10to24.txt contains standing FWD data
data_dictionary_woodydebrisBCI.csv contains explanations of the columns in the above data files, as well as information on which columns are in which files (TRUE/FALSE entries in columns titled the same as the filenames)
subplot_coordinates.txt contains the coordinates of the centers of the subplots, in local plot coordinates
CWD_Dynamics_Protocol.pdf contains the census protocol followed in collecting these data

Note that the data collected changed somewhat over time. No data were collected in 2011. Penetrometer measurements were taken in 2009-2020, but not later. Inclination and orientation measurements were taken starting in 2019.

Metadata:
For more details on the sampling design, refer to the protocols included in the data package and available online at: https://forestgeo.si.edu/protocols/woody-debris .

Data processing: Data processing was conducted in R, starting from separate raw data files for each year. First the individual raw data files were revised to make column names and structure consistent. These were then merged into a combined file with data for all years. Obvious typographical errors, such as entries in the wrong columns, were corrected, with all changes documented. Comments in the notes column that occurred repeatedly were turned into codes included in a new column, coded-notes.

Associated publications
Raw data from 2009 to 2016 were previously analyzed and reported in the following publications, though with different data cleaning methods than were used to create this data package:

Gora, E. M., R. C. Kneale, M. Larjavaara, and H. C. Muller-Landau. 2019. Dead wood necromass in a moist tropical forest: stocks, fluxes, and spatiotemporal variability. *Ecosystems* 22: 1189-1205. https://doi.org/10.1007/s10021-019-00341-5

Gora, E. M. 2024. Dead Wood Stocks, Fluxes, and Decomposition at Barro Colorado. In *The First 100 Years of Research on Barro Colorado: Plant and Ecosystem Science*, Volume 2, ed. Muller-Landau, H. C. and S. J. Wright, pp. 499–503. Washington, DC: Smithsonian Institution Scholarly Press. https://doi.org/10.5479/si.26880793

Author contributions

Pablo Ramos and Paulino Villareal collected the data. Lily F. Pitcher conducted the data cleaning, merging, and processing of the data. Helene C. Muller-Landau conceived the study, contributed to protocol development, and supervised the research.

Acknowledgements

Markku Larjavaara led the protocol development and Evan Gora advised on data cleaning. Funding was provided by Smithsonian ForestGEO and the HSBC Climate Partnership.