Forest Inventory and Analysis
Down Woody Materials Indicator

FIA Fact Sheet Series

The Down Woody Materials (DWM) Indicator is a set of variables collected on Phase 3 (forest health) FIA plots. The DWM Indicator is designed to estimate the biomass of forest ecosystem components not sampled during the FIA Phase 2 inventory. These biomass components include: coarse woody debris, fine woody debris, duff, litter, shrubs/herbs, slash piles, and fuelbed depths.

Why is the Down Woody Material Indicator Important? The DWM Indicator provides the only nationally consistent and extensive inventory of down woody biomass. DWM data can be used to explore important fire, wildlife, and carbon questions.

Forest fire managers and researchers may utilize the DWM indicator in numerous ways:

- Assessment of forest fire risks for all regions of the U.S.
- Estimation of fuel loadings by various forest attributes for the U.S.
- Creation of national fuels maps
- Monitoring effects of forest fuel reduction projects

Wildlife scientists and managers may use the DWM Indicator to assess wildlife habitat dynamics across the U.S., including:

- Structure and amount of coarse woody debris in critical habitats
- Assessment of coarse woody debris decay classes
- Establishment of important relationships between forest types/past management actions and current levels of coarse woody debris

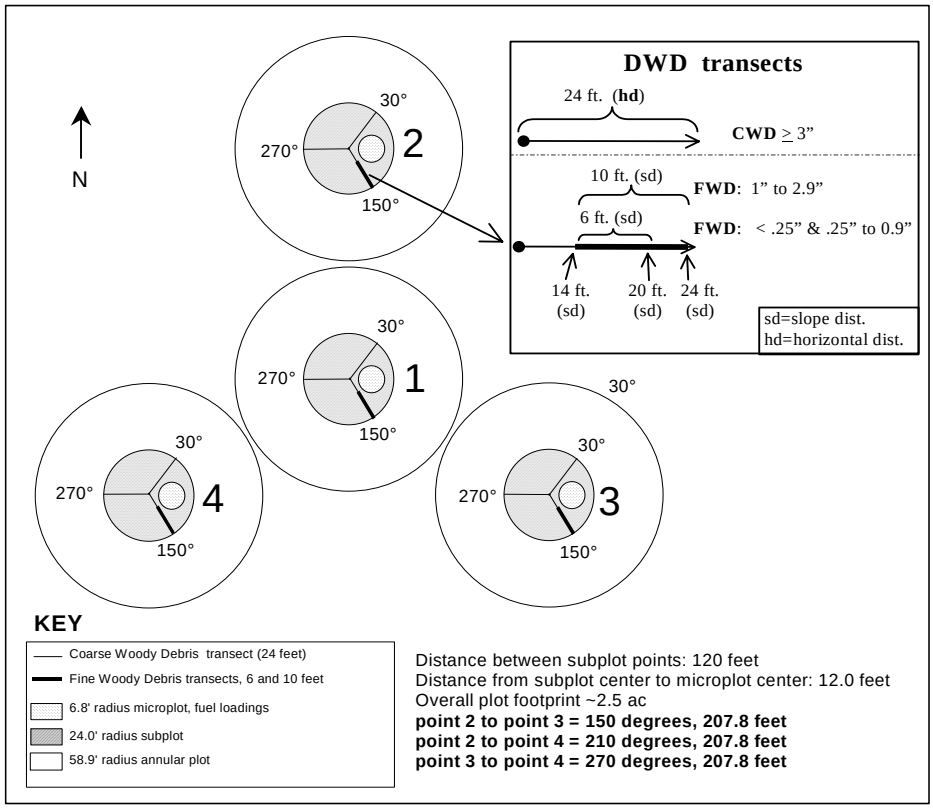
Carbon modelers may utilize the DWM Indicator data to:

- Estimate down woody material and forest floor carbon pools
- Monitor changes in critical carbon pools for the entire U.S.
- Provide a carbon estimation framework and sampling protocol as identified by international agreements

The DWM Indicator not only serves as a data source for estimation and monitoring of down woody material biomass, but also serves as a broad indicator of forest health.

How is the Down Woody Materials Indicator Measured? The DWM Indicator is sampled on FIA Phase 3 plots using line transect intercept sampling, microplot fixed-area sampling, and slash pile sampling protocols (Brown 1974, Hardy 1996). The various components of the DWM Indicator are sampled on accessible forest land using the following protocols for each FIA Phase 3 plot:

- Coarse woody debris are sampled on three 24-foot transects for each FIA subplot (288 feet plot total)
- 1-hr and 10-hr fine woody debris are sampled on one 6-foot transect on each FIA subplot (24 feet plot total)



- 100-hr fine woody debris are sampled on one 10-foot transect on each FIA subplot (40 feet plot total)
- Duff, litter, and fuelbed depths are measured at 24-feet from subplot center on each coarse woody debris transect (12 points plot total)
- The height and cover of dead/living shrubs and herbs are measured on one 6.8-foot radius microplots on each FIA sub-plot (0.013 acre sampled per plot)
- Slash piles that are coincident with FIA subplots are measured for their dimensions and density

FIA field crew who complete a thorough training course and are certified for the indicator conduct DWM inventories. Field audits are conducted to improve data quality and minimize errors**.**

Where and When are Down Woody Materials Measured? The Down Woody Materials Indicator is measured on Phase 3 plots, which are a subset of the Phase 2 plots. There is one Phase 3 plot for every 16 Phase 2 plots (one Phase 3 plot per 96,000 acres of forest). Sampling intensity may increase in areas with increased regional needs and or funding abilities. FIA field personnel collect DWM data, along with other Phase 3 indicators, generally between early June and early September.

What is the current status of the Down Woody Materials Indicator and data? Sampling of the DWM Indicator began during the summer of 2001 in a majority of states. The DWM Indicator will continue to be implented in the remaining states as the FIA survey becomes annual. Raw field data, along with other indicator data, are currently available for download. Processed data, in the form of fuel load estimates, are available upon request.

How can Down Woody Data be Analyzed? DWM data can be analyzed in numerous ways benefitting foresters, scientists, federal/state officials, and concerned citizens alike: state/regional reports, fuel maps, core tables, and integrated analyses.

State/Regional Reports*:* With sufficient state-level DWM sampling intensities, estimates of DWM components may be added to FIA state reports to augment assessments of forest attributes currently available. In addition to state reports, regional reports addressing specific down woody materials issues may be created (i.e. wildlife habitats and forest wildfires).

Fuel Maps: Due to the inherent spatial nature of all phases of the FIA sampling design, DWM data may be used to create national and regional fuel loading maps. Data interpolation methods, coupled with Phase 1 forest/nonforest maps, may produce critical maps of fuel loadings by size classes.

Core Outputs: FIA table formats of various forest attributes may contain acreage estimates of fuel loadings, carbon estimates, and wildife habitats. Tables of DWM summaries may be stratified by forest type, stand age, disturbance history, ownership, or other variables from the FIADB.

Integrated Analyses: DWM Indicator data/output can be combined with other FIA variables for detailed assessments of numerous forest ecosystem attributes. For example, DWM data may be used in concert with the soils indicator and Phase 2 tree-level variables for comprehensive assessments of national carbon pools.

There are numerous questions that integrated analyses may address:

- Which forest types in a certain region have the highest fine woody debris loadings?
- Did a large scale disturbance event (i.e. hurricane) significantly increase coarse woody debris tonnage for a certain region?
- Can total fuel loadings be related to other stand level forest attributes such as total basal area in order to benefit remote sensing of fuel loadings?
- Where are forests that contain coarse woody debris habitat conditions necessary for certain wildlife species?
- How do forest management actions affect DWM tonnage estimates over time?
- What is the relationship between forest floor carbon estimates and the underlying soil carbon levels?
- How do vegetative indices from the vetation indicator interact with the shrub/herb fuel complexes estimated in the DWM inventory?

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For more information about the FIA Program:

- Visit our national FIA website: http://www.fia.fs.us
- Visit our DWM web-site: http://www.ncrs.fs.fed.us/4801/DWM
- See our "FIA Contacts" Fact Sheet

Literature Cited:

- Brown, J.K. 1974. Handbook for inventorying downed woody material. GTR-INT-16. USDA Forest Service, Ogden, UT.
- Hardy, C.C. 1996. Guidelines for estimating volume, biomass, and smoke production for piled slash. GTR-PNW-364. USDA Forest Service, Portland, OR.