

TITLE: Estimating Mass of Down Woody Materials in the Western United States by Linking Two Phases of Forest Inventory and Analysis (FIA) Data INT-F-09-02

LOCATION: Western United States.

DURATION: 1 year of 1-year project **FUNDING SOURCE:** Fire Plan EM

PROJECT LEADERS:

Principal Investigator: Stephen P. Prisley, Associate Professor, Virginia Tech University, Blacksburg, VA prisley@vt.edu, 540-231-7674

Coinvestigator: David C. Chojnacky, Adjunct Faculty, Virginia Tech Department of Forestry, Falls Church, VA dchojnac@vt.edu, 703-237-8620

FHP SPONSOR/CONTACT: Jeri Lynn Harris, Interior West Regional FHM Program Manager, USDA Forest Service, Golden, CO jharris@fs.fed.us, 303-236-8001

PROJECT OBJECTIVES:

1. Estimate forest floor down woody material (DWM) mass for the western United States by extending modeling methodology being developed for the eastern United States from FIA data. The models link FIA's phase 3 (P3) DWM data to phase 2 (P2) plot data for greater inference.
2. Publish model results in a journal.

JUSTIFICATION:

There is an opportunity to extend work from a previous Forest Health Monitoring (FHM) study to the western United States. Project work for down woody materials in the eastern United States was funded by FHM in 2007 and 2008, and is scheduled for completion in December 2008. Due to progress in development of FIA's database (FIADB 3.0), data for the western United States were also included in a July 2008 download (from U.S. scale files) for updating eastern data. Although western data have not been compiled, over 1,200 plots could be included with eastern data. Therefore, this proposal is being submitted to enable completion of the DWM mass analysis on a larger geographic scale—the entire country.

This study seeks to improve a significant linkage between the P2 plots and P3 DWM data (generally sampled on only 1/16th of P2 plots) for estimating DWM mass. Down woody materials include soil organic layers of duff and litter; dead and down fine and coarse woody detritus (FWD and CWD); and all live and dead understory vegetation. DWM is a key component of fire fuels. In addition, it is important for carbon storage in the forest floor, organism habitat, and decomposing materials critical for nutrient cycling. Therefore, linkage of the FIA P3 DWM data to all P2 plots is critical for wide of use FIA's information for assessment of fire risk, fuel loading, and other management needs. Models are probably the best method for such linkage, as we have demonstrated with sporadic data available for some eastern states (Heath and Chojnacky 2001; Chojnacky and Heath 2002; Chojnacky et al. 2003; Chojnacky and Schuler 2004; Chojnacky et al. 2004, 2006, [*In preparation*]; Chojnacky and Milton [*In press*])

DESCRIPTION:

a. Background: With previous Forest Health Monitoring grants and other funding, we have linked P2 to P3 data for duff, litter, and down woody materials, using regression models for estimates of

mass and carbon at the P2 scale (Fig. 1). These results, from the eastern United States, are currently being updated with the July 2008 data release of FIADB 3.0. The additional funding requested in this proposal would support inclusion of western states.

b. Methods: Objective 1 entails modeling to estimate DWM mass from P2 variables and/or auxiliary topographic and climate data. Because FIA does not measure DWM mass but rather measures key parameters for calculation of mass, considerable work is required simply for data compilation. We have expended considerable effort developing compilation software and have a close working relationship with FIA (Chris Woodall) for using the latest auxiliary parameters (for material density and other factors) in the compilation process. We even compile DWM data to the “condition scale” detail within plots for appropriate merger with P2 data. (Therefore, a side benefit of our work is a condition-scale database of DWM data.)

Modeling the DWM data for linkage to P2 data is no simple task and we are still searching for improved methodology. Our previous work identified climatic variables (which seem related to decomposition rates) as key predictor variables. However, landscape-level climatic data is also spatially modeled (by extending data between weather stations) which is motivating our current emphasis of more detailed spatial analyses. For example, simply grouping data for the eastern United States into ecoregion sections is showing some promise for model improvement. More detailed spatial analyses will be particularly important for the more topographically diverse western mountain regions.

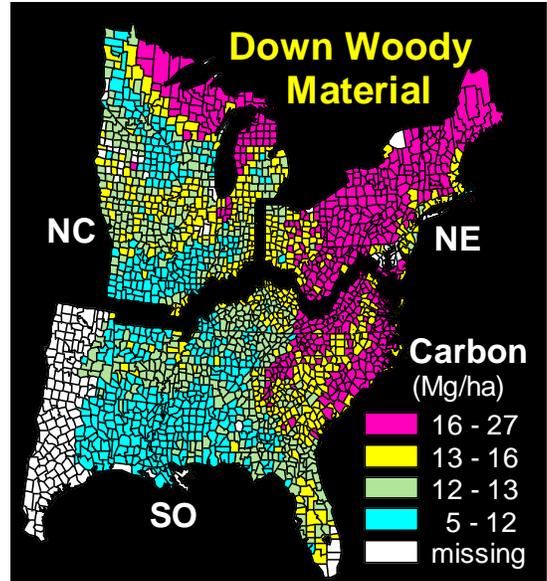


Figure 1. Down woody material (DWM) carbon (which is 50% of mass) shown as county-scale estimates derived from previous model between P3 and P2 plots for 2001 and 2002

Objective 2 will entail writing a manuscript with the new model results and revising it, with the assistance of a technical editor, for submission to a professional journal.

c. Products:

1. Regression or similar models for the western United States for estimating mass from P2 plot variables and auxiliary information (most likely climate variables). Models will include estimates for duff, litter, FWD, CWD, and understory vegetation.
2. Publication of results in a journal and presentation at the Forest Health Monitoring meeting and perhaps other outlets as funding permits.
3. Condition-scale database of DWM data merged with P2 data summarized for key stand composition and structure variables.

d. Schedule of Activities (for 12 month study):

Complete western United States data acquisition from July 2008 download of FIADB 3.0 by editing and checking into issues from P2 and P3 data merger.	2 months
Compile DWM estimates from raw data measurements.	2 months
Analyze auxiliary climate data and construct models for linking P3 and P2 data.	6 months

Draft manuscript(s).	2 months
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The project can be completed by March 2010 if funding is secured by March 2009.

e. Progress/Accomplishments for multi-year projects: Not applicable.

f. References:

Heath, L.S.; Chojnacky, D.C. 2001. Down coarse woody material statistics for Maine timberlands, 1995. Res. Bull. NE-150. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 80 p.

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Chojnacky, D.C.; Amacher, M.C.; Perry, C.H. 2006. A model for monitoring forest floor duff and litter carbon sequestration. In: Reynolds, K., ed. Sustainable forestry in theory and practice: recent advances in inventory and monitoring statistics and modeling, information and knowledge management, and policy science. Gen. Tech. Rep. PNW-GTR-688. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. [CD-ROM]; Online: http://www.fs.fed.us/pnw/pubs/pnw_gtr688/authors/index.htm

Chojnacky, D.C.; Milton, M. [In press] Measuring carbon in shrubs. In: Hoover, C., ed. Handbook of Field Measurements for Landscape-Scale Forest Carbon Monitoring. Springer.

Chojnacky, D.C.; Amacher, M.C.; Gavazzi, M.J. [In preparation] Estimating mass and carbon in the forest-floor duff and litter layers from Forest Inventory and Analysis (FIA) data. Submitted to Southern Journal of Applied Forestry

COSTS:

	Item	Requested FHM FIRE Funding	Other-Source Funding	Source
FISCAL YEAR 2009				
Administration	Salary: Chojnacky	\$40,000		
	Salary: Priskey's student	\$10,000		
	Travel	\$3,000		
Procurements	Writer/Editor subcontractor	\$5,000		
	Supplies/Miscellaneous	\$500		
Indirect/Overhead	Fringe benefits	\$3,375		
	Indirect costs not recovered by Virginia Tech		\$16,088	Virginia Tech
TOTAL		\$61,875		