Assessing Deadwood Using Harmonized National Forest Inventory Data

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Abstract: Deadwood plays an important role in forest ecological processes and is fundamental for the maintenance of biological diversity. Further, it is a forest carbon pool whose assessment must be reported for international agreements dealing with protection and forest management sustainability. Despite wide agreement on deadwood monitoring by national forest inventories (NFIs), much work is still necessary to clarify definitions so that estimates can be directly compared or aggregated for international reporting. There is an urgent need for an international consensus on definitions and agreement on harmonization methods. The study addresses two main objectives: to analyze the feasibility of harmonization procedures for deadwood estimates and to evaluate the impact of the harmonization process based on different definitions on final deadwood estimates. Results are reported for an experimental harmonization test using NFI deadwood data from 9,208 sample plots measured in nine European countries and the United States. Harmonization methods were investigated for volume by spatial position (lying or standing), decay classes, and woody species accompanied by accuracy assessments. Estimates of mean plot volume based on harmonized definitions with minimum length/height of 1 m and minimum diameter thresholds of 10, 12, and 20 cm were on average 3, 8, and 30% smaller, respectively, than estimates based on national definitions. Volume differences were less when estimated for various deadwood categories. An accuracy assessment demonstrated that, on average, the harmonization procedures did not substantially alter deadwood observations (root mean square error 23.17%). FOR. SCI. 58(3):269–283.

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DEADWOOD IS ACKNOWLEDGED TO BE A CRITICAL ECOLOGICAL FACTOR that plays a fundamental role in forest ecosystems (e.g., Christensen et al. 2005, Lombardi et al. 2010). It is one of the most relevant components of forest biodiversity, and it represents an important forest carbon pool (Stokland et al. 2004, Woodall et al. 2009). Dead trees, stumps, and fine and coarse woody debris (CWD) are essential to forest ecosystem dynamics by providing food and habitat for taxa such as fungi, arthropods, birds, insects, and epiphytic lichens (Sippola and Renvall 1999, Bowman et al. 2000, Ferris et al. 2000, Siitonen et al. 2000, Similä et al. 2003, Jonsson et al. 2005, Odor et al. 2006, Londsale et al. 2008, Winter and Möller 2008). Approximately 20–25% of forest species depend on decaying wood (Boddy 2001, Siitonen 2001), although decayed material is often viewed as a limited habitat resource for some organisms (Hagen and Grove 1999).

Deadwood is also considered to be an important indicator for assessing sustainable forest management and conservation of forest biodiversity (Ferris and Humphrey 1999, Hahn and Christensen 2004, Travaglini et al. 2007, Fischer et al. 2009). Deadwood was recognized as a biodiversity indicator for sustainable forest management by Forest Europe, the former Ministerial Conference on the Protection of Forests in Europe (2003), and the Montréal Process (Montréal Process 2005) and as one of 26 indicators selected for the Streamlining European 2010 Biodiversity Indicators initiative to track temporal biodiversity changes in the context