The Role of CVS (and FIA) Data and Genetic Tests in Assessing Species Vulnerability to Invasive Pests and Changing Climate[1]

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United States tree species and their associated ecosystems, managed forests, and urban plantings are increasingly vulnerable to non-native invasive pathogens and insects as well as effects associated with a changing climate. Some species, such as whitebark pine (*Pinus albicaulis*), have been proposed for listing under the Endangered Species Act. To fully assess the vulnerability of tree species and ecosystems, we need to make better use of data that shows temporal trends in mortality and forest health. With these data, forest managers and the United States public will have a greater sense of urgency, and debate over the full extent of possible management actions will be better informed. Several under-utilized types of data are available to help quantify changes over time in vulnerability of forests and tree species and the potential impacts of the biotic and abiotic agents driving change. One of these is Forest Inventory and Analysis (FIA) data, which provides a probabilistic sample across all land ownerships so that results from the analysis can be reliably extrapolated to all lands. The FIA sample design will consist of a new annual inventory which will be consistent across the United States. The first round of plot re-measurement in this program is currently underway. Continuous Vegetation Survey (CVS) data, currently available, and used here, covers primarily U.S. Department of Agriculture Forest Service land (Lintz et al. 2016). Other important sources of data include long-term progeny tests, provenance trials, and clone banks, which serve as de-facto permanent sentinel plots comprised of known genetic components, which is a distinctive benefit. We provide examples from each of these types of data and show examples of species that are on the decline (Lintz et al. 2016; Sniezko et al. 2012, 2013).

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