Broad Decline of Populations of Large Old Trees

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Faison (2013) suggested the dynamics of large old tree populations is more complicated than discussed in Lindenmayer *et al.* (2013) and presented inventory information indicating the ***volume*** of these trees appears to be increasing in some ecosystems. We welcome such temporal changes but suggest the oversimplified perspective by Faison (2013) is misleading.

We acknowledge that in places like much of the eastern U.S.A. and Europe, where most native forests were formerly cleared, there has indeed been recovery and this eventually will result in greater volume (and probably greater numbers) of large trees. However, recovery is from a very low baseline due to past clearing (D'Amato *et al.* 2009). In addition, although there are some bigger trees in these forests, it does not mean they are fully mature (see below). Moreover, the inventory databases cited by Faison (2013) represent only a small fraction of the economic and ecological scenarios under which forests are managed. They also fail to shed light on the ecological processes threatening the abundance and overall population dynamics of large old trees in the vast majority of ecosystems (Lindenmayer *et al.* 2012). For example, these databases do not reflect the impacts of high rates of logging and/or clearing imperilling large old trees in such places as rainforests (Edwards & Laurance 2009) and forests in western North America, Siberia, and southeastern Australia. Similarly, Faison (2013) fails to recognize that in some forests, such as mixed conifer ecosystems in southwestern U.S.A. which are subject to frequent fire, rapid growth of large young trees is not a positive outcome but a major ecological problem. Large young trees provide fuel ladders and competition for resources that threaten the abundance of large old Ponderosa Pine trees which are key structural elements in these ecosystems.

Faison (2013) also fails to make the critical distinction between large *old* trees and large young trees. Large young trees lack most of the distinctive and ecologically important features that only come with age—i.e., large old trees are not simply enlarged versions of younger trees. A key ingredient is time and hence the abundance and persistence of attributes like cavities and large lateral branches depends upon much more than growth rates (Franklin *et al.* 2002; Gibbons & Lindenmayer 2002). This is why we emphasized the term large ***old*** trees in our review (Lindenmayer *et al.* 2013).

There is no doubt that increasing tree volume is important for trees to eventually become large old trees.

But an impaired growth rate is rarely the underlying ecological problem driving population declines of large old trees. Addressing the drivers threatening populations of large old trees is therefore crucial to the persistence of these keystones structures (Lindenmayer *et al*. 2013). As outlined in our review, special management practices are needed over timeframes well beyond those typical of resource management policies to protect existing populations of large old trees, promote the eventual recruitment of new trees, and ensure that their key ecological and other values are maintained (Lindenmayer *et al.* 2013).

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