

Western Ecological Research Center

Publication Brief for Resource Managers

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Does Coring Contribute to Tree Mortality?

Collecting increment cores is a standard method for measuring tree ages and growth in seasonal environments where annual rings are formed. These data are fundamental for our understanding of historic and contemporary forests and their environments. However, there is a possibility that the damage caused by coring creates a pathway for disease agents that contributes to tree mortality. If coring has a measurable effect on tree mortality, it may be important to consider how it shapes subsequent forest dynamics, and limit its use to situations where destructive sampling is considered acceptable.

In a study recently published in the *Canadian Journal of Forest Research*, USGS scientists Drs. Phil van Mantgem and Nate Stephenson used 21 years of annual census data from cored and uncored permanent forest monitoring plots to detect changes in mortality rates for two common species in the Sierra Nevada of California, white fir (*Abies concolor*) and red fir (*A. magnifica*). They found no differences in tree death rates up to 12 years following coring. They emphasize, however, that their 12-year post-coring records are short relative to the maximum life spans (more than 300 years) of these species, and these findings may not apply to other species growing in different environments.

Using data from two cored and two uncored permanent plots in Sequoia National Park, van Mantgem and Stephenson demonstrated that mortality rates were indistinguishable for 1,520 cored and uncored firs. This finding held when subdividing the data into large or small trees. The authors also distinguished mortalities where the cause of death was a fungal or insect pathogen that might reasonably be associated with coring damage, but again were unable to detect any mortality differences.

Management Implications:

- Coring did not appear to affect mortality over 12 years for white fir and red fir in the Sierra Nevada.
- Coring did not increase the frequency of deaths associated with fungal or insect attacks.
- The 12-year post-coring records are short relative to the maximum life-span of these species, so future events could still cause coring to become a more important contributing factor of tree death.

In spite of these findings, the authors still recommend caution when collecting these samples: they could not rule out the possibility that cored trees may have damage, perhaps unobservable internal fungal infections, which could result in future elevated mortality rates. Also, additional environmental challenges (e.g., drought, windstorms, pathogen outbreaks) could make coring damage a more important contributing factor of tree death in future years. Finally, other species, particularly hardwoods, are likely to show greater susceptibility to fungal attacks following coring. The authors concluded that more research is needed to presume categorically that coring causes no significant harm.

van Mantgem, P. J., and N. L. Stephenson. 2004. Does coring contribute to tree mortality? *Canadian Journal of Forest Research* 34:2394–2398.