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Comments: Mature and old-growth forests are late seral stage ecosystems with a mosaic of tree and understory ages and species represented. This variation encourages forest resilience and persistence after disturbance events like drought, fire, flooding, and parasitic infestations. Managers should take care when working in these areas not to foster large single-age stands, overly high density, or monocultures of species that are not resilient in the face of changing climate. Current research indicates that trying to maintain existing forest conditions, especially in the West, will not be significantly different from a no-action alternative in preserving the existence of any forest at all (see 1.) Coop, J.D.; Parks, S.A.; Stevens-Rumann, C.S.; Crausbay, S.D.; Higuera, P.E.; Hurteau, M.D.; Tepley, A.; Whitman, E.; Assal, T.; Collins, B.M.; et al. (2020). Wildfire-driven forest conversion in western North American landscapes. *BioScience*, 70, 659-673, 2.) Johnstone, J.F.; Allen, C.D.; Franklin, J.F.; Frelich, L.E.; Harvey, B.J.; Higuera, P.E.; Mack, M.C.; Meentemeyer, R.K.; Metz, M.R.; Perry, G.L.; et al. (2016). Changing disturbance regimes, ecological memory, and forest resilience. *Frontiers in Ecology and the Environment*, 14, 369-378, 3.) Overpeck, J.T.; Rind, D.; Goldberg, R. (1990). Climate-induced changes in forest disturbance and vegetation. *Nature*, 343, 51-53., and 4.) Buma, B.; Wessman, C.A. (2013). Forest resilience, climate change, and opportunities for adaptation: A specific case of a general problem. *Forest Ecology and Management*, 306, 216-225. <https://doi.org/10.1016/j.foreco.2013.06.044>.)

Defining mature and old growth forests nationwide is challenging, but should include local considerations of historical seral progressions, disturbance patterns, measures of current species diversity (trees, understory species, wildlife, invertebrates, and microbiotic soil communities), projected local changes in temperature, precipitation, wind, etc., and topographic features like elevation, aspect, and slope.

Much of these data can be gathered via remote sensing technologies, but several papers indicate that large scale data sets like LANDFIRE or aerial pest surveys can be insufficiently detailed for planning stand-level treatments - which are what most federal agency offices have sufficient funding to consider. Funding is also needed for in-person monitoring of forest plots like those in the FIA database, and developing new technologies that can better sense fuel loading variables like canopy base height and surface fuel loading.

Yet more funding is necessary to have a long-term, landscape-scale impact on our forests because this data has to be analyzed and applied in fuel treatments (prescribed fire, thinning), fostering the growth of species we expect to be successful (propagating, planting), and communicating about the treatment results so that other managers may act more efficiently in the future.

The two most important features of old-growth forest are complexity and resilience, both of which are very difficult to manufacture or regain once lost. That does not mean management should focus on a singular, unchanging "ideal" forest, even in spaces that are healthy right now. Change is inevitable, but we must consider how we can aid the species and systems we value in enduring the habitat loss, fragmentation, disturbances, and climatic changes that our society has brought to bear.

To do that, we may have to exclude some features that the general public associates with forests from our management definitions. Healthy forests are not characterized by a lack of disturbance events, but by surviving them. Fires, floods, wind events, etc. will continue to happen, likely at smaller, more regular intervals. Our management strategies should prioritize considerations of severity, the persistence of refugia, and structures in the wildlife urban interface that pose a long-term threat if damaged. Some structures should be removed proactively to foster habitat continuity, and any new construction must adhere to strict building and maintenance regulations, especially if it encroaches on old growth or mature forest. These forests in particular will require proactive management to address existing excessive fuel loading and high tree density that lead to extreme fire behavior. However, not all dead material should be removed, as that would decrease habitat quality for wildlife and negatively affect nutrient cycling necessary for regeneration.

In summary, the definition of old growth and mature forest should vary locally but focus on dynamic resilience capacity, systems thinking, and ongoing proactive management actions required to preserve it.

Thank you for reading.

