Forest Ecosystems and Society
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Date: August 30, 2022
To: Jamie Barbour, Assistant Director, Ecosystem Management Coordinator
From: James Johnston, Assistant Professor (Senior Research), Oregon State University
Re: Executive Order 14072: Protecting Mature and Old-Growth Forests, both Foreign and Domestic

Please consider these comments about EO 14072. I am an Assistant Professor (Senior Research) at the College of Forestry at Oregon State University. The views here are my own; Oregon State University did not review or endorse these comments.

I've been involved with efforts to craft policy to protect mature and old-growth forests for almost thirty years. For more than ten years I have conducted research into forest successional and disturbance dynamics relevant to old tree conservation at scales ranging from individual trees (e.g., Johnston et al. 2019) to ecoregions (e.g., Johnston et al. 2021a). In particular, my colleagues and I have cored to the pith and measured radial growth of more than 3,000 trees throughout Oregon that range in age from 150-700 years of age (see figure next page). A recent paper explicitly addresses conservation of old trees in different forest types (see Johnston et al. 2021b).

There are important social, economic, and ecological benefits to conserving old trees. I believe much of my testimony about the interaction of old-growth forest protection initiatives and national forest policy offered to the U.S. Senate Committee on Energy and Natural Resources on October 2, 2001 is still relevant to the present executive order (see https://books.google.com/books/about/Forest_Protection_Initiatives_and_Nation.html?id=nYs0AAAAIAAJ). However, developing robust and durable protections for old trees pursuant to EO 14072 presents significant challenges.

Trees vs. stands

The first challenge is distinguishing cases in which it is appropriate to protect forest stands and cases in which it is appropriate to protect individual trees. The executive order contemplates protection of mature and old trees to "improve the resilience of our lands, waters, wildlife, and communities." In many cases—particularly in very moist and productive forests such as the Douglas-fir dominated temperate rainforests of western Oregon and western Washington—production of cool and clean water, wildlife habitat for threatened and endangered species, recreational experiences, and other amenity services are strongly associated with complex forest. The structural and compositional complexity of these stands is related both to trees that are very old and inarguably old growth trees, as well as younger trees that no reasonable definition would classify as mature or old growth.

Removal of younger trees by timber harvest in moist structurally complex forest may significantly diminish the recreational value and wildlife habitat value of these forest stands.

In seasonally dry forests, frequent fire was critical to the development and persistence of old trees. Conservation of old trees in seasonally dry forests after more than a century without fire requires active management to remove younger trees that compete with old growth for resources and create ladder fuels that carry fire into the canopy of old-growth trees. Research by my colleagues and I show that removal of some relatively old (i.e., trees established in the late 19th century) as well as trees that are relatively large (i.e., 20-30 inches diameter at breast height) is often necessary to restore the successional and disturbance dynamics associated with persistence of old trees (see Johnston et al. 2021c, Johnston et al. 2018, and Johnston 2017). Many trees that could be considered mature by some definition (i.e., 50-150 years old) need to be removed in order to protect the oldest trees in dry forest stands, particularly as the climate warms, putting additional stress on old trees.

In summary, delineating entire *stands* and protecting all trees within those stands from timber harvest is an appropriate strategy for conserving mature and old forests within some highly productive, structurally complex forest types. In seasonally dry forests, it is appropriate to focus on identifying and conserving the oldest individual *trees* in stands. Most seasonally dry forests will require significant active management to ensure conservation of the oldest trees, and depending on how "mature" trees are defined, there may be tradeoffs between protection of mature and old-growth trees.

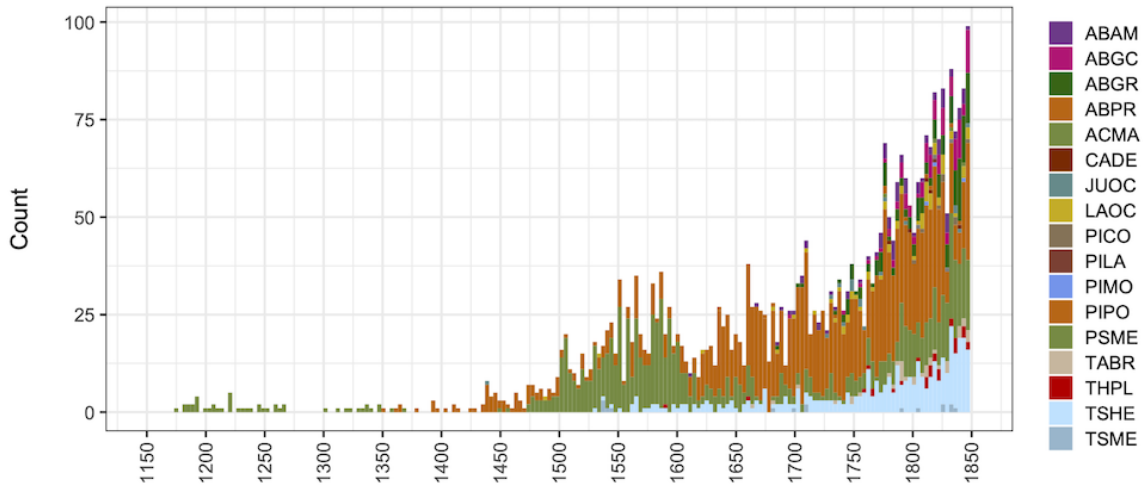

Figure: Dates of establishment of ~3,000 trees sampled in Oregon.

Managing natural disturbance

A second challenge is determining the tempo and intensity of natural disturbance that is consistent with conservation of mature and old trees. Stand replacing disturbance can remove old-growth structure in the moistest structurally complex forests. But these forests are well adapted to this type of disturbance and this type of disturbance contributes to watershed and landscape-scale habitat. For instance, stand replacing disturbance in moist, structurally complex old-growth forest contributes down woody debris to streams which

provides critical habitat for threatened and endangered fish stocks. Policy to significantly curtail the extent and severity of natural disturbance like fire in structurally complex moist forest would diminish the ecological effectiveness of mature and old trees. Policies which promote understory thinning in these forests may diminish the effectiveness of complex habitat and do little to mitigate stand replacing fire.

Unlike moist forests, seasonally dry forests are poorly adapted to stand replacing disturbance. After more than a century of fire exclusion, fire interacting with increased density, species composition shifts, and increases in surface fuels poses significant risk to the persistence of old-growth trees at stand, watershed, and landscape scales.

We need more information about causes of mortality in old trees and rates of loss of old trees in seasonally dry forests. (Unpublished data from my colleagues and I suggests that rate of loss of old trees in unmanaged stands in eastern Oregon may exceed 2.5% a year). But available information suggests that extensive thinning and low-intensity prescribed fire will be necessary to conserve the majority of extant seasonally dry old growth.

Conclusion

Perpetuating mature and old growth is a matter of relinking pattern and process feedbacks within forest communities that create and sustain old trees over time. Characteristic pattern and process feedbacks differ markedly across conifer dominated forests of the western United States, to say nothing of hardwood forest communities. It is unlikely that a single definition of mature and old-growth, or a particular type of mapping product can capture the pattern-process feedbacks appropriate for conservation of old trees in every area.

New policy should distinguish between:

1. Forest types where conservation of entire stands can achieve the objectives of EO 14072, active management and fire mitigation is largely forest is largely unnecessary, and there are few if any tradeoffs between conservation of young, mature, and old trees; and,
2. Forest types where the focus should be on conservation of the oldest trees present, active management and fire mitigation is necessary, and where there may be tradeoffs between protection of young, mature, and old trees.

Please contact me at james.johnston@oregonstate.edu if I can be of any assistance.

Literature cited

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