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Old Growth and Mature Forests

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What follows is a response to The United States Department of Agriculture (USDA), United States Forest Service (Forest Service), and the United States Department of the Interior (DOI), Bureau of Land Management (BLM), inviting public comment to inform the response to the Executive Order Strengthening the Nation's Forests, etc.

First, it absolutely must be understood that any definition of an old-growth forest is arbitrary and most often characterized to fit the wants, desires, and needs of the entity (or person) expressing the description.

Humans, easily distracted by the obvious, focus on the largest visible organisms, which in a forest are trees. We typically characterize an old-growth forest as one that is in a late stage of ecological succession, the presence of large old trees, numerous snags, woody debris, and with a multilayered canopy.

Because different forests contain dissimilar mixes of trees, plants, wildlife, and ecological systems, it is impossible to design a single definition for old growth which can be applied to every forest. Such an endeavor is futile and pointless.

Old-growth definitions must acknowledge diversity and can only be applicable to forests for which they were designed. One such set of old-growth definitions was developed by Green et al, 1992.¹ Those definitions, though an improvement over a single classification, have limitations and continue to be hotly debated.

Forests, at every stage of development, are complex collections of interconnected, interdependent ecosystems supporting countless, diverse species while providing ecosystem services. Because most species and ecosystems are beyond human perceptions, we tend to see forests as little more than a collection of trees, a perspective with no basis in reality.

Because forests are complex collections of ecosystems, struggling to define old-growth as nothing more than trees of a certain size and/or age, ignores reality and obscures any understanding of old-growth forests as multifaceted organisms. For example, a single teaspoon of forest soil can hold thousands of bacteria species, several yards of fungal filaments, thousands of protozoa, scores of nematodes. Furthermore, in old-growth stands, soil typically sequesters more carbon than above-ground organisms.

Because numerous recent scientific researchers have verified that old trees sequester more carbon (on an annual basis) than young trees, it is understandable why a single definition of old-growth forest stands is preferred (people who live in western cultures feel the need to fit everything into nice, neat categories).² This is especially true now that the Biden Administration has directed government agencies to protect mature and old growth trees for carbon sequestration. But seeking a single definition for old growth is fraught with pitfalls. This carefully prearranged process is designed to ignore the best scientific research, be susceptible to political pressure from outside forces, and, considering the people and decision makers involved, reach a predetermined outcome.

Forests are dynamic not static. Those that reach the old-growth stage continue to undergo gradual directional

changes in composition, structure, and function albeit at a slower rate than in the previous stages. 3 It is better to consider an old-growth forest as a complex organism that is continuous, with some capacity to regenerate and self-perpetuate while meeting a wide range of biodiversity requirements rather than simply a forest consisting only of large, old trees.

FIGURES: Figure 1 - The four phases of forest stand development presented by Oliver and Larson

Disturbances such as fire, wind throw, disease, insects, or harvest (logging and thinning), create openings in a forest's canopy. These present opportunities for regeneration to occur and, when the openings are large enough, a "stand initiation phase" may be triggered.⁴ When a new stand becomes established, sufficient sunlight still reaches the ground to stimulate the growth of grasses, forbs, and shrubs that could not develop in the shade of an older, pre-disturbance forest.

As young trees in a new stand grow and take advantage of the available space, their crowns begin to merge. Competition for space and available resources intensifies as the young forest progresses toward the "stem exclusion phase". Depending upon the forest type, this period may last for many decades.

Natural tree mortality from crowding remains high and, as trees die, voids are quickly filled by surviving trees. This phase is characterized by high tree density with a relatively little sunlight reaching the forest floor. Therefore, only shade-tolerant plants capable of growing under shade persist in the understory.

The canopy remains largely intact during the "understory reinitiation phase" while a stand approaches a state of maturity containing fewer but larger trees. As large overstory trees age and die, a mosaic of variously sized canopy gaps is created that allows other vegetation and small, suppressed trees to establish. This process creates a multi-layered structure that characterizes forests entering an "old-growth phase".⁵

The most important characteristic of what qualifies a forest as "old growth" is its structural and functional complexity. Simply containing a few large, old trees does not mean a forest functions as old growth. Instead, old-growth forests contain trees of mixed ages and decaying wood that are respectively dispersed vertically and horizontally through the canopy and stand along with uncountable numbers of other organisms.

Most North American forests are currently in one of the three pre-old-growth phases. The tree density of these forests has become highly politicized now that facts associated with global warming have become more widely recognized and understood. Further politicization is ensuing because forests are experiencing the effect of global warming (i.e., more wildfire and other natural disturbances). Additionally, as members of the public become more aware of the importance of carbon sequestration to help mitigate global warming, there is increasing pushback against the misinformation distributed and used by the timber industry to ensure a continuing supply of tax-subsidized logs from public lands.

President Biden's directive to conserve mature and old-growth trees may be a step in the right direction but is not by itself sufficient. Unfortunately, his order was prompted by politics and based upon information received from government agencies, pre-filtered by political pressure applied by timber industry lobbyists.

Now that climate scientists have confirmed global warming is occurring at such an accelerating rate that humanity's very existence is at risk, every possible effort should be made to mitigate and/or forestall the effects of rising worldwide temperatures. In short, everything which can be done should be. Conservation of not just old-growth forests but forests in every phase must be pursued. Focusing only on old-growth forests as a solution, as is being suggested by this request for public input, is short sighted, sidesteps over-logging as a threat to carbon sequestration, and is about as effective as spitting on a forest fire.

Effort should be made to conserve every tree, no matter its age or size.⁶ Unfortunately, such a prospect is not

politically feasible and will not happen. Monied forces work fulltime against solutions which severely limit the number of tax-subsidized logs available to the timber industry.

Although the timber industry continues its attempts to obscure the fact, logging/thinning and the wood products industry have been shown to spew more greenhouse gasses into the atmosphere than wildfires.⁷ This attempt to discover a universal old-growth definition appears to be little more than an industry-supported diversion designed to allow the Forest Service and the Bureau of Land Management to continue providing tax-subsidized logs, albeit smaller, to the timber industry.

The science has never been more clear. If governments do not employ every possible method to mitigate global warming, humanity's risk will drastically increase as the earth's weather becomes more chaotic and societies fragment, disintegrate, or collapse.

Rather than focus on developing a single definition for mature and old-growth forest, the Bureau of Land Management and the Forest Service should recognize and accept that:

- * forests provide ecosystem services upon which continued human existence depends,
- * humans have an extremely limited understanding of the interplay and interdependence of the uncountable organisms and ecosystems that compose forests,
- * in the long run, it is always unproductive to manage nature,
- * preservation of all forests is necessary to help mitigate the effects of global warming,
- * supplying tax-subsidized timber to industry is counterproductive to global warming mitigation efforts,
- * allowing natural disturbances to take their course will allow forest to adapt to global warming without well-meaning but statistically unsuccessful human intervention,
- * many of today's problems are the result of past solutions, and
- * believing newly developed agency solutions will not cause future problems is magical thinking.

Regrettably, it is becoming more obvious every day that no government agency, especially the United States Forest Service or Bureau of Land Management, is willing or able to stop business as usual to help mitigate global warming.

If it even read, I expect this scientifically based response to be ignored, partially because no direct answers to the five questions designed to limit public input are provided and because the government agencies involved in this process are being managed by career politicians (i.e., line officers) and not scientists.

Respectively submitted by,

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FOOTNOTES:

1 Green, P. et al. (1992) Old Growth Forest Types of the Northern Region (with Errata through 2011)

2 Mildrexler, D.J. et al (2020) Large Trees Dominate Carbon Storage in Forests East of the Cascade Crest in the US Pacific Northwest

3 Franklin, Jerry F., Norman Johnson, K., and Johnson, Debora L. (2019) Ecological Forest Management. Waveland Press, Inc., Long Grove, Illinois

4 A "stand" is a contiguous area of similar site quality with a community of trees sufficiently uniform in composition, structure, age, and size to distinguish it from adjacent areas with different tree communities.

5 Oliver, C.D., and Larson, B.C. (1996) Forest stand dynamics, John Wiley and Sons, New York

6 Moomaw, W.R. et al. (2019) Intact Forests in the United States - Proforestation mitigates climate change and serves the greatest good

7 Law, B.E. et al. (2018) Land use strategies to mitigate climate change in carbon dense temperate forests