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A Carpe Diem Moment on Forests and Climate Policy

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Abstract

Mature and old-growth forests and trees (MOG) have declined globally from decades of unsustainable logging. MOG provide unique biodiversity and ecosystem benefits essential in slowing biodiversity loss and mitigating climate impacts worldwide. In the U.S., what remains of these forests is largely on federal lands where MOG logging continues despite a presidential order to inventory MOG for conservation purposes. We argue for stepped-up MOG protections by building on the exemplary Tongass National Forest in Alaska where roadless area protections containing MOG, previously removed under the Trump administration, were recently reinstated by the Biden administration while also supporting an economic transition out of old-growth logging and into previously logged but reforested sites. Nationwide MOG protections would establish U.S. leadership on the Paris Climate Agreement (natural sinks and reservoirs) and the Glasgow Forest Pledge to end deforestation and forest degradation. It would demonstrate progress toward 30 x 30 and present a global model for effective forest and climate response.

Keywords: Biodiversity; Federal lands; Logging; Mature forests; Old-growth forests; Protection; 30 x 30 targets

Mature and Old-Growth Forests (MOG) Need Protection from Logging

Mature and old-growth forests and trees (herein MOG) have unique biodiversity and climate benefits that have been declining globally [1]. Protecting them from resource extraction and development worldwide would make an invaluable contribution

towards mitigating the global climate and biodiversity crises by uptake and storage of massive amounts of atmospheric carbon along with myriad ecosystem benefits [2]. In the U.S., the Biden administration recently set MOG conservation in motion by reinstating 3.7M ha of roadless area protections (removed by the Trump administration) and ceasing industrial scale old-growth logging on thousands of MOG hectares on the Tongass National Forest in Alaska where an economic transition is underway. The transition is shifting the timber industry out of old-growth logging and into previously logged but reforested sites where impacts are much lower [3]. Similar protections should now be enacted for all MOG on federal lands to achieve scalable conservation and provide a global model of forest protections and more responsible forest management. Federal lands with the most MOG include those managed by the U.S. Forest Service and, to a degree, the Bureau of Land Management that manages these lands for many purposes [4].

As a signatory of the 26th UN Climate Change Conference (COP26) Glasgow Forest Pledge to end deforestation and forest degradation by 2030, the U.S. is taking steps toward this global effort via three presidential directives. In January 2021, President Joe Biden issued Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad,” to achieve the broad goal of conserving at least 30% of lands and waters by 2030 (“30 x 30”). On the 22nd of April 2022 (Earth Day), the President issued Executive Order 14072, “Strengthening the Nation’s Forests, Communities, and Local Economies,” directing federal land-management agencies to inventory, assess threats to, and conserve MOG. Surprisingly, the order did not even mention logging as a threat, despite such widespread logging-related losses and evidence that logging emissions exceed those from natural disturbances such as wildfires by more than double on federal forest lands [5]. In November 2022, the Biden administration announced a “road map for nature-based solutions to fight climate change” that is focused mainly on green infrastructure and wildfire risk reduction, but lacks the obvious natural solution of MOG protections.

Protecting MOG from logging is a sound investment in climate mitigation and ecosystem services as MOG contain irreplaceable benefits compared to logged forests. In the conterminous U.S., nearly 100 MOG forest types (many considered imperiled) support numerous at-risk and federally listed species, high carbon densities, and drinking water sources [4]. In Alaska’s Tongass rainforest, where there are extensive roadless areas, and MOG (specifically old growth) is more expansive (>2 M ha) than any other national forest, abundant populations of Bald Eagles (*Haliaeetus leucocephalus*), Marbled Murrelets (*Brachyramphus marmoratus*), and a world-class salmonid (five species) fishery thrive [3]. This is in stark contrast to imperiled murrelet and salmonid (*Oncorhynchus spp*) populations in the Pacific Northwest. On the Tongass, MOG within and outside of roadless areas, store the equivalent of 20% of the carbon across the entire national forest system, making this national forest a unique carbon reservoir that if fully protected would provide a model for U.S. compliance with the Paris Climate Agreement on sinks and reservoirs of carbon [3].

As the Biden administration heads into the second half of this presidential term the obvious natural climate solution is full MOG protection (among other nature-based approaches such as wetland and green infrastructure) that would build on the Tongass example while outlining clear science-based principles for MOG approaches that may be internationally instructive.

Defining MOG for the National Inventory

Clarifying what constitutes MOG is of interest to domestic and international policies (noted above), policy-relevant research [as

noted 3-4,6-8], and environmental non-government organizations. This is increasingly urgent as conservation groups (for instance, some 125 NGOs within climate-forests.org) have documented aggressive logging by federal agencies that seem to be ignoring the presidential order (e.g., Figure 1). There is some evidence that the tide is beginning to slowly turn, however. Recently, the U.S. Forest Service withdrew one highlighted MOG logging project: 800 ha of older forests in Oregon's Willamette National Forest. The agency reversed course partially due to "recent directives and climate-related plans concerning conservation of mature and old-growth forests and carbon stewardship." While an important step, there are nearly two-dozen such logging projects on federal lands (<https://www.climate-forests.org/worth-more-standing>) and millions of hectares of MOG outside federal protected areas [4].



Figure 1: The Green Mountain (Vermont) National Forest's "Telephone Gap Integrated Resource Project" includes 10,000 ha of proposed mixed logging (i.e., clearcuts, shelterwoods, commercial thinning, improvement cutting, selection) within the photo area. Most (85%) of the trees are estimated at >80 years old, 55% are >100 years old, on a national forest where most MOG was logged decades ago (logging statistics from climate-forests.org; project map available at <https://www.fs.usda.gov/project/?project=60192>) (photo with permission John Geery).

To aid with MOG definitions, at least two recent (2022, 2023) approaches provide a foundation for broad-based MOG protection on federal lands.

First, based on Light Detection and Ranging (LiDAR) derived relative measures of tree height, canopy cover, and above ground biomass, DellaSala et al. [4] structurally ranked forests from least (newly established) to most (MOG) advanced in the continental U.S. They report about 36% of forests qualify as MOG, with the majority on federal lands. More than 20M ha of federal MOG are outside designated protected areas where logging can occur despite the presidential order given no formal protection policy is in place. Such spatially explicit mapping can be used along with ground-truthing of MOG (site level) to also

establish the boundaries of new protected areas such as forest carbon reserves [8]. Importantly, MOG has superior carbon benefits compared to logged stands [2], which is why carbon reserves are sensible climate policy [8].

The Biden administration set a national target at 50-52% reduction from 2005 levels in “economy-wide net greenhouse gas pollution in “2030”, claiming that scaling-up clean-renewable energy and other measures in the recently passed Bipartisan Infrastructure Law would achieve 40% of the target [9]. If federal MOG at-risk to logging were instead protected, the equivalent of some 9% of U.S. annual emissions over a decade would be avoided [4]. This would work in tandem with the President’s goal to close the gap in U.S. emissions reductions.

Losses from natural disturbances, including insect infestation and wildfire, are accelerating in various parts of the country and should be monitored as part of a changing baseline in any MOG policy going forward. Establishing this baseline would ensure that carbon benefits arising from constraints on logging are not compromised by factors outside federal control. This would demonstrate compliance with Article 5.1 of the Paris Climate Agreement regarding protection of carbon sinks and reservoirs that could extend from the Tongass rainforest to all MOG on federal lands.

The second approach proposed by Birdsey et al. [7] used plot-based metrics to assess tree maturity based on culmination of net primary productivity (CNPP) on 11 national forests in the lower 48 states. According to these researchers, CNPP is the age at which forest/stand reaches a maximum carbon accumulation rate but is still at a fraction of its carbon above and below ground and biodiversity potential. Tree maturation was *minimally* defined at 35-75 years for a range of forest types. Up to two-thirds of accumulated carbon would stay out of the atmosphere by avoiding MOG logging, representing substantial emissions avoidance. The climate-forest.org campaign, for instance, proposes that protection policies be established for trees once they are at least 80-years old and that age threshold is supported by the Birdsey tree maturation range (upper bound *minimum*). Age-based thresholds for protecting MOG are useful because the association among tree age, diameter-at-breast height, and biomass accumulation is field verifiable. Our ongoing research aims to combine these two approaches (DellaSala, Birdsey) for more robust MOG classifications on federal lands.

Seize the Moment by Protecting MOG

To address global crises head-on, we urge the Biden administration to act swiftly and comprehensively in initiating a nationwide regulatory process (i.e. national rulemaking) for protecting MOG on federal lands similar to the Clinton administration’s protection (in 2000) of ~24M ha of federal roadless areas. The administration should seize the Tongass Carpe Diem moment by extending protection to all federal MOG, formally protecting at least the 20M ha identified as at-risk to logging in the continental U.S. Most notably this should include mature forests, and not just old growth, due to the substantial loss of old-growth forests nationwide and the need to recover the old-forest ecosystem writ-large [4]. Such an effort could begin contributing to 30 x 30 targets, make the U.S. an international leader on forests and climate, and leverage a proven and substantive natural solution to the global crises in line with the White House roadmap on nature-based solutions. We recognize administrative protections would not qualify as strict (GAP status code 1 and 2) protected areas in the interim without further restrictions on development beyond just logging, but like the roadless policy, they should count as interim 30 x 30 targets and strengthened overtime [4]. To date the administration’s 30 x 30 initiative lacks sufficient federal lands protections to close the 30

x 30 gap (only 12% of U.S. lands and waters are protected) and forest-climate policies have yet to embrace MOG at scale.

Protecting all MOG on federal lands would not interfere with fire-risk reduction if restoration targets were focused on degraded (logged) forests in high fire-risk areas and emphasized evidence-based small tree density reduction and protection of large, fire-resistant trees [10]. National timber supply would be minimally impacted as federal lands represent only ~ 4% of the nation's wood supply, with MOG accounting for an even smaller fraction [11]. Rulemaking could also include economic assistance for rural communities to transition into diverse economies and obtain wood fiber supply from previously logged but reforested sites, such as exemplary efforts underway on the Tongass and Siuslaw (Oregon) National Forests. Sending a clear message to the international community that MOG matters most in climate mitigation and nature-based solutions would be a monumental achievement worthy of presidential recognition. The Biden administration should take full advantage of this flagship climate-forest proposal as an Earth Day 2023 gift to the nation in mitigating the global climate and biodiversity crises. Doing so would also send a global message in backing words (pledges, directives) with realized actions as the world's remaining unlogged forests are in global retreat [1].

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