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Comments: Dear Deputy Chief French and Director Stone-Manning;

Thank you for this opportunity to comment. On July 15, 2022, the Biden Administration published a Request For Information (RFI) in the Federal Register, seeking input on the development of a definition for old-growth and mature forests on Federal lands and requesting public input on a series of questions.

The stated purpose of the RFI is to take a step toward implementing President Biden's April 22, 2022 Executive Order (E.O.) 14072: "Strengthening the Nation's Forests, Communities, and Local Economies." Along with other policy statements E.O. 14072 "calls on the Secretaries of Agriculture and the Interior, within one year, to define, identify, and complete an inventory of old-growth and mature forests on Federal lands, accounting for regional and ecological variations, as appropriate, and making the inventory publicly available."

We appreciate the Biden Administration's pursuit of conservation goals in E.O. 14072, however calling for a universal definition framework for old-growth is misguided because old growth occurs in different habitat types, at varying elevations, aspects, climate conditions, and ecosystems throughout the United States. [See Question #1: What criteria are needed for a universal definition framework that motivates mature and old-growth forest conservation and can be used for planning and adaptive management?]

In addition, these comments address the other questions in the RFI:

What are the overarching old-growth and mature forest characteristics that belong in a definition framework?

How can a definition reflect changes based on disturbance and variation in forest type/composition, climate, site productivity and geographic region?

How can a definition be durable but also accommodate and reflect changes in climate and forest composition?

A definition must distinguish between old growth and old age. Old growth relates ecologically to the structure and function of a stand. Features include a complex structure with large standing, medium age trees, young trees, dead trees leaning on other trees, fallen dead trees and evidence of decay. Old age is just that: age. It may not have the ecological attributes that old growth associated wildlife, plants, fungi, macroinvertebrates, and birds need. (Yanishevsky, 1987)

Complex structure, snags (i.e., standing dead trees) and down woody material are important components of old growth forests and provide key habitat for many species of birds and mammals. Old growth forests contain reservoirs of biological diversity from mychorrizal fungi to habitat for mammals.

Habitat effectiveness is also very important - old growth stands surrounded by clearcuts or development or bisected by roads provide less optimum habitat for wildlife for numerous reasons such as fragmentation, small patch sizes, weed infestation or potential microclimates. The goal should be to connect old growth stands by allowing mature forests to develop old growth attributes while providing habitat adjacent to old growth forests.

In the northern Rockies the definition must utilize the habitat types in Pfister, et al. Forest Habitat Types of Montana which is a land-classification system based upon potential natural vegetation for the forests of Montana. It is based on an intensive 4-year study and reconnaissance sampling of about 1,500 stands. A hierarchical classification of forest sites was developed using the habitat type concept. A total of 9 climax series, 64 habitat

types, and 37 additional phases of habitat types are defined. A diagnostic key is provided for field identification of the types based on indicator species used in development of the classification.

In order to measure the quality of old growth forests on Bureau of Land Management and Forest Service lands the agencies need to designate old growth indicator species that can be monitored to determine whether old growth is functioning as habitat for wildlife. The National Forest Management Act 2012 planning rule does not require indicator species so as Forest Plans are revised old growth indicator species are being eliminated, this needs to be changed.

It should also be noted that a definition that includes "planning and adaptive management" indicates that logging old growth forests will be on the table despite the paucity of science to support that logging can "improve" old growth. Given the length of time it takes for forests to reach the old growth stage it is impossible to know whether old growth "treatments" work or instead inflict long-term damage to this important ecosystem.

Old-growth forest habitat is a diminishing resource on public lands due to many factors. Maintaining existing old-growth stands and providing for recruitment of future old growth is necessary to provide for the viability of old-growth associated wildlife species. While not perfect, the Old-Growth Forest Types of the Northern Region (Green et al, 1992) is probably the best reference available for forests in the Forest Service Northern Region and should be used as a guide to determine old-growth forest habitat.

We strongly caution though that the minimum characteristics in Green et al, are not the recommended standards, but merely the starting point by which to determine whether a stand is classified as old growth. It is NOT to be used to "manage" old growth down to these minimum characteristics. Also, it is important to note that old-growth attributes such as decadence, large trees, old trees, snags, canopy structure, coarse woody debris, etc. are critical components of old-growth forest habitat. Stands that may not have the minimum number of large trees but contain these other important attributes should be considered "recruitment" or future old-growth and allowed to progress towards meeting the Green et al definition.

It is also worth noting that the Forest Service in the Northern Region has moved away from utilizing habitat types when identifying forest stands, these are a key provision in the Green et al definitions, thus any definition should mandate using habitat types as a metric.

Old-growth stands function best as habitat when they are connected to other stands. Connectivity can be achieved by corridors of actual old growth or by suitable closed-canopy or mature condition of the matrix between old-growth stands (Thomas, et al. 1990, Bennett, 1999). Stands designated as future old growth that are presently mature may be suitable (Pfister, et al 2000). Linkages should, whenever possible, contain a large fraction of interior forest (i.e., 100 meters from a high contrast edge, Bennett 1999).

Interior old growth habitat (>100 meters from edge of an opening or stand of lesser age or a road) is the most important component of old-growth habitat (Baker and Knight 2000). In general larger stands are more effective as habitat than smaller stands (Pfister 2000). Fragmentation of existing patches of old growth by roads, timber harvesting or other created openings will decrease effectiveness of the patch as habitat due to the reduction in amount of interior old-growth conditions (Baker and Knight 2000).

Stands that met the Green et al definition of old growth but are burned in a forest fire do not cease to provide a valuable function to wildlife and the forest ecosystem and should not be salvage logged. This burned old growth may function differently but it is still important habitat because burned snags stand much longer than beetle-killed trees, and the fact that it burned does not change its age and age is a primary factor in old growth habitat (Pers. comm. R. McClelland).

The RFI also asks: What, if any, forest characteristics should a definition exclude?

Any forest characteristics whose goal is promoting resource exploitation and logging must be excluded from the framework.

The National Forest Inventory and Analysis must be excluded from the methodology for conducting the inventory process, as mandated in the E.O. FIA is for sampling, and does not yield spatially explicit or accurate information that discloses the location and extent of mature and old-growth forests.

Following is scientific support for old-growth indicator species:

* Management Considerations from McClelland and McClelland 1999:

Nest tree size - Managers often apply minimum size standards for wildlife resource goals that conflict with exploitable resources, e.g., timber. Thus, the smallest recorded nest-tree dbh may be adopted as a size standard. This approach ultimately could lead to extirpation of the pileated woodpecker in affected areas. Trees even larger than the recommended optimum tree size for pileated woodpeckers are increasingly uncommon. They should be nurtured not only for a wider range of choice for pileated woodpeckers but for other wildlife (e.g, black bear dens) and for their intrinsic aesthetic values (Blocker 1995). Thus, a management plan needs to perpetuate forest diversity, not simply a tree size that fits the paradigm of a single species.

The pileated woodpecker as an old-growth indicator species - Despite concerns about the indicator species concept, the pileated woodpecker should be considered a sensitive species. The pileated woodpecker warrants that concern because of its key role in the cavity-nesting guild and its dependence on large trees and old growth that are commercially valuable as timber or firewood.

The pileated woodpecker's link with forest "health" - In western larch forests of Montana, the pileated woodpecker is closely associated with forest values often considered characteristic of an "unhealthy" forest: fire, insects and disease. Yet these agents have been major factors in forest development in the northern Rockies (McClelland 1968, Monnig and Byler 1992). [hellip]Forest management that emphasizes restoring forest health through routine cutting of dead, dying and diseased trees and fire suppression can eliminate essential characteristics of old-growth western larch.

Fire's role in western larch forests - Fire has played a key role in the evolution of several forest types that support pileated woodpeckers in the northern Rockies, e.g., western larch and ponderosa pine (Habeck 1990). [hellip]Because of its longevity (maximum >900 yrs), larch are often present as relicts (legacies) in stands of various ages (Fiedler and Lloyd 1995). Thus, old larch trees may survive fires over centuries, isolated or in groups or stands, providing nest and roost sites for pileated woodpeckers.

Heartwood decay - Although the historic role of fire in western forests now is widely recognized by managers, the essential roles of natural diseases and decay generally have not received similar comprehension (Christensen et al. 1996). [hellip]In our study, where western larch was the most commonly observed nest-tree species, analysis of excavation chips showed that heartwood decay was an important nest-tree characteristic. Because western larch has comparatively hard wood, pileated woodpeckers selected larch with heartwood softened by decay.

On a landscape scale, fire and heartwood decay organisms are both essential elements in a healthy forest, if healthy connotes a complete assemblage of ecosystem processes and components (Harvey 1994). [hellip]Emphasizing individual tree health subverts the goal of ecosystem integrity and long-term sustainability of forests and their myriad biotic components such as the pileated woodpecker. [hellip]In the northern Rocky Mountains, tree decay, native insects, and fire are integral components of a healthy forest. Decaying and dead trees are essential components for the long-term presence of pileated woodpeckers in western larch forests. "Both quality and sustainability can be used as broad descriptors of ecosystem management goals, with more

specific objectives set on an ecosystem-specific basis" (Wicklum and Davies 1995). In this context, quality in western larch forests should focus on ecosystem completeness, not on subjective health criteria.

* Previously, old-growth larch forests have not been considered important habitat for Red-naped Sapsuckers. Our data make evident that in the northern Rocky Mountains, sapsuckers commonly nest in large larch with heartwood decay. Because heartwood decay incidence increases with age, habitat value to Red-naped Sapsuckers and other species is amplified in old growth forests. Consequently, the perpetuation of old-growth western larch forests should be an important component in the conservation of avian diversity. (McClelland et al. 2000)

* Foraging perch selection was influenced not only by site factors, but also by tree characteristics. [hellip]The preference for snags and dead-top and broken-top live trees is consistent with Stalmaster and Newman (1979), Hansen and Bartelme (1980), Steenhof et al. (1980). Grub and Kennedy (1982), Biosystems Analysis (1985), and Fielder and Starkey (1986) who found that Bald Eagles favored snags and partly dead trees. These tree types tended to be large and open in structure, making them more desirable as perches. (Caton et al. 1992)

* Research shows that the Rocky Mountain Fisher selects for large, old trees, snags and dense overhead cover more than had been previously thought. Research also shows that Fisher do not select and use riparian areas as much as biologists had hypothesized. Retention and recruitment of connected old-growth forest habitats is very important to maintain viability of fisher; relying on riparian buffer zones is not adequate.

Management Recommendations to Protect Old Growth

To protect remaining old growth, provide for recruitment of future old growth, and link the currently small and isolated patches, we suggest the following management standards.

* Use the Old-Growth Forest Types of the Northern Region as a first step in identifying old growth stands.

* All existing old growth must be preserved. A determination of the historic range of old growth must be done. Old-growth forest habitat must be increased to the historical range by allowing mature stands to develop old growth characteristics (snags, down woody material, decadence and age). The Forest Service must calculate how much old growth there is on a watershed (i.e., approximately 10,000 acres) and forest-wide basis. Recruitment old growth must be identified on a watershed and forest-wide basis. Recruitment old growth is subject to the same protections as designated current old growth.

* Designate the existing old growth and future old growth, map it and connect these stands with linkages as described above.

* Place longer-rotation or less intensive uses adjacent to designated old growth, so that a lower-intensity managed zone serves as a buffer for the old-growth system (Noss and Cooperrider 1994). Avoid placing high intensity land uses (e.g. clearcuts, roads) next to designated old growth (Pfister 2000).

* Integrate future recruitment old growth into the network. Where otherwise equivalent replacement stands exist, choose those adjacent to designated old growth as future old growth.

No logging should take place in old growth stands because logging with reduce of eliminate the complex structure that is part of which defines an old growth forests and thus hurt old growth dependent species.

We request that the mature old growth (MOG) assessment and national rule making build on UNFCCC (2019)

1.CP/25 (para. 15) with the USDA and DOI promoting enforceable actions (i.e., a "bright- line rule") that directly

address the accelerating climate and biodiversity crises contributed by logging and related land uses. The US government should announce forest protection commitments prior to the COP27 via a national rulemaking process to protect from logging MOG as natural climate solutions (Griscom et al. 2017, Moomaw et al. 2019, DellaSala et al. 2020).

Against the backdrop of the starkest warning yet from the IPCC (2021) on the need to front load far more ambitious action to prevent and reduce GHG emissions across all sectors (including forestry) this decade, the findings of the first ever joint workshop of IPBES and IPCC scientists assume critical importance as a fundamental reason for protection of MOG from logging that is best accomplished by national rulemaking. We request that this begin immediately and not have to wait until April 2024 for MOG inventories to be completed because there is already sufficient information to meet the MOG purpose and need concurrent with a rulemaking process (e.g., Mackey et al, DellaSala et al in review, FIA datasets on forest age distributions such as Pan et al. 2011 - which needs to be updated).

The key message from the joint IPBES - IPCC workshop is that "biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other (and that) neither will be successfully resolved unless both are tackled together."

The first recommendation from the joint workshop was "stopping the loss and degradation of carbon-and-species rich ecosystems on land and in the ocean, especially forests, wetlands, peatlands, grasslands and savannahs and sea grass meadows as well as deep water and polar blue carbon habitats" (emphasis added).

Protecting MOG from logging is the most effective natural climate solution as supported by the IPCC Special Report on Land in 20192 that noted protecting carbon dense ecosystems have immediate mitigation benefits while others, such as restoration and tree planting, take decades to realize. US obligations under the ecosystem provisions of the UNFCCC (Article 4.1 (d)) and the Paris Agreement (Article 5) have never been fully realized, especially those centered on MOG protection. Indeed, the flaws in current UNFCCC approaches have been well documented regarding protective strategies for natural climate solutions such as MOG and this needs to be corrected going forward with policy development specific to the protection from logging of MOG.

Mature/Old Growth Forests are Nature's Wellsprings for Clean Water

Forests play a pivotal role in the hydrological cycle that includes the continuous circulation of water between the biosphere and the atmosphere. Forests do this essential service by via uptake of water in roots and release of water back to the atmosphere via evapotranspiration through leaf pores. Simply put, forests can be thought of as giant water towers for water storage and gradual release. Importantly, the water function of trees increases with tree size (maturation) because leaf area is related to site water balance and soil water storage/retention. Species composition has little influence on the relation between leaf area and site water balance, while tree size matters most. In other words, larger trees have more leaf area and greater water balance (Grier and Running 1977).

Mature forests also help reduce flooding by buffering streams from peak high flows - that is - they may impede excessive runoff through absorption and slow release of water. And they provide shade along streams by keeping stream and ambient temperatures from overheating.

The older and larger the trees, the greater these ecosystem benefits.

In contrast, the hydrological cycle can be disrupted by logging. For instance, deforestation of tropical rainforests (i.e., "rivers in the sky") has contributed to droughts in China, India, and the U.S. Midwest (Wokosin and Harris 2018). In the temperate zone, logging large, canopy trees, results in drier understories, whereby the amount of sunlight and heat reaching the ground causes more evaporative losses and higher surrounding temperatures (Wheeling et al.

2019)4

. In sum, forest canopies regulate the rate at which moisture and heat are exchanged with the atmosphere from local to global scales, which in turn influences water retention and the makeup of forest ecosystems interconnected with streams and marine ecosystems.

Logging and development are known to produce downwind continental interiors with declining rainfall and water availability that heighten drought and wildfire risks (Ellison et al. 2021). This top logging threat needs to be recognized in any MOG assessment.

Please focus on ecosystem completeness, not on subjective forest health criteria.

Please include our comments in the official record for this Request for Information.

Please find Pfister et al. 1977 and McClelland and McClelland 1999 attached.

Thank you for your time and consideration of our comments.

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ATTACHMENT: Pfister et al. 1977.pdf

ATTACHMENT: McClelland and McClelland 1999.pdf