Friends of the Clearwater

Keeping Idaho's Clearwater Basin Wild

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Secretary of Agriculture Vilsack and Director Walker:

These are comments on the June 2024 Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System Draft Environmental Impact Statement ("Draft EIS" or "DEIS"), on behalf of Friends of the Clearwater (FOC).

Introduction

Executive orders by President Biden recognize that our nation's forests lie at the nexus of solutions for two ongoing crises facing our planet: climate change and the loss of biological diversity. The federal government actions that led to this Draft EIS provided both encouragement and expectation that collectively, citizens and government could work together to forge policy changes to face these difficult challenges. Although the U.S.D.A. Forest Service was directed to update its policies to address these intertwined climate and biodiversity crises, the content of the Draft EIS clearly reveals the Forest Service (FS) is not up to the task.

Best Available Scientific Information (BASI)

The DEIS states, "The Planning directives enumerate several sources of scientific information that may be considered BASI. This list includes peer reviewed articles, expert opinion, and 'data or information from public and governmental participation.'" Throughout the public process that began with the executive orders and continuing through the scoping process, knowledgeable and reputable sources of scientific information have weighed in strongly in opposition to the FS's course of action, or made science-based suggestions for improvement. In addition, FOC cited scientific sources—including those from the agency itself—in our previous comments. Whereas the DEIS claims, "…uncertainty and/or conflicting sources of information are acknowledged and interpreted where applicable" that is patently false. Most of what we and others have submitted for consideration as BASI has gone without proper consideration, has been brushed off by DEIS Appendix A, or has been altogether ignored. The Draft EIS's selection of scientific information is highly biased against consideration of other reasonable alternatives.

It is urgent for this process to weigh science and public input in a thorough and unbiased manner. Therefore we incorporate our previous comments—in their entirely—within these comments on the DEIS. Those letters are included as Attachment A, to facilitate the FS responding in writing, as National Environmental Policy Act (NEPA) regulations require. Furthermore, this letter cites scientific sources and opinion we believe represent BASI the FS must incorporate into its analyses and decisionmaking.

Forest plan amendments under the preferred Modified Proposed Alternative 2 violate executive orders requirements to conserve mature and old-growth forests and protect biological diversity

Executive Order 14008 of January 27, 2021 (Tackling the Climate Crisis at Home and Abroad) set the goal of conserving 30 percent of our lands and waters by the year 2030. Executive Order 14072 of April 22, 2022 (Strengthening the Nation's Forests, Communities, and Local Economies) calls on the Secretaries of Agriculture and the Interior to "conserve America's mature and old-growth forests on Federal lands" and "define, identify, and complete an inventory of old-growth and mature forests on Federal lands… ." EO 14072 recognizes, "Forests provide clean air and water, sustain the plant and animal life fundamental to combating the global climate and biodiversity crises." The proposed forest plan amendments impede these executive orders.

Ceballos et al. 2017 state:

> The strong focus on species extinctions, a critical aspect of the contemporary pulse of biological extinction, leads to a common misimpression that Earth's biota is not immediately threatened, just slowly entering an episode of major biodiversity loss. This view overlooks the current trends of population declines and extinctions. Using a sample of 27,600 terrestrial vertebrate species, and a more detailed analysis of 177 mammal species, we show the extremely high degree of population decay in vertebrates, even in common "species of low concern." Dwindling population sizes and range shrinkages amount to a massive anthropogenic erosion of biodiversity and of the ecosystem services essential to civilization. This "biological annihilation" underlines the seriousness for humanity of Earth's ongoing sixth mass extinction event.

The outcome of the amendments must be evaluated both in terms of the damage the FS would be constrained from doing, and also the damage promoted with projects implementing amended forest plans. FOC finds this proposal to be unacceptable on both counts.

The DEIS states, "The proposed action …sets forth standards and guidelines that provide constraints for decision- making at the project-level." In the section "Problems with the Notice's Proposed Plan Components" our February 2, 2024 scoping comments on the USDA Federal Register notice ("Land Management Plan Direction for Old-Growth Forest Conditions Across the National Forest System"), FOC explained how those proposed standards and guidelines would not actually constrain. (See Attachment A.) In sum, the standards and guidelines offered as constraints are so riddled with loopholes ("exceptions) that they would constrain practically

nothing. The same is true of the updated standards and guidelines in the Modified Proposed Alternative, given their extremely generous allowance of "deviations."

Major factors contributing to the proposal's deficiencies are that its standards and guidelines are merely "established to help achieve or maintain the desired condition or conditions…" and to "promote" them, so are subservient to the "proactive" management emphasis of the latter. The Draft EIS arranges its vague, unenforceable and nonconstraining "desired conditions" to be the dominant plan component—the component around which the others are written. As the Draft EIS states, "Regardless of the standards, **desired conditions are binding on projects**…" (Emphasis added.)

The DEIS defines Desired Conditions: "A desired condition is a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are **specific enough to allow progress toward their achievement to be determined**, but do not include completion dates" (emphasis added). In order to "determine …progress toward" there must be measurement, yet the DEIS gives us no idea how its desired conditions would be measured. Let's examine the four Desired Conditions in search for those metrics.

NOGA-FW-DC-01 states, "Old-growth forests occur in amounts and levels of **representativeness**, **redundancy**, and **connectivity** such that conditions are **resilient** and **adaptable** to stressors and likely future environments." (Emphases added.) The DEIS provides not a single clue as to how those emphasized terms can be measured now, let alone how "progress toward" could be assessed.

NOGA-FW-DC-02 states, "Old-growth forests persist in areas that have the inherent capability to sustain old-growth forests over time." This is at least as vague as NOGA-FW-DC-01.

NOGA-FW-DC-03 states, "The long-term **abundance**, **distribution**, and **resilience** of old-growth forests within the plan area **contribute to** ecosystem services across the National Forest System, including but not limited to **long-term stability** of forest carbon, clean water and soil stabilization, plant and animal habitat, spiritual and cultural heritage values and education, and recreational and tourism experiences." (Emphases added.) The DEIS fails to explain how those emphasized terms can be measured now, or how "progress toward" would be assessed.

NOGA-FW-DC-04 states, "Old-growth forests **contribute to** the **ecological integrity** of terrestrial and aquatic ecosystems within the plan area, in concert with other successional stages that are also necessary for ecological integrity." (Emphases added.) Again, the DEIS provides no notion as to how "contribute to" or "ecological integrity" can be measured.

Furthermore, the two Plan Monitoring components include nothing remotely explicit as to how progress or contributions toward desired conditions would be measured. Those two components include vague promises for coming up with something later, which only fuels our skepticism.

FOC agrees that the desired conditions in the DEIS are useful descriptions of what would be

desirable about old-growth conditions on national forests, but they fail to conform to requirements in the Planning Rule.

We are alarmed by the management activities being encouraged and promoted by the DEIS in service of pursuing desired conditions. It promotes "proactive stewardship in order to protect old-growth." And if it isn't abundantly clear what this means, the DEIS Glossary states, "Proactive stewardship …(r)efers to vegetation management…" as in, **old growth must be managed** by active manipulation of the amount, distribution, extent, etc. of the trees and other plant species found in old growth. This is further laid out in the Technical Guidance for Standardized Silvicultural Prescriptions for Managing of Old-Growth Forests ("Silvicultural Prescriptions"). The DEIS says it "provides in-depth direction on silvicultural prescriptions prepared to maintain or restore" desired conditions and "complements the National Old Growth Amendment by providing a tool that will be used by field resource managers working at the project level to implement the amendment's objective of fostering resiliency of old-growth forests across national forests." The Silvicultural Prescriptions states, "If the old-growth forest does not exhibit desired conditions or does not have high ecological integrity or is unlikely to be resilient to future conditions, consider treating the stand." So forest managers are free to apply vague, unmeasurable conceptualizations to determine if, in their opinion, old growth is crying out for "treatment." How can anyone argue that a forest of old growth (or any forest area, actually) is, objectively, resilient enough to be left unmanaged if there are no established methods for measuring resilience? The answer is—one cannot. The FS rigs the game, promoting "proactive stewardship" as the answer to the (mythically) non-resilient old growth. To make our view abundantly clear, **the preferred alternative directs managers to log our oldest, most intact and biologically diverse public forests.**

Attachment B includes a detailed critique of the use of the desired conditions as a plan component (*see* VII. B.2. Habitat protections under forest plans *and* VI. G. Old growth logging promoted in revised forest plans).

Logging promoted by the DEIS would result in many of the largest, oldest trees being logged from old growth. Other old growth would be clearcut. The deviations the DEIS installs into the standards and guidelines do not genuinely constrain this. Old-growth associated wildlife would experience degraded and destroyed habitat—its diversity reduced at the very least. Soil would be compacted for decades, conditions for increasing abundance of non-native plants would be created. The roads needed to haul off our 200-year old trees will cause harm to aquatic ecosystems via increased sediment and other hydrological disturbances, or add to existing ecological deficits. The severity of fires that might encounter the manipulated areas would likely be elevated for decades. The DEIS and its incorporated Draft Ecological Impacts Analysis Report hardly touch on these issues, if at all.

Forest plan amendments under the preferred Modified Proposed Alternative 2 violate executive orders requirements to address the climate crisis

Executive Order 14008 of January 27, 2021 (Tackling the Climate Crisis at Home and Abroad) begins, "The United States and the world face a profound climate crisis. We have a narrow moment to pursue action at home and abroad in order to avoid the most catastrophic impacts of

that crisis and to seize the opportunity that tackling climate change presents." Executive Order 14027 of May 7, 2021 (Establishment of the Climate Change Support Office) recognizes the situation as a "global climate crisis."

Executive Order 13990 of January 20, 2021 (Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis) sets the policy of the Biden Administration to "…reduce greenhouse gas emissions; to bolster resilience to the impacts of climate change…". Yet the preferred alternative would accelerate—not reduce—greenhouse gas emissions.

Its Section 5 (Accounting for the Benefits of Reducing Climate Pollution), Executive Order 13990 states, "It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues." But the DEIS obfuscates and avoids the task of accurately accounting for the full costs.

Executive Order 14072 of April 22, 2022 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." (Emphasis added.) EO 14072 recognizes, "Forests provide clean air and water, sustain the plant and animal life fundamental to combating **the global climate and biodiversity crises**, and hold special importance to Tribal Nations." (Emphasis added.) In response, the FS has merely produced an estimate. Using the results of its "inventory" the agency cannot point to the location of a single stand of old growth anywhere in the National Forest System.

The Fact Sheet accompanying Executive Order 14072 recognizes:

> America's forests are a key climate solution, absorbing carbon dioxide equivalent to more than10% of U.S. annual greenhouse gas emissions. Federal lands are home to many of the nation's mature and old-growth forests, which serve as critical carbon sinks, cherished landscapes, and unique habitats.

Proper implementation of Executive Order 14072 would "**Safeguard mature and old-growth forests on federal lands**, as part of a science-based approach to reduce wildfire risk" and "**Enlist nature to address the climate crisis with comprehensive efforts to deploy nature-based solutions** that reduce emissions and build resilience" (emphases added). But the preferred alternative would not "safeguard" old growth, as we discuss in these comments. Terminology in the title of the Draft EIS is telling: "…**Address** Old-Growth Forests… ." In its extreme bias toward "proactive" vegetation management, the FS finds it to hard to say what is needed and required is to **conserve** old-growth forests. All the amendments would safeguard is access to timber from old growth and mature forests.

And what of "nature-based solutions"? Following a scientific literature review, Faison et al 2023:

> ...argue that expensive management interventions are often unnecessary, have uncertain

> benefits, or are detrimental to many forest attributes such as resilience, carbon accumulation, structural complexity, and genetic and biological diversity. Natural forests (i.e., those protected and largely free from human management) tend to develop greater complexity, carbon storage, and tree diversity over time than forests that are actively managed; and natural forests often become less susceptible to future insect attacks and fire following these disturbances. Natural forest stewardship is therefore a critical and cost effective strategy in forest climate adaptation.

Such scientific nature-based solutions are ignored and suppressed by the DEIS. Clearly, the plan elements the DEIS proposes reveal an agency totally unwilling to work with natural processes—to even recognize their role in genuinely restoring ecosystems and bringing forests to the status known as old growth.

At a time when species are going extinct faster than any period in human history, the survival of species and persistence of healthy ecosystems requires science-based decisions. A recent analysis by NatureServe addresses five essential questions about biodiversity–the variety of life on Earth–that must be answered if we are going to effectively conserve nature. In the first report of its kind, NatureServe, 2023 reveals an alarming conclusion: **34% of plants** and **40% of animals** are at risk of extinction, and **41% of ecosystems** are at risk of range-wide collapse. The analyses presented in that report suggest how to effectively and efficiently use our financial resources to make the best conservation decisions.

The proposed forest plan amendments would result in indirect, and cumulative impacts on climate change because the proactive stewardship/vegetation management actions proposed would adversely impact forest ecosystems' functions for sequestering and storing carbon. Naturally functioning forests act as carbon sinks, meaning they store more carbon than they emit. In thwarting these natural processes, the proposed forest plan amendments would worsen the climate crisis.

The Intergovernmental Panel on Climate Change is a group of scientists convened by the United Nations to guide world leaders. The Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC, 2023) states:

> There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all. …The choices and actions implemented in this decade will have impacts now and for thousands of years. … Maintaining the resilience of biodiversity and ecosystem services at a global scale depends on effective and equitable conservation of approximately 30% to 50% of Earth's land, freshwater and ocean areas, including currently near natural ecosystems.

In their March 20, 2023 Press Release introducing the Synthesis Report (IPCC, 2023) the IPCC states, "This Synthesis Report underscores the urgency of taking more ambitious action and shows that, if we act now, we can still secure a liveable sustainable future for all." The news release goes on:

> In 2018, IPCC highlighted the unprecedented scale of the challenge required to keep warming to 1.5°C. Five years later, that challenge has become even greater due to a

> continued increase in greenhouse gas emissions. The pace and scale of what has been done so far, and current plans, are insufficient to tackle climate change.
>
> More than a century of burning fossil fuels as well as unequal and unsustainable energy and land use has led to global warming of 1.1°C above pre-industrial levels. This has resulted in more frequent and more intense extreme weather events that have caused increasingly dangerous impacts on nature and people in every region of the world.
>
> Every increment of warming results in rapidly escalating hazards. More intense heatwaves, heavier rainfall and other weather extremes further increase risks for human health and ecosystems. In every region, people are dying from extreme heat. Climate-driven food and water insecurity is expected to increase with increased warming. When the risks combine with other adverse events, such as pandemics or conflicts, they become even more difficult to manage.

A *Missoulian* news article on the release of that report quotes United Nations Secretary-General Antonio Guterres: "Humanity is on thin ice — and that ice is melting fast. …Our world needs climate action on all fronts —everything, everywhere, all at once." That article quotes from the report, "The choices and actions implemented in this decade will have impacts for thousands of years" calling climate change "a threat to human well-being and planetary health." It quotes report co-author and water scientist Aditi Mukherji: "We are not on the right track but it's not too late. Our intention is really a message of hope, and not that of doomsday."

IPCC (2022a) states, "The rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt."

There is extreme scientific concern over the imminent effects of climate change on the earth's ecosystems and civilization itself. The IPCC (2018) report stated that if greenhouse gas emissions continue at the current rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts and poverty. That report painted a much more dire picture of the immediate consequences of climate change than previous reports, and said that avoiding the damage requires transforming the world economy at a speed and scale that has "no documented historic precedent." It described a world of worsening food shortages and wildfires, and a mass die-off of coral reefs as soon as 2040—a period well within the lifetime of much of the global population.

On April 18, 2023 Forest Service Deputy Chief Christopher French issued a memo to Regional Foresters entitled "Mature Old Growth Guidance: Infrastructure and Investment Jobs Act and Executive Order 14072". It states:

> In response to E.O. 14072, we recently completed the mature and old-growth (MOG) inventory that is built on the existing old-growth definitions developed by each region over the past 30 years. The inventory methods categorize MOG using approximately 200 combinations of forest type, productivity level and biophysical setting. We will shortly issue guidance on using this information. Specific Forest Plan content should guide

> operations to maintain or contribute toward the restoration of the structure and composition of classified old-growth stands.

Part of any reasonable interpretation of an old-growth "inventory" would be that it would allow one to determine if any particular location within a national forest is within the mature and old-growth inventory or not. At this point, the FS has not produced an inventory that could make such a determination. No spatially specific inventory was produced, based upon ecological definitions of old growth.

DellaSala, et al. (2023) advocate for:

> …stepped-up MOG[1] 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.

The Forest Service chief's 1989 Position Statement on National Forest Old Growth Values (*see* Appendix C in Green et al., 1992) did not anticipate forests' contributions toward a stable climate as one of the values. Given the dire climate crisis in which we find ourselves, and in order to serve all those stated values, the FS is obligated to analyze and disclose the carbon sequestration potential of the landscapes and ecosystems within which old growth is found. The DEIS fails to utilize the best available scientific information to fulfill that obligation.

Law and Moomaw, 2023 state: "Forests are critically important for slowing climate change. They remove huge quantities of carbon dioxide from the atmosphere—30% of all fossil fuel emissions annually—and store carbon in trees and soils. Old and mature forests are especially important: They handle droughts, storms and wildfires better than young trees, and they store more carbon."

In a paper entitled "Creating Strategic Reserves to Protect Forest Carbon and Reduce Biodiversity Losses in the United States" Law et al. (2022) assert that "many of the current and proposed forest management actions in the United States are not consistent with climate goals, and that preserving 30 to 50% of lands for their carbon, biodiversity and water is feasible, effective, and necessary for achieving them."

In a January 12, 2023 News Release, scientists (Birdsey et al., 2023) point out that "Mature Federal Forests Play an Outsized Role in the Nation's Climate Strategy." They state:

> A new study published in the peer-reviewed journal Forests and Global Change presents the nation's first assessment of carbon stored in larger trees and mature forests on 11 national forests from the West Coast states to the Appalachian Mountains. This study is a

[1] Mature and Old-Growth forests

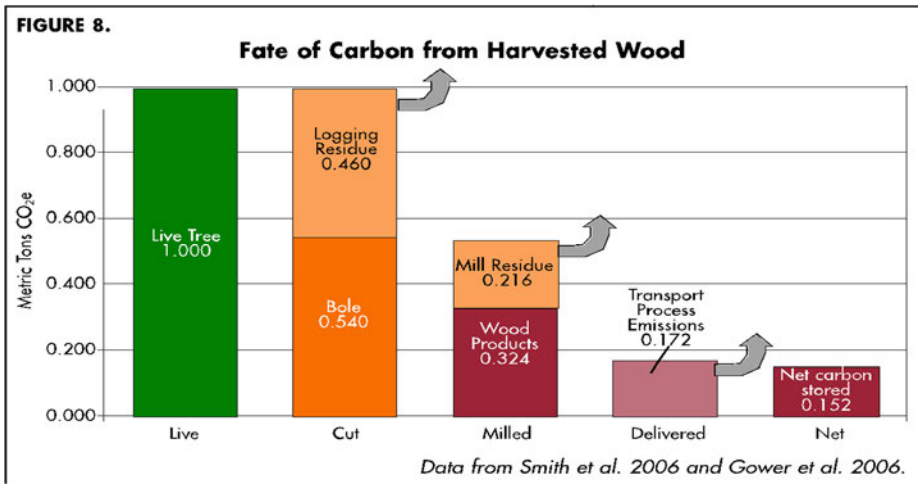
> companion to prior work to define, inventory and assess the nation's older forests published in a special feature on "natural forests for a safe climate" in the same journal. Both studies are in response to President Biden's Executive Order to inventory mature and old-growth forests for conservation purposes and the global concern about the unprecedented decline of older trees.

In 2022 over 90 scientists working at the intersection of ecosystems and climate change sent a letter to Canada's Prime Minister Justin Trudeau "Regarding the Protection of Canada's Primary Forests." They state:

> When primary forests, whether in Canada or elsewhere, are logged they release significant amounts of carbon dioxide, exacerbating climate change. Because primary forest ecosystems store more carbon than secondary forests, replacing primary forests with younger stands, as Canada is doing, ultimately reduces the forest ecosystem's overall carbon stocks, contributing to atmospheric greenhouse gas levels.
>
> Even if a clearcut forest eventually regrows, it can take over a decade to return to being a net absorber of carbon, and the overall carbon debt in carbon stocks that were removed from older forests can take centuries to repay, a luxury we simply no longer have. Recent studies also indicate that soil disturbance associated with logging results in large emissions of methane (CH4), a powerful greenhouse gas second only to CO2 in its climate forcing effects.

The DEIS states, "Many management activities like removing hazardous fuels and reducing live tree density or activities enhancing species, structural, or age-class diversity may have short-term carbon emissions but **yield long-term carbon benefits through enhancing forest resiliency and therefore carbon stabilization** (Krofcheck et al. 2019, Puhlick et al. 2020; Crockett et al. 2023)." (Emphasis added.) There are plenty of scientific findings which contradict such DEIS justifications for its proactive stewardship/vegetation management.

Ingerson (2007) performs the kind of assessment the DEIS completely neglects to:



The green polygon displayed in the above Figure 8 representing the amount of carbon stored in a

live, standing tree. This contrasts greatly with the final maroon polygon representing the amount of carbon stored after accounting for logging and associated transportation and milling activities—a little more than 15% of that stored in the standing tree. DEIS statements to the effect that wood products are an efficient way to store carbon from forests are patently false.

Logging, road construction and other land management actions such as livestock grazing are likely to amplify the effects of climate change by making the land more susceptible to heat waves, droughts, water shortages, wildfires, wind damage, landslides, floods, warming waters, harmful algae blooms, insects, disease, exotic species, and biodiversity loss. (Talberth, 2023.)

Mildrexler et al. (2023) states:

> Claims that carbon stores will be "stabilized" by increasing harvest of large-diameter trees that store and accumulate the most carbon are inconsistent with basic science on thinning (Zhou et al., 2013) and the carbon cycle (Campbell et al., 2012; Law et al., 2018). These claims ignore the large amounts of CO2 rapidly released to the atmosphere following harvest (Hudiburg et al., 2019), and that large trees cannot be replaced in short timeframes. It can take centuries to reaccumulate forest carbon stocks reduced by harvest of large trees (Birdsey et al., 2006).

The federal courts are increasing their scrutiny of FS distortions and misrepresentations on climate impacts. In a recent federal court decision (*Center for Biological Diversity et al v. U.S. Forest Service*; CV 22-114-M-DWM) regarding the Black Ram timber sale on the Kootenai National Forest, Judge Molloy recognizes:

> Ultimately, "[greenhouse gas] reduction must happen quickly" and removing carbon from forests in the form of logging, even if the trees are going to grow back, will take decades to centuries to re-sequester. FS-038329. Put more simply, logging causes immediate carbon losses, while re-sequestration happens slowly over time, **time that the planet may not have**. FS-020739 (I[t] is recognized that global climate research indicates the world's climate is warming and that most of the observed 20th century increase in global average temperatures is very likely due to increased human-caused greenhouse gas emissions.").
>
> …NEPA requires more than a statement of platitudes, it requires appraisal to the public of the actual impacts of an individual project. …(T)he USFS has the responsibility to give the public an accurate picture of what impacts a project may have, no matter how "infinitesimal" they believe they may be.

(Emphasis added.)

A Council on Environmental Quality memorandum (dated August 1, 2016) includes guidance on considering greenhouse gas emissions and effects of climate change in NEPA reviews, and directs federal agencies to consider the extent to which a proposed action would contribute to climate change. That CEQ guidance states:

> Climate change results from the incremental addition of GHG emissions from millions of individual sources, which collectively have a large impact on a global scale. CEQ recognizes that the totality of climate change impacts is not attributable to any single action, but are exacerbated by a series of actions including actions taken pursuant to decisions of the Federal Government. Therefore, a statement that emissions from a proposed Federal action represent only a small fraction of global emissions is essentially a statement about the nature of the climate change challenge, and is not an appropriate basis for deciding whether or to what extent to consider climate change impacts under NEPA. Moreover, these comparisons are also not an appropriate method for characterizing the potential impacts associated with a proposed action and its alternatives and mitigations because this approach does not reveal anything beyond the nature of the climate change challenge itself: the fact that diverse individual sources of emissions each make a relatively small addition to global atmospheric GHG concentrations that collectively have a large impact.

The DEIS ignores that CEQ direction to quantify greenhouse gas emissions. Quantitative tools for such analyses include USDA (2014).

Talberth, 2023 analyzes and estimates carbon emissions from alternatives of a draft revised forest plan. Talberth (2024) provides an estimate of the greenhouse gas emissions associated with logging and logging road construction in Shasta and Siskiyou Counties using publicly available forest carbon data from 2012 to 2022. Yet the FS is unwilling to account for the greenhouse gas emissions its policies cause.

McKinley et al., 2011, state:

- …most of the aboveground carbon stocks are retained after fire in dead tree biomass, because fire typically only consumes the leaves and small twigs, the litter layer or duff, and some dead trees and logs.

- Generally, harvesting forests with high biomass and planting a new forest will reduce overall carbon stocks more than if the forest were retained, even counting the carbon storage in harvested wood products (Harmon et al. 1996, Harmon et al. 2009). Thinning increases the size and vigor of individual trees, but generally reduces net carbon storage rates and carbon storage at the stand level (Schonau and Coetzee 1989, Dore et al. 2010).

- Methane release from anaerobic decomposition of wood and paper in landfills reduces the benefit of storing carbon because methane has about 25 times more global warming potential than CO2. For some paper, the global warming potential of methane release exceeds its carbon storage potential,

- There are two views regarding the science on carbon savings through fuel treatments. Some studies have shown that thinned stands have much higher tree survival and lower carbon losses in a crown fire (Hurteau et al. 2008) or have used modeling to estimate lower carbon losses from thinned stands if they were to burn (Finkral and Evans 2008, Hurteau and North 2009, Stephens et al. 2009). However, other stand-level studies have

> not shown a carbon benefit from fuel treatments (Reinhardt et al. 2010), and evidence from landscape-level modeling suggests that fuel treatments in most forests will decrease carbon (Harmon et al. 2009, Mitchell et al. 2009) even if the thinned trees are used for biomass energy. Because the occurrence of fires cannot be predicted at the stand level, treating forest stands without accounting for the probability of stand-replacing fire could result in lower carbon stocks than in untreated stands (Hanson et al. 2009, Mitchell et al. 2009). More research is urgently needed to resolve these different conclusions because thinning to reduce fuel is a widespread forest management practice in the United States (Battaglia et al. 2010).

Also see Attachment B (A. Carbon sequestration and old-growth forests; B. Old-growth stands buffer climate change effects; and, C. Climate change affects old growth).

The urgency to act on the climate crisis is reason enough to evolve the U.S.'s relationship to forests from exploitation to preservation. If our elected officials and appointed managers were to strongly lead in objective consideration of what scientists are telling us about the critical role forests play in sequestering carbon and mitigating the effects of climate change, we would also realize the additional ecological benefits of preserving old growth and mature forests.

Range of Alternatives

The Draft EIS includes an overly narrow range of alternatives. And it is abundantly clear which alternative the agency will choose.

First, because as we note above the degree of loophole installed in the FS's preferred Modified Proposed Alternative 2 with its allowed "deviations", there is essentially no difference between that alternative and "Less Restrictive" Alternative 4.[2] The types, amounts, and locations of activities that would occur during projects/plan implementation would be the same. The fact that the FS might have to explain the deviations during project development to conform to amended plan direction is irrelevant. Unverifiable claims that actions are needed to "make the forest more resilient to stressors" or "reduce the risk of uncharacteristic wildfire" or similar rhetoric are standard text in virtually all timber sale NEPA documents we've seen for the past 20 years or so. Alternative 2 would have the same result as Alternative 4, with the latter simply being more transparent about its pro-logging stance. After a couple decades of promoting its destructive logging actions as being beneficial to forest ecosystems, the Forest Service cannot refrain from making the same scientifically strained claims to virtue. The agency will stand behind the Alternative 2 smokescreen.

Second, the way the DEIS characterizes "More Restrictive" Alternative 3, saying it "would limit ecologically necessary proactive stewardship activities" reveals the agency views Alternative 3 to be unacceptable. In fact, the DEIS says this alternative is only superior in a social or philosophical way, as if this is a zero-sum game: "**Parties** who hold strong non-material values for old-growth forests or prioritize **sustaining and supporting ecosystem services will benefit** more from this alternative." (Emphasis added.) Condescendingly, the DEIS then judges these

[2] For some national forest units, the No Action Alternative 1 also cannot be distinguished from Alternatives 2 and 4.

citizens as having perceptions in conflict with their own values, stating: "Alternative 3 may be **less beneficial for the provision of ecosystem services**…" (emphasis added).

In its skewed and biased evaluation of Alternative 3, the DEIS completely ignores the high level of destructive ecological impacts from the additional existence, construction and/or use of roads needed to implement project activities embraced by Alternatives 2 and 4, as recognized by multitudes of scientists including FS researchers Gucinski et al. (2001).

Clearly, the FS includes Alternative 3 in the DEIS merely to pretend it is considering a wide range of alternatives.

We also note the DEIS even admits the range of alternatives is narrow by design: "…the shared desired conditions among the action alternatives **mediates effects of differences** between the standards in the alternatives." (Emphasis added.)

Draft EIS explanations of how Amendments would change existing forest plans are vague, misleading and inconsistent

Since the DEIS does not provide explicit language of the direction on old growth that would remain in each affected forest plan, the DEIS is unable to objectively compare the "No Action" Alternative 1 with the action alternatives. In this context we begin by discussing the current forest plans of the Clearwater National Forest (CNF) and Nez Perce National Forest (NPNF), with which FOC is highly familiar.

Citing from Draft EIS Appendix C ("Comparison of Current Management of Old-Growth to Amendment for the Draft EIS categorizes existing forest plans into categories"), for Category 3:

> If the unit has some plan components (e.g. desired conditions, objectives) but does not have standards/guidelines that constrain management activities in old growth – or these do not apply forest-wide or are not as restrictive as the proposed NOGA standards – this unit is anticipated to experience noticeable change in terms of old growth plan direction."

The DEIS places the CNF and NPNF plans into Category 3. Whereas the forest plans for the CNF and for the NPNF include forestwide standards that constrain management activities in old growth, this categorization means the FS is claiming these two forest plans are "not as restrictive" as the Draft EIS action alternatives, that are said to make "noticeable change in terms of old growth plan direction" following amendment. This DEIS characterization is overly simplistic at best, but is mostly just flat wrong. For example, the CNF and NPNF forest plans were not developed under the assumption that old growth needed "proactive stewardship" (i.e., logging) to persist on the landscape. Such a premise was not examined—nor impacts analyzed—in those forest plans' EISs. Moreover, those plans do not include "deviations" that nullify their own standards as this Draft EIS proposes for action alternatives—deviations that allow complete obliteration of existing old-growth stands that are now being protected to comply with existing CNF and NPNF forest plan standards.

DEIS Appendix C states:

> Categories 2, 3 and 4 LMPs will be amended with the full suite of proposed plan components (goal, objective, management approach, and plan monitoring PLUS desired conditions, standards and guidelines) unless there are unique circumstances presented that would justify not amending them with the full suite of proposed plan components. While all of these LMPs will be amended the same, there will be different levels of noticeable change…

The CNF and NPNF forest plans are thus said to not "…functionally meet intent[3] of NOGA" and do not "Explicitly use() regional criteria to ID old growth" (Id.)

The DEIS states, "the plan amendment does not propose a single national old-growth definition. Instead, it directs the application of plan components based on local definitions, or regional definitions **where the underlying plan is incomplete.**" (Emphasis added.) The DEIS does not explain how the CNF and NPNF forest plans definitions might or might not be considered "incomplete." The wording of Standard 1 amplifies rather than clarifies the uncertainty as to how these two plans' old-growth direction would read upon being amended:

> Old-growth forests will be determined using definitions and associated criteria established in the land management plan. Where these definitions and associated criteria are found to be incomplete (i.e. only address some but not all ecosystems found in the planning area for which old-growth forest does or may exist) or are non-existent in the plan, the planning unit's corresponding regional old-growth forest definitions and associated criteria, or successor regional definitions and criteria, will be applied in part when these are incomplete or in full when non-existent.

Please explain if the CNF and/or NPNF forest plans "only address some but not all ecosystems found in the planning area." Please disclose which "ecosystems" go unaddressed by those forest plans, according to the DEIS's evaluations of them.

More from the DEIS:

> Of the 90 units that will apply new criteria, 59 may see changes in the amount of area classified as old-growth compared to the existing condition, particularly in forest types that lack quantitative criteria or defined qualities in the text of the LMP.

It is unclear, but seems likely, that the amendment would remove the definitions of old growth in the CNF and NPNF forest plans, substituting the Region One criteria (Green et al.). This would result in highly significant changes to CNF and NPNF forest plan direction, with huge implications for on-the-ground implementation. These plans both require specific amounts of old growth to be maintained both forestwide and in smaller geographic areas. If suddenly the definitions change so that previously identified old growth no longer qualifies, administrative chaos would ensue.

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[3] "The intent of this amendment is to **foster the long-term resilience** of old-growth forests and their contributions to ecological integrity across the National Forest System." (Emphasis added.)

The DEIS states, "The proposal is not intended to replace existing direction in LMP but rather to add language that provides consistency across LMPs. If existing LMP direction provides more restrictive constraints on actions that may affect existing or potential old-growth forests, those more restrictive constraints would govern." As we discuss above, the Draft EIS already concludes the NPNF and CNF plans are less restrictive. In failing to examine the details of existing forest plan direction for old growth, the DEIS fails to reconcile obvious or implied contradictions. The FS is obligated to state the complete text of every forest plan amended direction as is proposed, displaying their unambiguous interpretation of how the amended plans would integrate existing and new plan components relevant to old growth, implementing "different levels of noticeable change." In its failure to do so, the Draft EIS is inconsistent with NEPA.

FOC and others have consistently invited an open discussion about how Green et al might be applied as some of the BASI concerning old growth in Region One. To date the FS has chosen to be nonresponsive, arbitrary and evasive when it comes to identifying what consensus may be reached between its experts, independent scientists, and conservation interests concerning the Region One criteria.

We understand how thoughtfully integrating the Green et al distinctions between various habitat types into forest plan direction could potentially recognize and protect a wider diversity of old-growth conditions on the CNF and NPNF, which might also result in better providing for wildlife habitat needs. And the Green et al. criteria recognize that age of large trees is an important feature of old-growth forest and habitat—in fact a minimum criteria—which is not clearly emphasized in the current CNF and NPNF forest plans. But instead of seeking agreement with the public and managing genuinely consistent with BASI, the FS abuses Green et al. during project implementation. An example follows.

The Region One criteria document (Green et al., 1992) recognizes a fairly common "old growth type" in the North Idaho Zone where one often finds large, old Douglas-fir, grand fir, western larch, western white pine, Engelmann spruce, subalpine fir, and western hemlock trees on cool, moist environments. (Id.) Such old growth is relatively dense: "There are an average of 27 trees per acre 21 inches DBH or more. The range of means across forests and forest types is from 12 to 53." (Id.)

However, this sets the "minimum number" of trees per acre 21 inches DBH at only ten. (*Id.*). Which means the "average" stand could experience logging off 17 of its 27 largest, oldest trees and still qualify as old growth under the Region One criteria.

So why does Green et al., 1992 specify such a small minimum number of large, old trees—so far below its recognized average, and even less than its bottom limit of the recognized range? The answer lies in how the authors intended the criteria to be used: "The number of trees over a given age and size (diameter at breast height) **were** used as **minimum screening criteria** for old growth. …The **minimum screening criteria** can be used to identify stands that **may meet** the old growth type descriptions. " (Id., emphases added.) Green et al., 1992 further explain:

> The minimum criteria in the "tables of old growth type characteristics" are meant to be used as a screening device to select stands that maybe suitable for management as old

> growth, and the associated characteristics are meant to be used as a guideline to evaluate initially selected stands. They are also meant to serve as a common set of terms for old growth inventories. Most stands that meet minimum criteria will be suitable old growth, but there will also be some stands that meet minimum criteria that will not be suitable old growth, and some old growth may be overlooked**. Do not accept or reject a stand as old growth based on the numbers alone; use the numbers as a guide.**

(Id., **emphasis in the original**.) So improper use of the Green et al., 1992 minimum large tree screening criteria would allow logging large, old trees from old growth. And even if the existing stand in the above example possesses only the bare minimum large, old trees, managers could still log smaller and/or younger trees in the old-growth stand without disqualifying it, because numbers of such trees are not a part of the minimum criteria.

Likewise, the Green et al. 1992 minimum total basal area was set well below the recognized range, again presumably for its utilization as a screening device. For the same old growth type discussed above, the "average basal area is 210 ft^2 per acre. The range is 160 to 270 ft^2". Yet the "minimum" was set at either 80 or 120 ft^2 depending upon type sub-categorization.[4] Basal area is a measure of stand density, or the square footage of an acre that is occupied by tree stems. So logging a stand with a current basal area of 270 ft^2 (upper end of range) down to 80 ft^2 ("minimum") would still result in the stand technically meeting Region One criteria, but could result in the logging off of many large or medium diameter trees. This is an enticement for managers with timber priorities to log within old-growth stands. Decisionmakers' job performance is evaluated by meeting timber targets, not by restraining themselves from logging old growth.

In the above example, the artificially reduced abundance of younger, smaller trees has unknown but ominous implications for the stand's potential development and habitat quality, since it would be deviated from a trajectory governed by natural processes.

False invocation of Traditional Ecological Knowledge

The DEIS alleges it integrates "Western scientific ecological knowledge" and "Traditional Ecological Knowledge" (dropping "Traditional" and calling it simply "Indigenous Knowledge"), and includes a Goal "to foster tribal inclusion in the interpretation and implementation of all aspects of the old-growth amendment …and enable co-stewardship when implementing this amendment." As with other discretionary direction in the proposed amendments, what this actually means—how it would affect plan implementation—is not well elucidated. Does this mean empowering legitimate tribal holders of traditional ecological knowledge to veto proposals where the FS silviculturist is "consider(ing) treating the stand …(i)f the old-growth forest does not exhibit desired conditions or does not have high ecological integrity or is unlikely to be resilient to future conditions" (citing the Silvicultural Prescriptions)? Does this mean using ancestral cultural practices embodying humility and reciprocity when contemplating "vegetation management" in areas with traditional food and medicinal plants occurring among the trees to be logged? We believe this is unlikely, simply because of the vast gulf between traditional

[4] With the issuance of the Green et al. 1992 (**errata correction 2007**) the Forest Service emphasizes and clarifies that stand basal area is one of the "minimum criteria."

indigenous worldviews and the colonial/exploitative mind set that drives contemplation of the "resiliency" question.

The DEIS implies there can somehow be reconciliation between "Western Science" and Indigenous Knowledge at the project level even though the dominant culture driving economic exploitation of national forests within traditional indigenous homelands refuses to undertake any genuine truth and reconciliation process with the tribal peoples and cultures who experienced displacement and genocide at the hands of this exploitative system—and whose peoples still face discrimination and struggle with cross-generation trauma. The power structure remains critically imbalanced, and the preferred alternative does not alter this one bit. The DEIS's discussions of "Indigenous Knowledge" read like an attempt at cultural appropriation.

Ecological/biological diversity roles of old growth are hardly acknowledged

The Draft EIS recognizes some of the defining physical characteristics of old growth, however the ecological roles and diversity of life forms old growth uniquely exhibit are hardly considered. Therefore, the DEIS is unable to analyze or disclose impacts on these unique ecological roles and diversity from the "proactive management" it promotes.

Further, the DEIS subdivides forests into old growth and non-old growth without exhibiting a genuine understanding of the scientific information that stitches together these areas into a whole, fully functioning landscape. Kaufmann et al. (2007) identify limitations of the DEIS's approach. Those authors identify "old-growth forests or landscapes" which:

> …contain sufficient numbers of patches and stands of old growth to be reasonably representative of the forest type in historical times. However, portions of the landscape may be in various stages of development (even temporary openings or patches of very young trees) to provide future old-growth patches in the landscape. Landscapes vary in size, but are generally considered to be at least as large as major natural disturbances, such as fire.

There is no binding direction in the preferred alternative to conserve mature forest and/or recruit old growth, in recognition of this landscape ecology and successional processes, and the fact that old growth has always evolved and developed quite extensively absent the proactive stewardship/vegetation management methods the DEIS proposes. As Tomao et al. (2020) recognize:

> If no management practices are performed for a long time, stands may gradually evolve into so-called "old-growth forests". In the absence of anthropogenic disturbances, forests may slowly recover the natural disturbance dynamics (forest fires and windstorms, parasite outbreaks, fungal decay, gap creation due to insects) and develop those stand structural features (large living trees, large amount of deadwood, canopy gaps of various size, coexistence of senescent, mature and initial stages) typical of primary forests...

The DEIS claims that the rate and extent of old-growth development can be increased, but fails to acknowledge this is scientifically unfounded and highly theoretical simply because validation would take well over a century. The DEIS's perspective is mainly from tree farming techniques

("silviculture") that attempt to increase the rate of growth and health of individual **trees** instead of the rate of development of ecologically functioning old growth. Attachment B (in H. Creating old growth?) includes scientifically supported discussions on this topic.

Rose et al. (2001) cite dozens of other scientific sources on dead wood in forest ecosystems. Snags and down dead wood are critical elements of old growth, providing habitat niches for old-growth associated species as well as providing the substrate for natural processes inherent to fully functioning forest ecosystems. Yet the DEIS perspective is that dead wood represents "fuels" contributing to emergency situations that need to be addressed by the FS's Wildfire Crisis Strategy, which is policy that trumps ecological considerations on much of the national forest system lands.

The purpose of much existing forest plan direction on old growth responds to the diversity requirements found in the National Forest Management Act, which in turn are addressed by regulatory requirements to maintain the viability of wildlife species associated to a significant degree on old-growth conditions. Ecological analyses of wildlife in the DEIS and the Biological Evaluation are practically nonexistent. The concept of management indicator species is not even broached. The preferred alternative would clumsily insert direction on old growth while ignoring existing diversity purposes and mechanisms integrated into existing plans.

The Biological Evaluation indicates that the preferred alternative would impact species listed under the Endangered Species Act (ESA), yet the DEIS states that consultation as per ESA Section 7 is "not warranted …at this time" because of the "national scale and programmatic nature" of the amendment. This is gross misinterpretation of legal requirements under ESA. Programmatic Section 7 consultation is routine. Implementation of amended forest plans would impact ESA-listed species at local scales and more widely.

See Attachment B, which provides further scientific information on the ecology of old growth not considered in the DEIS.

Fire Risk and Wildland Fire Ecology

The DEIS omits any mention of the scientific uncertainty surrounding agency policies that emphasize the use of logging and other "vegetation treatments" for mitigating risk of fire. It is increasingly understood that reducing "fuels" does not consistently prevent large fires and does little to influence the outcome of these fires. *See* Lydersen et al. 2014.

Former FS Deputy Chief James Furnish (2022) weighs in:

> For a long time, we have heard that the problem is in the forests, and that we must ramp the pace and scale of work in these forests. The proponents ask for our continued faith that scaling is possible, even though they have been at it for nearly 30 years and most of our home and community loss happens in grasslands and shrublands.
>
> Let me begin by citing the large Jasper Fire, in SD's Black Hills National Forest, circa 2000. Jasper Fire burned almost 90,000 acres of intensively managed Ponderosa pine

forest, about 10 percent of the entire national forest. Human caused, it was ignited on a hot, dry, windy July day – quite typical of weather in peak burning periods nowadays. Suppression efforts were immediate and used every tool in the agency's tool box… to no avail. Notably, the burned terrain exemplifies what we consider the best way to reduce fire intensity, if not fireproof, a forest. This mature forest of small saw timber had been previously thinned to create an open stand intended to limit the likelihood of a crown fire. Yet, the fire crowned anyway and raced across the land at great speed, defying control efforts. Much of the area remains barren 20 years later, while the Forest Service slowly replants the area.

I cite this example, because it represents precisely what agencies posit as the solution to our current crisis: 1) aggressively reduce fuel loading through forest thinning on a massive scale of tens if not hundreds of millions of acres (at a cost of several $ billion, and then do it again), while trying to 2) come up with sensible answers about how to utilize the finer woody material that has little or no economic value; and 3) rapidly expanding the use of prescribed fire to reduce fire severity. These solutions are predicated on the highly unlikely (less than 1%) probability that fire will occur exactly where preemptive treatments occurred before their benefits expire. These treatments are not durable over time and space, and only work if weather conditions are favorable, and fire fighters are present to extinguish the blaze.

To be blunt, the ineffectiveness of current practices has led many scientists to suggest, based on peer reviewed science and field research as opposed to modeling, that agency "fire dogma" needs to be revisited. The call for a true paradigm shift is occurring both within and outside the agency. Several truths have emerged:

1) Fires burn in ways that do not "destroy", but rather reset and restore forests that evolved with fire in ways that enhance biodiversity.
2) Forest carbon does not "go up in smoke" – careful study shows that more than 90 percent remains in dead and live trees, as well as soil, because only the fine material burned.
3) The biggest trees in the forest are the most likely to survive fire, and thinning efforts that remove mature and older trees are counter-productive. We are seeing more cumulative fire mortality in thinned forests, than in natural forests that burn.
4) Thinning and other vegetation removal increases carbon losses more than fire itself and, if scaled up, would release substantial amounts of carbon at a time when we must do all we can to keep carbon in our forests.
5) If reducing home loss is our goal, experts are telling us that the condition of the structure itself and vegetation immediately adjacent to the home are the primary drivers of home ignition and loss, and that the condition of vegetation more than 100 feet from the home has nothing to do with the ignitability or likelihood a home will burn.
6) Large, wind-driven fires defy suppression efforts and many costly techniques simply waste money and do more damage. Weather changes douse big fires, people do not.

Downing et al 2022 state, "Focusing on minimizing damages to high-value assets may be more effective than excluding fire from multijurisdictional landscapes."

Cohen and Strohmaier (undated) recognize:

> …research has shown that home ignitions during extreme wildfires result from conditions local to a home. A home's ignition vulnerabilities in relation to nearby burning materials within 100 feet principally determine home ignitions. … Although an intense wildfire can loft firebrands more than one-half mile to start fires, the minuscule local conditions where the burning embers land and accumulate determine ignitions….. Thus, community wildfire risk should be defined as a home ignition problem, not a wildfire control problem.

A team of Forest Service scientists found denser, older forests with high canopy cover had lower fire severity and "buffer the negative effects of climate change" regarding wildfires, largely due to a less fire-prone microclimate in dense forests. (Lesmeister et al., 2019).

DellaSala (2022) explains:

> We cannot effectively solve for wildfire increases through unmitigated fire suppression or amped up logging across immense landscapes because wildfire increases are influenced by ongoing burning of fossil fuels and land use practices that in turn drive destruction of ill-prepared communities. As this relates to the US Forest Service, their forest management logging practices are contributing to the problem, and are not a solution, …. Our primary focus should be helping existing communities to become fire-safe.

Hutto (2022) believes that

> …relative to climate, forest structure plays little to no role in creating the fire situation we see today — hot, dry, windy conditions (not fuels) play the prominent role in producing recent increases in fire frequency and extent. Consequently, forest thinning will do little or nothing to alter the trend in fire frequency and extent. Thinning may do a good job of reducing fire severity and extent when conditions are mild, but 98% of the land that burns in any given year do so under extreme weather conditions, so thinning cannot solve the problem we're facing.

The DEIS relies upon claims that fire on forest landscapes is somehow "uncharacteristic" due to the effects of fire suppression. The agency is attempting to conflate the fire ecology of a small subset of forest biomes with that of much of the western United States. Baker et al., 2023 is recent scientific information pertaining to fire, and explains government distortion of science. Their Abstract states:

> The structure and fire regime of pre-industrial (historical) dry forests over ~26 million ha of the western USA is of growing importance because wildfires are increasing and spilling over into communities. Management is guided by current conditions relative to the historical range of variability (HRV). Two models of HRV, with different implications, have been debated since the 1990s in a complex series of papers, replies, and rebuttals. The "low-severity" model is that dry forests were relatively uniform, low in tree density, and dominated by low- to moderate-severity fires; the "mixed-severity" model is that dry

> forests were heterogeneous, with both low and high tree densities and a mixture of fire severities. Here, we simply rebut evidence in the low-severity model's latest review, including its 37 critiques of the mixed-severity model. A central finding of high-severity fire recently exceeding its historical rates was not supported by evidence in the review itself. A large body of published evidence supporting the mixed-severity model was omitted. These included numerous direct observations by early scientists, early forest atlases, early newspaper accounts, early oblique and aerial photographs, seven paleo-charcoal reconstructions, ≥18 tree-ring reconstructions, 15 land survey reconstructions, and analysis of forest inventory data. Our rebuttal shows that evidence omitted in the review left a falsification of the scientific record, with significant land management implications. The low-severity model is rejected and mixed-severity model is supported by the corrected body of scientific evidence.

It's a simple matter of following the money. Baker et al., 2023 point out that many research scientists who are funded by or work for the FS promote the "low severity fire model" so they can justify the myth that logging will prevent forests from being "destroyed" by the prevailing fire regime: mixed- and high-severity fires. The FS's much-abused "emergency situation" determinations are a smokescreen for expedited logging. Since fire cannot be entirely removed from landscapes that naturally feature mixed- and high-severity fires, actions in the Home Ignition Zone of the privately owned structures in the vicinity of forest lands are the critical consideration for structure survival. Furthermore, the public has never been provided a guarantee of hazard-free ingress/egress—nor should we. That would essentially involve an annual removal of all combustible vegetation adjacent to roads. Regardless, fires would be a source of firebrands that would be carried by the thermal forces and wind onto private properties. Finney and Cohen, 2003 state: "The probability that a structure burns, …has been shown to depend exclusively on the properties of the structure and its immediate surroundings (Cohen 2000a)."

Baker et al., 2023 reveal manipulation of evidence by researchers associated with the federal approach to fire management, providing an in-depth look at how the FS's prevailing hypothesis underlying forest thinning projects in the western U.S.—its low-severity open forest model—has been falsified.

Those responsible for firefighter safety must always mitigate and minimize the risk. This will always involve the choice to withhold personnel from entering dangerous situations, simply because those dangers are potentially omnipresent.

It is unwise that the FS wants to replace dense, shadier and cooler conifer forests with clearcuts and, eventually, densely packed little trees–in the name of reducing severe fire behavior. Atchley et al., 2021 note that heavier fuels actually slow fire spread. They also state:

> Wind entrainment associated with large, sparse canopy patches resulted in both mean and localised wind speeds and faster fire spread. Furthermore, the turbulent wind conditions in large openings resulted in a disproportional increase in TKE [Turbulence Kinetic Energy] and crosswinds that maintain fire line width.

Good graphics can be found in one interagency "Living with Fire" publication.[5] It spans many regions and on page 4 provides the graphics showing that an open pine forest can burn at 150 acres per hour while dense conifer forest can burn at 15 acres per hour with 20 mph wind speeds.

Another version[6] of "Living with Fire" includes an additional graphic showing "dense confer reproduction" can burn at 650 acres per hour with 20 mph winds–second only to grass and brush fires.

The DEIS ignores BASI indicating past logging practices tend to increase the risk of intense fire behavior. The risks fires pose to human life and property—the built environment—are best dealt with in the immediate vicinity of the properties—not by logging national forest lands far from human occupied neighborhoods.

We strongly support government actions that facilitate cultural change towards landowners taking the primary responsibility for mitigating the safety and property risks of fire, by implementing firewise activities on their property and surrounding structures. The BASI supports such a prioritization.

From a news release announcing the results of research by Bradley et al. (2016):

> "We were surprised to see how significant the differences were between protected areas managed for biodiversity and unprotected areas, which our data show burned more severely," said lead author Curtis Bradley, with the Center for Biological Diversity.
>
> The study focused on forests with relatively frequent fire regimes, ponderosa pine and mixed-conifer forest types; used multiple statistical models; and accounted for effects of climate, topography and regional differences to ensure the findings were robust.
>
> "The belief that restrictions on logging have increased fire severity did not bear out in the study," said Dr. Chad Hanson, an ecologist with the John Muir Project. "In fact, the findings suggest the opposite. The most intense fires are occurring on private forest lands, while lands with little to no logging experience fires with relatively lower intensity."
>
> "Our findings demonstrate that increased logging may actually increase fire severity," said Dr. Dominick A. DellaSala, chief scientist of Geos Institute. "Instead, decision-makers concerned about fire should target proven fire-risk reduction measures nearest homes and keep firefighters out of harm's way by focusing fire suppression actions near towns, not in the back country."

Two recent peer-reviewed scientific articles suggest genuine solutions. Baker et al. (2023b) provides an alternative approach that focuses on using wildfire for ecosystem benefits and redirecting fire prevention efforts at the community level. Importantly, they explain that high-severity fire rotation intervals (landscape scale) are on the order of centuries (within historic bounds), providing ample time for old-growth forests to develop even if fire rates were to double

[5] https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_020876.pdf
[6] https://firesafemt.org/img/LivingwFireFSM20091.pdf

due to climate change. Additionally, beetle/drought cycles are on very long rotation intervals (within historic bounds). This indicates that large-scale logging to contain fires and insects will not work in a period of changing climate, and in fact will do far more damage.

Law et al. (2023) also redefines the fire issue, emphasizing working with fire for ecosystem benefits and prioritizing community protections instead of massive thinning/logging that end up emitting far more greenhouse gasses into the atmosphere. They buttress calls from other scientists to coexist with wildfires and reject false solutions such as logging promoted by the DEIS.

Harmon et al. (2022), show the vast majority of carbon stored in trees before two large wildfires in California's Sierra Nevada mountain range persisted after the fires.

See Attachment B, which provides further scientific information on the fire ecology related to old-growth ecosystems not considered in the DEIS.

Conclusion

This Draft EIS is an elaborate pretense of valuing old growth for anything but timber. The Forest Service is a failed, broken bureaucracy controlled by capitalist institutions that prioritize short-term profits above the livable future of our planet's biosphere. If the agency wants to restore any credibility, it must select Alternative 3, modified to prohibit in old growth all actions the agency normally and regularly proposes as "vegetation management." The modified Alternative 3 should likewise prohibit such activities across wide swaths of national forest lands identified for recruitment of future old growth based on BASI selected in the absence of "proactive stewardship" management bias.

Sincerely submitted,

Jeff Juel, Forest Policy Director
Friends of the Clearwater
[redacted]

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Attachment A

Previous comments from Friends of the Clearwater regarding old growth, climate change and the related Executive Orders

November 8, 2021

The Honorable Joseph R. Biden
President of the United States
The White House
Washington, D.C. 20500

Deb Haaland, Secretary of the Interior
Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

Tom Vilsack, Secretary of Agriculture
United States Department of Agriculture
1400 Independence Ave., S.W.
Washington, D.C. 20250

Dear President Biden, Secretary Vilsack, and Secretary Haaland:

On January 27, 2021 President Biden signed Executive Order 14008, an order entitled "*Tackling the Climate Crisis at Home and Abroad*". With that order, President Biden committed his administration to a conservation goal of protecting 30 percent of land and 30 percent of ocean waters by 2030. To meet that goal, the administration launched the "America the Beautiful" campaign, where according to the Department of Interior website, they state the purpose as a:

> "*decade-long challenge to pursue a locally led and voluntary, nationwide effort to conserve, connect, and restore the lands, waters, and wildlife upon which we all depend.*"

This Presidential Action refers to the need and importance of protecting biodiversity. Several times within the Executive Order (EO), the administration asserts that protected lands increase resilience to the impacts of climate change and better conserve the biodiversity of our lands.

The language in section 201 appears to have been used as a template for a recurring theme throughout the EO in four other sections. This language apparently signifies the overall importance this administration places on obtaining a better world via fighting climate change.

> **PART II—TAKING A GOVERNMENT-WIDE APPROACH TO THE CLIMATE CRISIS**
>
> **Sec. 201**.
>
> *It is the policy of my Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Governmentwide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through*

innovation, commercialization, and deployment of clean energy technologies and infrastructure.

On behalf of grassroots conservation groups in the Greater Yellowstone Ecosystem (GYE), we are preparing this letter to reflect our shared concern that the policies of the previous Administration be changed. Wildlife and wilderness in the GYE are instrumental and critical to achieving the goals of 30 x 30. We were pleased at the news of this Administration's willingness to acknowledge climate change and to apply science to resolve the issues. Application of best science requires we take a decisive role in protecting our land and water resources. We had high hopes there would be a change in our national policies when it came to implementing the best available science in our natural and physical world.

We expect and need strong leadership at the national level. We appreciate the recent decisions over the expansion of Bears Ears, Grand Staircase Escalante and Seamounts National Monument as well as furthering the protections of Tongass National Forest. But we need to encourage your administration to do more. The GYE is facing an onslaught of threats from multiple special interests within the region. Recent decisions by the political leadership of Montana and Idaho, Governors Gianforte and Little respectively, have allowed the politicization of wildlife and have already worsened the mismanagement of our natural heritage by the states.

- Wolves are facing extermination due to state management.
- Bison (our National Mammal) need to be on public lands.
- Grizzlies require connected habitat.
- Timber projects and road construction fragment wildlife habitat. They are given urgency because of wildfire threats, but underlying drought and increasing temperature are driving wildfire not fuel loads. Logging roads fragment habitat for all species.

In Montana and Idaho, new extreme state laws have put wolves squarely in the crosshairs for near extermination across the region, badly undermining the goal of protecting biodiversity. The Department of Interior's failure to instate emergency protection for wolves under the ESA could lead to a major setback in wolf recovery across the region, with impacts rippling out to other species such as elk and deer (threatened by Chronic Wasting Disease, which wolves help control) and major segments of the tourism and hunting economy. We need to reinstate wolf protections under the Endangered Species Act.

Slaughtering wolves and failing to reestablish public bison herds on public land does nothing to foster environmental justice. Over 150 tribes wrote to Secretary Haaland September 14 asking for emergency relisting the gray wolf under the ESA due to spiritual connections with these animals. Wyoming meanwhile seeks to delist grizzly bears once again, seeking to open hunting of these magnificent creatures which hold spiritual significance for Native Americans. Bison also belong on public lands and yet are severely restricted in their range in Montana due to meddling and intolerance by the Montana Department of Livestock.

The actions of US Senators and Representatives run counter to Executive Order 14008. Montana Senators Daines and Tester and Representative Rosendale seek the dissolution of federal Wilderness Study Areas on national forest and BLM lands across Montana, instead of seeking to further protect them. This runs completely counter to the goals of 30 x 30.

The Custer Gallatin National Forest is undercutting protection of the Hyalite Porcupine Buffalo Horn WSA in its forthcoming final forest plan. The Custer Gallatin is also preparing major timber protects like the South Plateau which include road building and clearcutting in critical grizzly bear habitat next to Yellowstone National Park. They are currently clearcutting in the Bridger Range and preparing to take down large old trees in the Gallatin Range, exacerbating climate change by releasing much of the carbon stored in old Douglas fir and lodgepole pine, destroying what are essentially carbon removal machines (trees).

We see these policies being contrary to the goals, purpose and intent of Executive Order 14008. Not only do they create confusion and conflict with the original purpose, intent and mission of the Executive Order, but they provide confusion and conflict with several Federal agencies and programs, all of which have been long designated to protect and conserve our land, water and biodiversity. Just as these policies are considered contrary to the goals set aside in the America the Beautiful campaign, we also understand that there are similar actions proposed in the Infrastructure Bills in Washington D.C. Monies set aside for logging and forest thinning, especially those planned in old growth communities, undermine one of the fundamental protective measures of ecological biodiversity.

Federal, state, tribal and private interests need to work together in an effort to protect the planet from and mitigate the negative effects of climate change. The same could be said for the protection of this planet's biological diversity. Yet, the politicization of local and regional politics is threatening to hamper the national goals of this administration. We strongly feel that the protection of the GYE is fundamental in the administration's goals. The U.S. Forest Service stated in their draft 2020 Forest Service Plan the following:

> *The Custer Gallatin National Forest encompasses over 3 million acres in southern Montana and the northwest corner of South Dakota. Stretching over 400 miles from its westernmost to its easternmost boundaries, the Custer Gallatin is among the most ecologically, socially, economically, and culturally diverse national forests in the Forest Service's Northern Region.*

The GYE is believed to be the only intact temperate zone ecosystem in the lower United States. This hallowed resource should be and could be key in the importance of fighting climate change, but this fragile ecosystem is becoming increasingly isolated by growing human populations and development. The influx of human activity further isolates the habitats of plants and animals to the north and northwest. The isolation is particularly threatening to populations of large mammals, as it will result in a gradual deterioration of population genetics and population resilience in the GYE. The Gallatin Range must

remain in wilderness condition to provide a northward connection with other mountain ecosystems in the northern Rocky Mountains.

Not only would maintaining the GYE in the most complete wilderness condition as much as possible be positive for the region's biodiversity, it would also mitigate the negative impacts of climate change by preserving mature and old-growth forests, allowing the Northern Rockies to be part of the natural carbon sinks around the globe. We urge the Biden Administration to use the GYE as a tool for mitigating climate change and preserving the region's biodiversity by taking actions to preserve wilderness, protect wildlife connectivity including that for grizzlies, provide ESA protections for wolves, allow bison on public lands and protect mature and old growth forests.

There is much work to do and the undersigned nonprofits are officially requesting the Biden Administration to help us help you in our shared desire to mitigate climate change and preserve the biodiversity of this planet. Preserving the Greater Yellowstone Ecosystem can be a huge part of that effort. To summarize, we ask this administration protect all predators from unsound and unscientific laws and practices, keep old-growth forests intact, allow bison on public lands and to designate all wildlands as wilderness as defined and characterized in the Wilderness Act of 1964. We look forward in working together among our non-government organizations, governmental agencies, private citizens in this effort. This step alone matches and is in agreement with goals of the "*America the Beautiful*" campaign that we established at the beginning of this letter.

> "*decade-long challenge to pursue a locally led and voluntary, nationwide effort to conserve, connect, and restore the lands, waters, and wildlife upon which we all depend.*"

Thank you and with sincere regards, the undersigned:

Gallatin Wildlife Association
Clinton Nagel, President

Gallatin Yellowstone Wilderness Alliance
Joseph Scalia III, President

Conservation Congress
Denise Boggs, Executive Director

Wyoming Wildlife Advocates
Kristin Combs, Executive Director

Yellowstone Bison Foundation
Pat Simmons

Footloose Montana
Stephen Capra, Executive Director

John Muir Project
Rachel Fazio, Associate Director

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August 5, 2022

Christopher French, Deputy Chief
U.S. Forest Service

Tracy Stone-Manning, Director
Bureau of Land Management.

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. This letter is response to the RFI from Friends of the Clearwater (FOC), whose mission includes protecting the ecosystems of the Wild Clearwater Country in which many old growth and mature forests are still found, and also from Alliance for the Wild Rockies (AWR).

Introduction

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 in calling for old-growth definitions and inventories the RFI is largely reinventing the wheel. It quotes a generic old-growth definition from the Forest Service Chief's 1989 letter to Regional Foresters entitled "Position Statement on National Forest Old Growth Values" while omitting highly relevant details of that letter, in which the Forest Service Chief directed Regional Foresters:

> Regions with support from Research shall continue to **develop forest type old growth definitions, conduct old growth inventories**, develop and implement silvicultural practices to maintain or establish desired old growth values, and explore the concept of ecosystem management on a landscape basis.

(Emphasis added.) So one would expect regional definitions of old growth to have been developed long ago, and to our knowledge they have (*see* e.g. Green et al., 1992; Hamilton, 1993

for the Northern and Intermountain Regions, respectively). The inventories' scientific veracity might be debated, which to its credit the RFI invites, however the purpose of the definitions was for use in completing inventories. But this is where agency obstructionism and failure really kicked in. In short, E.O. 14072 would not be needed to tell the Forest Service to conduct old-growth inventories if the agency had done what it was mandated to do 33 years ago.

The Forest Service Northern Region provides an example of noncompliance and inconsistency. Fourteen years after the Chief's directive, the inventory status differed from Forest to Forest, with varying levels of completion (Juel, 2003).

A prime example of the Forest Service dragging its feet on old-growth inventories is the Nez Perce National Forest (NPNF). The NPNF's 1987 Forest Plan required the agency to "Inventory, Survey and Delineate Old-Growth Habitat" by 1990. Thirty-three years later FOC requested the NPNF's complete old-growth inventory, intending to calculate forestwide old-growth acreage, map its location for public display, and check for overlap of old growth with proposed logging locations. We received a database, but because of ambiguities in the data and since our calculations using the data showed less than one percent old growth on the entire NPNF, we assumed our calculations were incorrect. So we had a conference call with agency officials to shore up our data interpretation. Unfortunately the appropriate Forest Service specialists were not present, so we requested a follow-up meeting with agency staff who could explain in detail the data and the status of the NPNF old-growth inventory. At that point, Forest Supervisor Cheryl Probert refused, saying she had higher priorities than meeting with FOC.

Subsequently, FOC brought a lawsuit against the Forest Service in regards to two huge timber sales on the NPNF, claiming their incomplete old-growth inventory was preventing the agency from complying with old-growth standards in the Forest Plan. In June of this year, a federal court ruled in our favor, issuing an injunction on the two timber sales.

In another display of agency intransigence, in July Forest Supervisor Matt Anderson of the Bitterroot National Forest (BNF) publicly stated his refusal to conduct the inventory required by the Executive Order. In the context of a Forest Plan Amendment specific to old growth, he states: "Due to the dynamic nature of stand progression, a **forest-wide stand delineation of old growth will not be provided**. Old growth is not a static state; natural disturbances such as windstorms, wildfire, insects and diseases can move a stand from one successional stage to another" (emphasis added). Since Supervisor Anderson also claims that Forest Plan amendment "will also comport with Executive Order 14072, which provides agency-wide direction for an inventory of old growth and mature forest" we are left wondering if the Forest Service genuinely welcomes input on the questions posed in the RFI.

BNF Supervisor Anderson's statement also asserts the National Forest Inventory and Analysis (FIA) is "what is being used for the national inventory effort." He is referring to the inventory that is to follow from E.O.14072. Regarding FIA data for inventorying old growth, there are significant methodological flaws, one of those being that the FIA data do not determine the size of any particular stand of old growth or mature forest. Concerning the FIA, Bollenbacher et al., 2009 (a Forest Service Northern Region report) state: "All northern Idaho plots utilized a primary sample unit composed of four fixed radius plots with trees …21.0 inches DBH and

larger tallied on **a ¼ acre plot**" (emphasis added). Also, Czaplewski, 2004 (another Northern Region report) states, "Each FIA sample location is currently a cluster of field sub-plots that collectively cover an area that is nominally **one acre in size**, and FIA measures a probability sub-sample of trees at each sub-plot within this cluster" (emphasis added). Clearly, with FIA sampling only small plots, the data would not inform an inventory conforming to an ecological definition of old growth. Some Northern Region national forests suggest or require a 300-acre stand be managed as old-growth habitat for the pileated woodpecker, a species needing very large snags or trees with defect for excavation of nest cavities. FIA data do not reliably measure ecologically functioning old growth, so its use for conducting inventories to meet the E.O. conservation and biological diversity goals would be inappropriate.

So our experiences with Northern Region national forests make us skeptical that federal land management agencies will genuinely be "making the inventory publicly available" as required by the E.O. For decades the Forest Service and Bureau of Land Management (BLM) have been pumping out propaganda to instill fear of forests ("risk of catastrophic fire") and characterize them as unhealthy ("overly dense", "infested with insects" etc.) or otherwise aesthetically distasteful so citizens don't challenge the agencies' industrial logging agenda. These bureaucrats don't want citizens to visit their forests and learn for themselves how "old growth is valuable for a whole host of resource reasons such as habitat for certain animal and plants, for aesthetics, for spiritual reasons, for environmental protection, for research purposes, for production of unique resources such as very large trees" (quoting from the 1989 Forest Service Chief's Position Statement on National Forest Old Growth Values).

The RFI and E.O.14072 also fail to identify and acknowledge the biggest threat to mature and old-growth forests on federal public lands—logging. Therefore in particular to the RFI, the purpose of inventorying these forests is unclear.

We want to make another point before responding to the five questions. Whereas the E.O. emphasizes the positive attributes of forests in general, the RFI too narrowly focuses on old-growth and mature forests, failing to acknowledge the one issue that affects pretty much all others we face in contemplating going forward—that being the climate emergency. It's not that old-growth and mature forests are unimportant considerations for the climate and conservation—indeed we acknowledge forests' vital functions in our responses to the five questions. However the system of federal public lands also includes a vast extent of lands that are not forested, would likely never feature forests, yet still play extremely important conservation and climate roles. Kauffman et al., 2022 explain how livestock use on federal public lands in western states exacerbates climate change. In sum, livestock grazing is a huge source of greenhouse gas emissions and severely harms the capability of the grazed lands to sequester carbon.

The five questions

The RFI requests input on five questions, restated below. As our responses indicate, we believe the questions fail to place mature and old-growth forests in the proper ecosystem and climate stabilizing contexts, suggesting this RFI exercise may be part of a veiled attempt to validate failing status quo government policies.

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?

First, we reject the phrase in this question "used for planning and adaptive management" because those terms are used almost exclusively by the Forest Service and BLM to prioritize logging and other resource extraction. If the government was implementing "adaptive management" with any scientific veracity it would have ended logging, mining, grazing, and other resource extraction on public lands long ago because, as the science shows, those activities heavily contribute to worsening the climate and biodiversity crises we now face.

The criteria must capture the wide range of traditional publicly shared values, to restore a balance from the current situation where the value of timber from mature and old forests dominates. In other words, the criteria must emphasize much higher priorities for "…habitat for certain animal and plants, for aesthetics, for spiritual reasons, for environmental protection, for research purposes, for production of unique resources such as very large trees" (again, quoting from the 1989 Forest Service Chief's Position Statement on National Forest Old Growth Values).
It takes most old growth a minimum of 150 years to develop, depending on geographic location. However this doesn't mean stands of burned trees or seedlings have no bearing on old-growth values for the purposes of E.O. 14072. As we discuss below, forest stands are components of old-growth ecosystems, and recognition of the complexity of ecosystems must be a part of the framework. To meet the conservation goals of E.O. 14072 the framework must value habitat diversity and landscape connectivity from a conservation biology perspective, as discussed more fully in response to question #3.

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

Note that our response to question #1 necessarily reframes and also responds to this question. Furthermore, a value the 1989 Chief's Position Statement on National Forest Old Growth Values did *not* anticipate is forests' contributions toward a stable climate. Given the dire climate crisis in which we find ourselves, and in order to serve all other values, the overarching criteria must examine the carbon sequestration potential of the landscapes and ecosystems within which old growth and mature forests are found.

Further, the framework must act on the need to highly prioritize immediate preservation of those forest areas exhibiting high levels of stored carbon, because they are threatened by the usual suite of commercial extractive activities government agencies enable. To that end, we refer you to scientific papers being submitted by Dr. Dominick DellaSala of Wild Heritage in response to this RFI. These papers by Wild Heritage, Griffith University (Australia), Woodwell Climate Research Center (Massachusetts) plus scientists from the International Panel on Climate Change and are currently undergoing review. Our understanding is that their mapping methodology uses the latest processed LiDAR (2019) imagery on tree height, canopy cover, plus published ecosystem biomass datasets spatially derived to rank order the structural development of all conterminous U.S. forests from least developed ("young") to most developed ("mature/old growth"). The mapping is at 30-m pixels, and uses Forest Inventory and Analysis (FIA) plots for

field validation of the rankings of remotely sensed areas. It is state-of-the art and science for defining mature/old growth spatially along with location, extent, ownership, protected status, amount of carbon sequestered, value for drinking water, and the imperiled species in the protected and unprotected mature forests. Mature/old growth in this context is the sum of their highest scorings for the three proxies relative to their surroundings: tree height + canopy cover + ecosystem biomass = mature/old growth forest which is then validated where researchers' polygons overlap FIA plots.

In other words, these scientists' data will be the best available science for achieving many of the mapping and inventory goals outlined in E.O. 14072, and will assist in the creation of a nationwide network of Strategic Carbon Reserves for responding to the Climate Emergency the Executive branch should have declared long ago. In dealing with this emergency, a first step for the Biden administration would be to issue an order halting all logging in areas these scientists' research has identified as exhibiting high levels of stored carbon.

As would happen with using these scientists research, the Forest Service/BLM definitional framework must lead to publicly accessible maps of mature and old-growth forests so anyone can visit and enjoy these areas, and also so the inventory and mapping methodology can be validated on the ground by interested independent scientists, NGOs, and citizens.

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

During the July 21, 2022 webinar Linda Heath of the Forest Service responded to a question by stating, "landscapes may make more sense." (She was responding to a participant's concern that the forest stand level is potentially too narrow a focus for the inventory, resulting in definitions that would miss the elements RFI question #3 describes.) We wholeheartedly agree. Juel, 2021 [in citing DeLuca (2009), Foster et al. (1996), Franklin and Spies (1991), Green et al. (1992), Hamilton (1993), Harris (1984), Harrison and Voller (1998), Kaufmann et al. (2007), Marcot et al. (1991), Noon (2009), Spies (2009), USDA Forest Service (1987d), and Warren (1990)] discusses the issue of how natural disturbances and processes lead to the type of diversity recognized by this question (*see* especially the two sections—*Old-growth ecosystems and old-growth landscapes*, and *Recovering old-growth landscapes*).

By embracing old-growth ecosystems and old-growth landscapes, the changes mentioned in this question would be fully considered in the definitional framework.

To preserve old-growth ecosystems/landscapes and tackling the climate emergency, the agencies must end resource extraction on federal lands and prioritize removing the human-caused impediments to the recovery of fully functioning ecosystems. This will assist in restoration of forest ecosystems to a condition for best expressing their carbon sequestration potential and natural resilience, featuring abundant, well-distributed old growth along with clean water, clean air, recovered populations of rare and endangered species, and remaining places where people find aesthetic appreciation, spiritual renewal, and a sense of full cultural connection and belonging to a place.

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

The inevitable result of climate change will be changes in forest composition to a degree we lack the capability to fully and accurately predict. The lessons from the past heavy-handed management on public lands reveal that emphasizing one set of "outputs" reduces the provision of the full, natural suite of ecosystem services making human civilization possible. In other words, resource extraction cuts strands in the web of life and inevitably reduces natural ecological resilience and threatens survival of humans and a vast number of other species. Please see our responses to the other four questions where we encapsulate these values.

5. What, if any, forest characteristics should a definition exclude?

This question precariously flirts with the danger of focusing on the minutiae while missing the wider ecological context, with its subtle bias toward the agencies' paradigm of manipulating and controlling aspects of nature to maximize or emphasize certain "outputs" that favor short-term economic gains for some sectors of our society at the expense of everyone else on the planet. To exclude burned forests, for example, embraces logging dead trees—an industrial process which harms ecologically sensitive areas while undervaluing the critical ecological benefits of wildland fire.

To be blunt, any forest characteristics whose conceptual bases facilitate or promote resource exploitation must be excluded from the framework.

Finally, for reasons given in our introduction, the FIA must be excluded from the methodology for conducting the inventory process mandated by the E.O. The FIA is most useful for sampling, and does not yield spatially explicit or accurate information that discloses the location and extent of mature and old-growth forests.

In conclusion, we thank you for soliciting and considering our input on this Request For Information.

Sincerely,

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July 20, 2023

Director, Policy Office
201 14th Street SW, Mailstop 1108
Washington, DC 20250–1124

Comments submitted via Federal eRulemaking Portal www.regulations.gov at: https://www.regulations.gov/commenton/FS-2023-0006-0002

Dear Secretary Vilsack,

Friends of the Clearwater submits these comments in response to the U.S. Forest Service's advance notice of proposed rulemaking on managing forests for climate resilience, 88 Fed. Reg. 24497-24503, RIN 0596-AD59 (April 21, 2023).

Friends of the Clearwater (FOC), a nonprofit organization since 1987, defends the Clearwater Bioregion's wildlands and biodiversity through a Forest Watch program, litigation, grassroots public involvement, and education. The Wild Clearwater Country, the northern half of central Idaho's "Big Wild," contains many unprotected roadless areas and wild rivers and provides crucial habitat for countless rare species. FOC strives to protect these areas, restore degraded habitats, preserve viable populations of native species, recognize national and international wildlife corridors, and bring an end to industrialization on public lands.

Rulemaking must comply with the Administrative Procedure Act (APA) and the National Environmental Policy Act (NEPA). Rules promulgated under the APA must be supported by facts and result from rational decisionmaking. Rational decisionmaking includes meaningfully considering the best available science and information received through the public comment process. Complying with the APA also includes soliciting future comment on the language of a proposed rule. Additionally, promulgating the type of rule suggested would be a major federal action with potentially significant environmental effects. For this reason, the Forest Service must prepare an Environmental Impact Statement (EIS), analyzing alternative rule language and assessing those alternatives. We also request that the Forest Service review the science provided by public comments and

utilize the best available scientific information to support rulemaking. And we request notification of any actions taken pursuant to this rule as required by NEPA.

At this time the Forest Service has asked for feedback on the following question:

> Given that climate change and related stressors are resulting in increasing impacts with rapid and variable rates of change on national forests and grasslands, how should the Forest Service adapt current policies to protect, conserve, and manage the national forests and grasslands for climate resilience, so that the Agency can provide for ecological integrity and support social and economic sustainability over time?

While FOC responds to that question in comments to which we contributed and signed onto, which are being submitted to you by other conservation organizations or coalitions, the Forest Service should also refer to, incorporate, and explicitly respond to public comments received in previous related proceedings. Since the beginning of the Biden Administration, the Forest Service has held multiple comment periods concerning climate change and wildfire in the context of publicly owned forests. FOC has consistently requested protection for national forests, supplying supporting scientific and other relevant information. For the present rulemaking, those comments we signed onto discuss forests and habitat, helping communities effectively manage wildfire risks, and the inconsistencies with best available science invoked by the Forest Service logging forests allegedly for fuel reduction and climate mitigation. However, we do not see evidence that the Forest Service has responded to our previous comments nor updated its policies to reflect the latest scientific understanding of forests and the climate. To the contrary, the Forest Service continues to target, destroy, and degrade mature and old-growth forests.

Here's an example of what the Forest Service should have already responded to in the context of this rulemaking. In our August 5, 2022 letter to Forest Service Deputy Chief Christopher French, responding to the Biden Administration's July 15, 2022 Request For Information 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, among other concerns FOC explained what is wrong with using the Forest Inventory and Analysis (FIA) for the national inventory effort. We stated, "FIA data do not reliably measure ecologically functioning old growth, so its use for conducting inventories to meet the E.O. conservation and biological diversity goals would be inappropriate." If the Forest Service were to genuinely respond to our concerns, it would admit what it acknowledged in another context, which resonates with our concerns. Specifically, from the Lolo National Forest's 2023 Draft Assessment[7] the Forest Service states, "Forest Inventory and Analysis data …is ideal for broad scale assessment and monitoring. However, because there is only approximately one plot per 6,000 acres, **this data is less useful at finer spatial scales**. Forest Inventory and Analysis data is **essentially nonspatial and cannot be used to understand how attributes vary across space or at finer spatial scales**..." (emphasis added). In other words, the "inventory" the

[7] The Lolo National Forest is currently undergoing the forest plan revision process, as governed by the 2012 Planning Rule.

Biden Administration eventually issued (earlier this year) doesn't allow anyone to identify specific stands of old growth and mature forests anywhere on national forest lands, so they might be considered for protection as climate mitigation or other purposes.

Not only are old growth and mature forests critical for mitigating climate change. They are also extremely important for the priceless diversity of life our public lands uniquely sustains. As the 1987 Nez Perce Forest Plan Final Environmental Impact Statement points out (at p. III-35):

> Habitat diversity is a measure of the variety, distribution, and structure of plant communities as the progress through various stages. Each stage supports different wildlife species. **One of the most critical elements of diversity in a managed forest is old growth. If sufficient old growth is retained, all other vegetative stages from grassland through mature forest will be represented in a managed forest.**

(Emphasis added.) Why this matters in regards to nonspatial and remote data inventories is expressed in the 2019 Draft Resource Management Plan and Environmental Impact Statement (Volume II) for the Bureau of Land Management's Missoula Field Office:

> The disadvantage of remotely sensed data is that it usually has a certain degree of error. Bitterroot/Lolo National Forest VMap data (Ahl and Brown 2017) concluded, based on a comparison to 4.404 ground-surveyed data points, that the accuracy for canopy closure was 84 percent, whereas the accuracy for cover type was 71 percent, and the accuracy for size class was only 62 percent. **The low level of accuracy for size class is of particular concern since many forest planning wildlife issues focus of on the availability of certain tree size classes.**

(Emphasis added.) Granted, VMap data may not be the same as FIA data, but the problems inherent in applying either dataset for conserving habitat attributes wildlife depend upon in specific places, such as the habitat components that define old growth or older/mature forests, are the same: The datasets don't accurately identify or measure the habitat components that express this biodiversity at the local scale. Yet it's only at this local scale where they can be specifically considered for protection during analysis processes governed by the National Environmental Policy Act prior to approval of land disturbing management activities.

Therefore we request that this rulemaking result in explicit, nondiscretionary mandates for identifying the location of mature and old-growth forests during programmatic and project-level NEPA planning processes on national forest lands, so that the public may be fully informed of the climate and biodiversity risks posed by such planning.

Before closing, we point out that the science on climate change is clear. Regarding the growing climate chaos in which we find ourselves, we have no time to lose, and no opportunities to forgo in meeting the challenges. Greenhouse gas emissions must be immediately minimized. Although most steps to meet that necessity are beyond the scope

of this rulemaking, it's not entirely so. Most active management on public lands causes carbon emissions even though the "outputs" of those actions are much, much less important than saving our imperiled climate. And the ongoing damage to the carbon sequestering potential of national forests and grasslands, as the Forest Service routinely authorizes, is not anything anyone should have to stomach. This Administration has the authority and moral mandate to quickly transition our forests and grasslands into a system of Strategic Climate Reserves, where nature will be allowed to act to mitigate the impacts of our past errors. Please muster the will to act in accordance with the level of urgency required!

Sincerely submitted,

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February 2, 2024

Joseph Biden, President
The White House

Thomas Vilsack, Secretary
United States Department of Agriculture

Transmitted to President Biden at: president@whitehouse.gov

Submitted via webform at: https://cara.fs2c.usda.gov/Public//CommentInput?Project=65356

Dear President Biden and Secretary Vilsack:

Friends of the Clearwater transmits these scoping comments on the U.S. Department of Agriculture (USDA) notice, "Land Management Plan Direction for Old-Growth Forest Conditions Across the National Forest System" (Federal Register / Vol. 88, No. 243 / Wednesday, December 20, 2023) (hereinafter "Notice).

Friends of the Clearwater, a nonprofit organization since 1987, defends the wildlands and biodiversity of the Clearwater Bioregion through a Forest Watch program, grassroots public involvement, and education. The Wild Clearwater Country, the northern portion of central Idaho's "Big Wild," contains many unprotected roadless areas and wild rivers and provides crucial habitat for countless rare species. We strive to protect these areas, promote their values as natural climate solutions, restore degraded habitats, preserve viable populations of native species, recognize national and international wildlife corridors, and end industrialization of public lands.

Introduction

Friends of the Clearwater (FOC) very much appreciates the opportunity to comment on the proposal to amend each forest plan of the national forest system in response to the climate and biodiversity crises. And we find much content in the Notice leading to optimism:

- "The Department believes that reaffirming, at a national scale, the commitment to maintaining …old-growth forests conditions across the National Forest System is prudent and warranted…"
- USDA seeks to "promote the long-term persistence, distribution, and recruitment of old-growth forest conditions across the National Forest System."
- "This proposed amendment is intended to create a consistent approach to manage for old-growth forest conditions with sufficient distribution, abundance, and ecological integrity (composition, structure, function, connectivity) to be persistent over the long term, in the context of climate amplified stressors."

- "The proposed action recognizes the role of old-growth forest conditions in contributing to ecological integrity."

Yet our optimism is tempered because the Notice vastly downplays the persistent and ongoing threats to old growth posed by human activities (logging and other vegetation manipulations) while being distracted by alleged "threats" posed by Mother Nature (specifically, "mortality from wildfires" and "insects and disease").

Additionally the USDA apparently lacks sufficient understanding of the role unmanaged old-growth ecosystems play in serving biological diversity and reducing greenhouse gas emissions. This is perhaps best exemplified by the Notice biasing the outcome of the amendment process toward a conclusion that old growth—and the mature forests we want to become old growth—need active human intervention to better serve biological diversity and reduce greenhouse gas emissions. The Notice ignores the scientific controversy of this USDA position.

The Assessment process

The Notice vilifies the natural processes that are so vital for creating the diversity and resilience inherent to forest ecosystems: "The **initial analysis** found that mortality from wildfires is currently the leading threat to mature and old-growth forest conditions, followed by insects and disease" (emphasis added). The Notice fails to explain what is meant by "initial analysis" and cites no basis for its questionable conclusion. A more thorough, objective and formally structured consideration of scientific information is needed to set the stage for a process as important as these plan amendments. This would be the **assessment**, as described in the 2012 Planning Rule: "Assessments rapidly evaluate existing information about relevant ecological, economic, and social conditions, trends, and sustainability and their relationship to the land management plan within the context of the broader landscape… ."

The Rule amending the 2012 Planning rule (Fed. Reg. Vol. 81, No. 241, Dec. 15, 2016) clarifies USDA direction for plan amendments: "The planning framework set forth in the 2012 rule includes three phases: **Assessment; plan development, amendment,** or revision; **and monitoring**." It clarifies that "the best available scientific information is to be used to inform the plan amendment process, as well as all other parts of the planning framework (36 CFR 219.5)." (Emphases added.)

The 2012 Planning Rule states, "Assessments rapidly evaluate existing information about relevant ecological, economic, and social conditions, trends, and sustainability and their relationship to the land management plan within the context of the broader landscape" and requires the USDA to "Document the assessment in a report available to the public. The report should document information needs relevant to the topics" including the following relating directly to climate change and ecological integrity:

- Terrestrial ecosystems, aquatic ecosystems, and watersheds;
- Air, soil, and water resources and quality;
- System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change;

- Baseline assessment of carbon stocks;
- Threatened, endangered, proposed and candidate species, and potential species of conservation concern present in the plan area;
- Social, cultural, and economic conditions;
- Benefits people obtain from the NFS planning area (ecosystem services);
- Areas of tribal importance;
- Cultural and historic resources and uses;

Also, "The plan-level monitoring program is informed by the assessment phase" (Id.) and "The responsible official shall document how the best available scientific information was used to inform the assessment, the plan decision, and the monitoring program… (Id.).

The Notice signals that USDA is skipping the Assessment process, dismissing the benefits it would provide for informing this amendment process from "Review(ing) relevant information from the assessment and monitoring to identify a preliminary need to change the existing plan and to inform the development of plan components and other plan content." (Id.)

Leaving forests unmanaged best serve to meet climate goals

President Biden, your Executive Order 13990 of January 20, 2021 (Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis) set as policy for your Administration to "…reduce greenhouse gas emissions; to bolster resilience to the impacts of climate change… ." And in Executive Order 13990 you state, "It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues."

And you begin your Executive Order 14008 of January 27, 2021 (Tackling the Climate Crisis at Home and Abroad) with: "The United States and the world face a profound climate crisis. We have a narrow moment to pursue action at home and abroad in order to avoid the most catastrophic impacts of that crisis and to seize the opportunity that tackling climate change presents." Further, your Executive Order on the Establishment of the Climate Change Support Office (May 7, 2021) recognizes the "global climate crisis."

Even a rapid but objective Assessment would better inform USDA of the natural resilience and role of forest ecosystems for sequestering atmospheric carbon and long-term storage. We cannot afford to make decisions lacking firm empirical basis in forest/climate research.

The proposed manipulation of forests to "increase the resilience" of our forests with the goal of reducing wildfire effects is inconsistent with best available science. For example, scientists Beverly Law and Mark Harmon (2011) conducted a literature review and concluded:

> Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO_2 to the atmosphere because the amount of carbon removed to change fire behavior is often far

> larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment.

The mechanical manipulations embraced in the Notice and Proposed Action would continue chronic unnatural emission of carbon from national forests to the atmosphere. Results from Hudiberg et al. (2019) indicate harvest-related carbon emissions between 2001 and 2016 in the states of California, Oregon and Washington averaged five times the emissions from wildfires.

In dry forests of the western U.S. even modest "thinning" operations emit three times more CO_2 into the atmosphere per acre than does wildfire alone. (Campbell et al. (2012.) And Mildrexler et al. (2023) found that 58% of the aboveground forest carbon in dry forests is comprised of trees less than 21 inches in diameter, and those are the trees that are typically targeted in current thinning operations to "increase resilience."

The fallacy of active management for creating or maintaining old growth

The Notice takes the position that the results of many decades and even centuries of forest successional processes can be replicated or shortcut by active management:

> The purpose of this amendment is to establish consistent plan direction **to foster**[8] ecologically appropriate management across the National Forest System by maintaining and **developing old-growth forest conditions** while improving and expanding their abundance and distribution and protecting them from the increasing threats posed by climate change, wildfire, insects and disease, encroachment pressures from urban development, and other potential stressors, within the context of the National Forest System's multiple-use mandate.

(Emphases added.) Such a position lacks empirical support. It is of great concern that the USDA wants to address climate and ecological integrity issues by including direction for logging within old growth and even exempting more intensive old growth logging from the proposed restraints. The USDA is failing the science test. Please see FOC's old-growth policy paper, which takes up this subject, among others related to U.S. Forest Service management of old growth.

Steel, 2009 notes "special interests and symbolic politics, a powerful combination that has proven its worth in muddying the waters of public knowledge and stopping intelligent progress in the thoughtful management" of old growth. This situation is recognized in a 2006 Ninth Circuit U.S. Court of Appeals opinion (*Earth Island Institute v. United States Forest Service* 442 F.3d 1147 (2006)):

> We have noticed a disturbing trend in the [Forest Service's] recent timber-harvesting and timber-sale activities…It has not escaped our notice that the [Forest Service] has a substantial financial interest in the harvesting of timber in the National Forest. We regret to say that in this case, like the others just cited, the [Forest Service] appears to have been more interested in harvesting timber than in complying with our environmental laws."

[8] An online dictionary defines "foster" as: "to promote the growth or development of; further; encourage."

There is simply no science supporting the position that vegetation manipulation can help to maintain old growth over time, or "foster" development of non-old growth into old growth. As stated by Thomas et al. (1988):

> The ecological complexity of old growth makes it unlikely that forest managers can create functional old growth through silvicultural manipulations of younger-aged, second-growth forests. Certainly, such knowledge does not now exist. …If silviculture is used to expedite this process, it should be done with the understanding that such action is experimental, and results lie many decades or centuries in the future. Accordingly, management options that include retention of existing old growth must be given priority.

Pfister et al. (2000) note that the outcome of legitimate experimentation for creating old growth can only be known far into the future:

> (T)here is the question of the appropriateness of management manipulation of old-growth stands… Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future—likely quite far in the future—considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed guess at best and, therefore, encompasses some unknown level of risk. In other words, producing "old-growth" habitat through active management is an untested hypothesis.

Hunter (1989) quotes from writing by the Society of American Foresters:

> With present knowledge, it is not possible to create old-growth stands or markedly hasten the process by which nature creates them. Certain attributes, such as species composition and structural elements, could perhaps be developed or enhanced through silviculture, but we are not aware of any successful attempts. Old growth is a complex ecosystem, and lack of information makes the risk of failure high. In view of the time required, errors could be very costly. At least until substantial research can be completed, the best way to manage for old growth is to conserve an adequate supply of present stands and leave them alone.

Speaking to the kind of hubris exemplified by the Notice, Franklin and Spies (1991) ask, "How can we presume to maintain or re-create what we do not understand?"

Misguided Policies

The proposed action "is intended to complement the Department's continued focus on, funding, and implementation of the Forest Service's Wildfire Crisis Strategy." However, some policies in the Wildfire Crisis Strategy conflict with the attainment of protecting old growth and preserving forests for their climate benefits.

That strategy, called "Confronting the Wildfire Crisis" (January 2022) states, "We will focus on key "firesheds"—large forested landscapes and rangelands with a high likelihood that an ignition could expose homes, communities, and infrastructure to wildfire. Firesheds, typically about 250,000 acres in size, are mapped to match the scale of community exposure to wildfire."

The problems inherent to the Wildfire Crisis Strategy are well-illustrated with the Nez Perce-

Clearwater National Forests' proposed Twentymile Project. The Twentymile Proposed Action (PA) states:

> The Secretary of Agriculture, Tom Vilsack, has determined that the Forest Service may carry out Authorized Emergency Actions under section 40807 of the Infrastructure Investment and Jobs Act (PL 117-58) on National Forest System lands in 250 **identified High Risk Firesheds**. Emergency actions are taken to achieve relief from threats to public health and safety, critical infrastructure, and/or to mitigate threats to natural resources. Forests projects proposed under an emergency authority must be approved by the Secretary.
>
> The NPC is requesting approval from the Secretary to implement the Twentymile project as an **Emergency Action Determination** project. The project lies within one of the 250 identified High Risk Firesheds. The reason for requesting this emergency authority is **to mitigate the harm to life and property adjacent to NFS land; to control insects or disease; remove hazardous fuels; and protect and restore water resources and infrastructure.**

(Emphases added.) The Forest Service's April 5, 2023 "Twentymile Project Update" introducing the public to the Proposed Action stated, "If approved, the Twentymile project **will not be subject to the pre-decisional objection review process**." (Emphases added.)

Prior to the so-called "Update" the public had never heard of the Twentymile Project. It had not appeared in any Schedule of Proposed Actions. So without any analysis or previous public involvement, the Forest Service proclaims the project meets the criteria in Section 40807 of Public Law 117-58 (enacted on November 15, 2021) for emergency actions needed to reduce the risk of wildfire. And Forest Supervisor Cheryl Probert prefers that outside a mere 30-day comment period, citizens have no further say in the matter. Oddly enough, the Twentymile PA states, "**There are no private lands within the project area**" to save from wildfire. And of the "nearby communities at risk" the PA says, "The Twentymile project is located on the forest's Red River Ranger District approximately **16 miles** southwest of Elk City, **15 miles** northwest of the township of Orogrande, and **12 miles** south of Newsome… ." (Emphases added.) To top it off, "the Proposed Action would create openings greater than 40 acres in size and require Regional Forester approval… Regeneration prescription would result in eleven openings created that are greater than 40 acres in size, ranging from 41 to 642 acres." (Id.)

We cite this situation because the Notice embraces the implementation of the Wildfire Crisis Strategy. Just as important, the Proposed Action described in this Notice includes a Guideline that embraces the same set of rationales the Twentymile PA uses to shortcut the public process:

> …landscape-level proactive stewardship activities should… be developed …to retain and promote the development of resilient old-growth conditions …including **for the purposes of reducing fire hazard, altering potential fire spread or fire severity, or reducing potential insect or disease outbreak that may spread to adjacent old-growth forest**.

(Emphasis added.) Use of the concept "resilience" in the Notice also concerns us greatly. Asaro et al. (2023) recognize, "Forest health is a difficult concept to define using terms such as integrity, resilience, or balance, which are problematic because **they do not provide objective, scale-independent criteria that can easily be assessed quantitatively and applied consistently across forest ecosystems.**" (Emphasis added.) The Proposed Action in the Notice provides absolutely no direction to create objective **measurement** of forest ecosystems' resilience as they are now, nor for monitoring the changes in resilience following implementation of management strategies under the amendment.

The risks posed by wildland fire are best dealt with in the immediate vicinity of homes, not by large-scale vegetation manipulations of national forest lands well away from human occupied neighborhoods. The forthcoming Environmental Impact Statement must explore the vast body of scientific information demonstrating that the only effective way to prevent structure damage is to manage ignition sources in the immediate vicinity of those homes, which happens to a very small portion of the wildland-urban interface and covers a minuscule extent of national forest land.

Inadequate Old-Growth Inventory

The Notice states the federal government completed the Executive Order 14072 requirement to "inventory mature and old-growth forest conditions on National Forest System lands, which the Forest Service completed an initial draft in April 2023 (Mature and Old-Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management." It represents the results of the inventory being "…the Forest Service identifying an estimated 24.7 million acres of old-growth forest conditions and 68.1 million acres of mature forest conditions representing 17 and 47 percent, respectively, of the 144.3 million acres of forested National Forest System lands."

A reasonable interpretation and expectation of that inventory is that it identifies the location of the old-growth forests the government says it's inventoried. However it's important to realize that from using that inventory nobody can locate a single stand of old growth anywhere in the entire national forest system. Not even a single centuries-old tree.

This is because of the nature of the data used—that proceeding from the federal Forest Inventory and Analysis (FIA) program sampling protocol. Sample design for FIA plots is semi-systematic; samples are taken at randomly located spots within a systematically placed grid consisting of fixed polygons. The location of plots is confidential, to prevent skewing of data which would result from intentionally managing differently at known plot locations. Yet this situation prevents independent peer review—a hallmark of the scientific method. The FIA "inventory" of old growth is akin to an anonymous poll or survey. Not even the USDA Secretary or Forest Service Chief know FIA plot locations.

This inherently leads to problems in monitoring, and therefore adaptive management. Conclusions based on FIA cannot be verified by independent investigators, thwarting independent review of data interpretation and thus scientific integrity.

Furthermore the size of FIA plots, covering "an area that is nominally one acre in size"

(Czaplewski, 2004), prevents assessment or implementation of ecological definitions of old growth, including the contiguity and connectivity needed to insure viability of old-growth associated wildlife and the long-term persistence of their populations.

Problems with the Notice's Proposed Plan Components

The USDA ignores the science and ecology of old-growth ecosystems, thus failing to meet common and realistic public expectations. The wording in Standard 1 fails to propose a clear and unambiguous prohibition of the degradation and logging of old growth: "(I)n a manner that prevents the long-term persistence of…" is highly subjective and open to various and even conflicting interpretations. Other ambiguous language promotes active management, which is misguided as we've already discussed. This includes Standard 2: "Vegetation management in old-growth forest conditions must be for the purpose of proactive stewardship, to promote the composition, structure, pattern, or ecological processes necessary for the old-growth forest conditions to be resilient and adaptable to stressors and likely future environments." Alarmingly, these standards would give excessive discretion to Forest Service responsible officials facing political pressures to increase logging, and would shield them from accountability. This would be a grave disservice to the public, our forests and our climate.

Along with those problems, in Standard 2 section (b) the "Exceptions to this standard" grants further discretion and unaccountability to responsible officials, who would only be required to "include the rationale in a decision document" no matter how absurd or lacking in scientific basis their rationale might be.

The exception for "cases where it is determined that the direction in this amendment is not relevant or beneficial to a particular forest ecosystem type" lends far too much credence to scientifically unproven or otherwise irrelevant distinctions between "types." This would routinely result in, e.g., 300-year old trees being logged because they are in some way out of bounds, and stands dominated by such trees being clearcut because they were somehow located wrongly by Mother Nature according to arbitrary Responsible Official decree. We already see this stretched logic being applied routinely in project analyses within our area of interest and beyond, resulting in clearcuts hundreds of acres in extent.

The aspirational language of "Desired Conditions" also lends wide discretion and doesn't contribute to accountability. Furthermore, the third and fourth Desired Conditions are mere statements of fact and accomplish nothing.

Science Consistency Review

The importance of this nationwide amendment process for ecological sustainability and the livability of the planet's climate calls for undertaking a science consistency review of the preliminary products of the proposed forest plan amendment process. Guldin et al. (2003a) describe such a review—a process the Forest Service created. Nie and Schembra (2014) recommend that the agency solicit independent feedback on its use of science. And Schultz (2010) recommends independent peer review of large-scale assessments and project level management guidelines.

Undertaking a science consistency review is particularly crucial in the absence of an Assessment being part of the amendment process.

Conclusion and recommendations

The science on climate change is clear. Regarding the growing climate chaos in which we find ourselves, we have no time to lose, and no opportunity to forgo in meeting the challenges.

Unfortunately this Notice represents a weak response to the climate and biodiversity crises. The Proposed Action, with its false solutions and loopholes, may reduce logging somewhat but would continue to facilitate forest exploitation and degradation, making the prospects of a decent quality of life for future generations more remote.

We recommend:

Initiate the Assessment process to better state the **need for change** based on best available scientific information indicating forests' natural resilience and capacity to best capture and store carbon in the absence of human manipulations.

Undertake an independent science consistency review of key preliminary products following from the above-mentioned Executive Orders, including the inventory for mature and old growth forests and this Notice/Proposed Action.

Drop all the exceptions to standards in the Proposed Action.

Include standards that require a comprehensive project area inventory of mature and old-growth forest conditions to inform analyses prior to decisions for vegetation management, prescribed fire and road construction projects. Set interim direction to implement these steps on all national forests by taking immediate executive action.

Initiate another set of nationwide forest plan amendments to transition our national forests and grasslands into a system of Strategic Climate Reserves, where natural ecological processes are allowed to mitigate the impacts of our past errors.

Again, thank you for the opportunity to comment.

Sincerely submitted,

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Attachment B

We incorporate this document into Friends of the Clearwater's comments on the June 2024 Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System Draft Environmental Impact Statement.

Management of Old Growth in the U.S. Northern Rocky Mountains
October 21, 2021

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MANAGEMENT OF OLD GROWTH IN THE U.S. NORTHERN ROCKY MOUNTAINS
Debasing the concept and subverting science to plunder national forests

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Friends of the Clearwater is a 501(c)(3) nonprofit dedicated to protecting and advocating for the wildlife and wildlands of the Clearwater Basin of North Central Idaho. These wildlands comprise the Wild Clearwater Country, and include federal public lands bordered on the north and south by the St. Joe and Salmon rivers, and bordered on the east and west by Montana and Oregon. Our mission includes educating the public about the issues these wildlands face, monitoring government management activities, and holding agencies accountable when their actions violate environmental laws or otherwise threaten ecological integrity or species.

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EXECUTIVE SUMMARY

Old growth originates from complex and interconnected forest ecosystems developing over timescales much longer than a human lifespan. The idea is nurtured by the human capacity for appreciation of nature and by scientific discoveries of the important role old growth plays for sustaining biological diversity. This report touches on old growth's contributions to these recreational, spiritual, ecological and scientific values, and critically examines the management policies and practices of the U.S. Forest Service for national forests of the U.S. northern Rocky Mountains bioregion.

Challenges in defining old growth arise from divergent perspectives, which vary depending upon the values of the beholder. It is undisputed that old-growth forests are structurally complex, feature large, old trees and associated characteristics that develop over relatively long intervals of time, feature large snags and down dead wood, and exhibit variations in forest canopy including small openings caused by various agents of tree mortality. Old growth is structurally distinct from earlier successional stages.

The complex character of old growth makes it fascinating to the general public. Its biological diversity attracts scientific inquiry. Some species have co-evolved with, and depend on, specific conditions in old-growth forests.

The highest quality water is produced by older, intact forests, and several attributes of old-growth forests are important to maintain healthy native fish populations.

Science also recognizes that forests of mature and old trees continue to store disproportionally massive amounts of carbon, helping to moderate the effects of climate change.

The Chief of the Forest Service issued a 1989 policy statement that "recognizes the many significant values associated with old growth forests, such as biological diversity, wildlife and fisheries habitat, recreation, aesthetics, soil productivity, water quality, and industrial raw material. Old growth on the National Forests will be managed to provide the foregoing values for present and future generations." The Chief's statement was partly to address to the controversy surrounding the logging of spotted owl habitat in federally owned Pacific Northwest old-growth forests. This also came shortly after the first long-term land management plans for national forests had been written, as directed by the National Forest Management Act (NFMA). Congress's passage of NFMA itself was largely in response to earlier controversies surrounding clearcutting of national forest lands. By the time these "forest plans" were formulated, logging had already eliminated almost all old growth from private lands, and left the extent of old growth in national forests in the lower 48 states much depleted and highly fragmented.

The relative scarcity of old growth and its recognized importance for wildlife elevated its status as a metric for diversity for planning purposes, following from NFMA's mandate to "provide for

diversity of plant and animal communities." And early forest plans recognized the inherent incompatibility of logging and old growth, prohibiting commercial exploitation in those old-growth stands identified for conservation.

Because of the relative novelty of old growth as a scientific concept, forest plans circa late-1980s—many of which remain in effect—reflected a wide variety of management approaches. The prevailing silvicultural view of old growth (i.e., "a decadent stand of trees" and "… an undesirable goal for timber management"), with its strong timber bias, seemed to be waning. Almost all forest plans prioritized protection of much of the remaining old growth. And as directed by NFMA, old-growth "management indicator species" (MIS) were designated under these forest plans. The objective of MIS designation is to keep track of their population trends, which provides feedback on the adequacy of forest plan protections for their habitat, thus insuring viable populations would persist across each national forest.

Generally, forest plans have required a minimum percentage of the forest be maintained in old-growth condition (ten percent at the very most), with old growth well-distributed to reflect biological needs of MIS and other species. However forest planners cited no biological basis to support the adequacy of their respective plan's minimum requirements. And while analyzing timber sale proposals, the agency ignores publicly presented scientific information suggesting their minimums are likely well below historic norms.

Another scientifically questionable aspect of the Forest Service's old-growth policies is an almost exclusive focus on existing old-growth stands, while ignoring the wider geographic and longer temporal contexts within which old-growth stands develop. Even old growth—generally requiring a minimum of 150 years to develop and often existing for centuries more—doesn't last forever, so planning for future old growth is necessary for its persistence on the landscape.

Old-growth stands are only one element of dynamic landscapes. Natural processes including fire, insect activity, disease, wind, regeneration of new seedlings, and nutrient allocations among individual trees interact to maintain a variety of conditions across the landscape. Old-growth components vary spatially and temporally, and only some of this ever-shifting landscape mosaic would exist as old growth at any given time.

Since it's not certain where old growth will occur decades or centuries in the future, maintaining old growth at any semblance of its historic abundance requires allowing natural processes operate across large landscapes. This conflicts with the Forest Service's prevailing prioritization of resource extraction on most national forest land.

Several lawsuits succeeded in halting Forest Service timber sales projected to destroy habitat for old-growth associated species, because the Forest Service could not prove it was preserving forest plan minimums and therefore meeting population viability requirements. The agency lacked comprehensive forestwide old-growth inventories, and had gathered practically no MIS population trend monitoring data.

Because agency budgets prioritize timber production goals above conservation, the Forest Service has responded to lawsuits by changing the rules. This has played out in several ways,

primarily by removing quantitative minimum old-growth standards in the process of amending or revising forest plans, which hampers the public from holding the agency accountable. Other changes have included weakening the definition of old growth or altogether erasing the term from forest plans. And in 2012, the agency updated its planning regulations, significantly diminishing the overall role of science in planning and removing the mandate for assuring viability of species.

Paralleling this disturbing trend of devaluing old growth is a Forest Service's culture of controlling nature, emerging in the early 1990s as "ecosystem management." The Forest Service promotes vague, unmeasurable goals such as "improving forest health" and "increasing resilience and resistance to wildfire and insect pests" under this manipulate-and-control management. Such terminology has become ubiquitous in timber sale environmental analysis documents, agency public relations statements, and industry campaigns attempting to conceal the fact that its management bears much resemblance to the unsustainable logging of the past.

This culture also postures that management can engineer better forests than those growing naturally. Such posturing has facilitated—and fully rendered the Forest Service vulnerable to—industry capture. Under a politically inspired misinformation campaign, logging proponents demonize forests as "unhealthy," and as "hazardous fuels" posing risks of "catastrophic fire" to justify management "prescriptions." The fear incited by raising the specter of imminent destruction distracts from and prevents sober evaluation of the science that indicates logging is destructive, and itself increases fire risk.

According to the Forest Service worldview, management even facilitates or accelerates development of old growth. Yet there is little scientific support for—and much expert opinion opposing—the hypothesis that active management can develop or maintain old growth over time.

The Forest Service implicitly or explicitly denies that the natural processes that created and maintained old-growth landscapes over countless millennia can continue to do so without constant and repetitive management intervention. As a product of centuries of natural ecological processes, old growth is an anathema to the Forest Service worldview that asserts lack of intensive management equates to an unhealthy forest.

For old growth to persist, it's not enough to prohibit logging of all existing old growth. Natural processes must be the "managers" for long intervals over large landscapes to be the cradles for future old growth. And there needs to be much tighter constraint on national forests management policies. Old-growth values must be reordered so the wood products that consume forests take a back seat to spiritual, ecological, recreational and scientific values.

Currently, the only detailed initiative that would adequately change management priorities over large landscapes in the northern U.S. Rocky Mountains is a bill in Congress—the Northern Rockies Ecosystem Protection Act (NREPA). NREPA would protect the remaining roadless areas on federal lands in this bioregion as Wilderness, and importantly for old-growth landscapes it would provide a template for preserving biological connecting corridors and restoring damaged landscapes by designating wildland restoration and recovery areas on federal lands.

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I. INTRODUCTION

I submit that an old-growth forest has worth in itself, worth beyond human uses. It is a manifestation of the "fierce, green fire" (Leopold, 1949) of life growing across the face of the earth. Saving old-growth forests for their own sakes, for their intrinsic value as ancient communities of life, represents a novel moral achievement that goes beyond even the most sophisticated human self-interest.

—Kathleen Dean Moore

The conception of old growth originates with complex and interconnected forest ecosystems that develop over timescales much longer than a human lifespan. The idea is nurtured by the human capacity for wonder, fascination, and appreciation of nature, tempered by the awareness of old growth's dwindling presence in an over-developed and exploited natural world.

This report examines the policies of the U.S. Forest Service, an agency tasked with sustaining the values of our national forests into perpetuity. The geographic area of interest is national forests of the U.S. northern Rocky Mountains bioregion, which encompasses large portions of Montana and Idaho, part of Wyoming, and some eastern portions of Oregon and Washington.

First, an overview of some scientific perspectives on old growth is presented. Old growth is then viewed through the lens of humanity's urgent existential crisis—climate change. The bulk of this report examines the management of old growth on national forests of the northern Rocky Mountains bioregion, from the 1980s until present. In conclusion, recommendations for policy changes are discussed.

II. OLD GROWTH AS AN ECOLOGICAL CONCEPT

Old growth …by combining sacred groves with ecological rationality …is a refuge for both the human spirit and a diversity of species threatened by the advance of commercialized landscapes.
—Robert G. Lee

As Lee suggests, spiritual sentiment and rational evaluation are two sides of the same human coin. Since expressions of the former are best left to the more literary and philosophical, and because conservation within our 21st century context demands a strong basis of objectivity, this report leans mostly upon scientific perspectives to advocate for this thing called "old growth."

Defining old growth in objective terms has proven to be no simple matter, however. Hunter (1989) noted, "there is a great deal of confusion over just what constitutes an old-growth stand because there is no generally accepted or universally applicable definition of old-growth."

A. Biological diversity associated with old growth

Scientists recognize the wide diversity of living and nonliving features as a defining character of old growth. Franklin and Spies, 1991 note the "later stages in forest development that are often compositionally and always structurally distinct from earlier successional stages." They describe the complexity and diversity that are defining traits:

> Structurally, old-growth stands are characterized by a wide within-stand range of tree sizes and spacing and include trees that are large for the particular species and site combination. Decadence is often evident in larger and older trees. Multiple canopy layers are generally present. Total organic matter accumulations are high relative to other developmental stages. Functionally, old-growth forests are characterized by slow growth of the dominant trees and stable biomass accumulations that are constant over long periods.

Countless scientific studies have explored the exceptional role old growth plays in providing essential habitat for wildlife species. Marcot, et al., 1991 recognize that old-growth habitat includes components serving many life functions:

> Old growth provides optimal habitat for some management indicator species, including spotted owl, pileated woodpecker, and marten, and for many other species of plants, fish, amphibians, reptiles, birds, and small mammals. It also provides thermal and hiding cover for ungulates, especially in winter. …Some wildlife species may have co-evolved with, and depend on, specific amounts and conditions of old-growth forests. Specific kinds, sizes, and patterns of old-growth environments are, therefore, keys to the long-term survival of these species. (Internal cites omitted.)

Similarly, Warren (1990) states:

> The greater vertical and horizontal diversity found within an old-growth stand allows for niche specialization by wildlife. Although the individual wildlife species occurring may not

> be unique to old-growth stands, the assemblage of wildlife species and the complexity of interactions between them are different than in earlier successional stages.

The 1987 Forest Plan for the Kootenai National Forest (USDA Forest Service, 1987a) states, "With respect to wildlife (old growth) represents a distinct successional stage that is an important component of wildlife habitat" and also:

> Richness in habitat translates into richness in wildlife. Roughly 58 wildlife species on the Kootenai (about 20 percent of the total) find optimum breeding or feeding conditions in the "old" successional stage, while other species select old growth stands to meet specific needs (e.g., thermal cover). Of this total, five species are believed to have a strong preference for old growth and may even be dependent upon it for their long-term survival (see Appendix I[9]).

Hammond, 2020 states:

> The highest quality water, provided in adequate and manageable quantities throughout an annual cycle is produced by old/old-growth forests. The multi-layered, large canopies, canopy gaps, and accumulations of decayed fallen trees provide for effective, natural water management that benefits forest ecosystems and aquatic ecosystems, and provides for human needs and safety. In short, old-growth forests are Nature's water storage and filtration system.

Likewise, Reeves and Bisson, 2009 note, "many attributes of old-growth forests are important for maintaining healthy fish populations…"

Beyond the numerous species commonly referred to as "wildlife", old growth uniquely exhibits diversity of other life forms (*Id.*):

> Wildlife richness is only a part of the story. Floral species richness is also high, particularly for arboreal lichens, saprophytes, and various forms of fungus and rots. Old growth stands are genetic reservoirs for some of these species, the value of which has probably yet to be determined.

From their literature review, Tomao et al. (2020) conclude, "Old-growth forests are recognized as an important reserve of fungal diversity for several fungal functional guilds. Indeed, a very large number of ectomycorrhizal species can be hosted in old growth stands (Richard et al., 2004; Zhang et al., 2017)." They note:

> • Fungal diversity is positively related with canopy cover, basal area and tree species diversity.
> • Diversity of deadwood size and decomposition stage is positively related to richness of wood-inhabiting fungi.

[9] The Kootenai National Forest's Forest Plan Appendix I wildlife species list is found in Appendix A of this report.

B. Old-growth ecosystems and old-growth landscapes

As discussed later in this report, Forest Service management policies have focused mainly on identifying, designating, inventorying and managing at the level of the old-growth "stand"[10] or patches consisting of multiple contiguous stands. Kaufmann et al. 2007 identify limitations of this approach: "The term 'stand' may be more useful for management purposes than for describing the ecology of forests." This report advocates for a more holistic idea of old growth—what Kaufmann et al. 2007 call "old-growth forests or landscapes" which:

> …contain sufficient numbers of patches and stands of old growth to be reasonably representative of the forest type in historical times. However, portions of the landscape may be in various stages of development (even temporary openings or patches of very young trees) to provide future old-growth patches in the landscape. Landscapes vary in size, but are generally considered to be at least as large as major natural disturbances, such as fire.

Accordingly, this report examines diversity beyond the stand level, as well as across longer scales in time. Franklin and Spies, 1991 recommend such a perspective:

> Our failure to study old-growth forests as ecosystems is increasingly serious in considerations of old-growth issues. Without adequate basic knowledge of the ecosystem, we risk losing track of its totality in our preoccupation with individual attributes or species. Definitional approaches to old growth based on attributes… predispose us to such myopia. The values and services represented by old-growth ecosystems will be placed at ever greater risk if we perpetuate our current ignorance about these ecosystems. It will also increase doubts about our ability to manage for either old-growth ecosystems or individual attributes (for example, species and structures) associated with old growth. We must increase ecosystem understanding and management emphasis on holistic perspectives as we plan for replacement of old-growth forests.

Green et al., 1992 (Old-Growth Forest Types of the Northern Region), while largely focusing on stand-level old-growth criteria, also acknowledges the need to look beyond:

> (A) stand's **landscape position** may be as important, or more important than any stand old growth attribute. …Stands are elements in **dynamic landscape**. We need to have representatives of the full range of natural variation, and **manage the landscape mosaic as a whole** in order to maintain a healthy and diverse systems. (Emphases added.)

Similarly, Hamilton, 1993 (Characteristics of Old-Growth Forests in the Intermountain Region) incorporates definitions of Landscape Ecology, Ecological Process and Ecosystem in describing old-growth definitions for the Intermountain Region.

[10] Warren (1990) explains, "Timber stands are delineated on the basis of predominant overstory species, tree sizes, and tree density. Contiguous old-growth habitat may be composed of more than one stand."

C. Disturbance processes intrinsic to old growth ecosystems

Natural disturbance processes are inherent to forest ecosystems in the northern Rocky Mountains. The "Generic Definition and Description of Old Growth Forests" (USDA Forest Service, 1989b) notes, "Sporadic, low to moderate severity **disturbances are an integral part of the internal dynamics of many old growth ecosystems**. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory." (Emphasis added.)

Hamilton, 1993 acknowledges that natural tree mortality is important for creating the very conditions that help define old growth:

> Tree deaths resulting in standing dead and down woody materials, plus some living trees with broken tops or rotting boles contribute to decadence, a necessary attribute of Old-growth. Decadent conditions in old-growth result in important snags, logs, and rotting trees that provide potential habitat for several species of birds and small mammals. Decadent conditions also indicate suitable habitat for certain plants which are not easily seen such as saprophytes and lichens which are not readily inventoried.

Franklin et al. 1987, state: "Tree death also demonstrates some principles of ecological processes: the importance of defining the spatial and temporal context of a study, the importance of stochastic processes, the fact that most ecological processes are driven by multiple mechanisms and that the relative importance of these mechanisms changes in time and space, and the importance of species' and ecosystems' natural histories."

Bollenbacher and Hahn, 2008 recognize that "(old-growth) stands, as well as various other forest conditions, have been influenced by landscape-level processes, such as fire (low-, mixed-, and high-severity), insect outbreaks, and disease. These processes result in a mosaic pattern of forest conditions across the landscape."

III. OLD GROWTH AND CLIMATE CHANGE

At least in terms of the modern climate crisis, perhaps the greatest benefit of old-growth forests is their ability to retain carbon.

— Marina Richie, The Secret Power of Old Growth

There is growing scientific concern over the imminent effects of climate change on the earth's ecosystems, as well as their implications for human civilization. The Intergovernmental Panel on Climate Change 2018 report states that if greenhouse gas emissions continue at the 2018 rate, the atmosphere will warm up by as much as 2.7 degrees Fahrenheit (1.5 degrees Celsius) above preindustrial levels by 2040, inundating coastlines and intensifying droughts, poverty, and strife. More recently, a 2021 report from the same panel amplifies the urgency to act.

A. Carbon sequestration and old-growth forests

Science recognizes the critical role forests, particularly old growth, play in sequestering carbon and thus moderating the effects of climate change. The vital role forests play as stores of sequestered carbon is recognized by Achat et al., 2015: "Compared with other terrestrial ecosystems, forests store some of the largest quantities of carbon per surface area of land." More specific to old growth, Mildrexler et al., 2020 state, "Large-diameter trees store disproportionally massive amounts of carbon and are a major driver of carbon cycle dynamics in forests worldwide." In a global perspective, "Given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes." (*Id*.) Also, Lutz et al., 2018 (co-authored by dozens of scientists) "recommend managing forests for conservation of existing large-diameter trees or those that can soon reach large diameters as a simple way to conserve and potentially enhance ecosystem services" including carbon sequestration.

Thomas DeLuca, former Dean of the University of Montana's W.A. Franke College of Forestry & Conservation, discusses research that shows "if the objective of management is carbon storage, old-growth forests are better left standing." (DeLuca, 2009.) "Old growth, rather than being thought of as stagnant with respect to carbon fixation, can sequester atmospheric carbon dioxide long past the achievement of old-growth conditions." (*Id*.)

McKinley et al. 2011 state:

> [I]f the starting point is a mature forest with large carbon stocks (Cooper 1983, Harmon et al. 1990), then harvesting this forest and converting it to a young forest will reduce carbon stocks and result in a net increase in atmospheric [CO^2] for some time (Fig. 8B; Harmon and Marks 2002). Even if the mature forest is converted to a very productive young forest, it could take several harvest intervals to equal the amount of carbon that was stored in the mature forest, even with 100% utilization efficiency, biomass for energy and substitution (Harmon et al. 1990; Fig. 8A).

Even in cases where logging does not regenerate a stand, carbon emissions can be significant. A literature review by Law & Harmon (2011) concludes:

> Thinning forests to reduce potential carbon losses due to wildfire is in direct conflict with carbon sequestration goals, and, if implemented, would result in a net emission of CO_2 to the atmosphere because the amount of carbon removed to change fire behavior is often far larger than that saved by changing fire behavior, and more area has to be harvested than will ultimately burn over the period of effectiveness of the thinning treatment.

Such conclusions are confirmed in multiple studies such as Campbell et al., 2011, Mitchell et al., 2009, and Reinhardt and Holsinger, 2010.

B. Old-growth stands buffer climate change effects

The microclimatic effects in old-growth stands become of increasing importance as average forest temperatures rise. Frey et al., 2016 find: "Vegetation characteristics associated with older forest stands appeared to confer a strong, thermally insulating effect. Older forests with tall canopies, high biomass, and vertical complexity provided cooler microclimates compared with simplified stands. This resulted in differences as large as 2.5°C between plantation sites and old-growth sites, a temperature range equivalent to predicted global temperature increases over the next 50 years." They hypothesize older, more complex forests may help to "buffer organisms from the impacts of regional warming and/or slow the rate at which organisms must adapt to a changing climate…" Additionally, forest canopies can buffer climate extremes and promote microclimates that in turn provide refugia for species in the understory. (Davis et al. 2019b.)

C. Climate change affects old growth

Acute effects of higher annual temperatures include increased extent, frequency, and severity of wildfire. Similarly, warmer temperatures can foster outbreaks of tree-killing insects, whose populations were more balanced under historic climates. These effects potentially accelerate natural disturbance processes occurring within old growth, creating unknown impacts on its persistence.

As climate conditions change in particular areas, shifts in forest composition are likely. Funk et al., 2014 believe suitable conditions for four common tree species in this bioregion (Douglas-fir, ponderosa pine, lodgepole pine, and Engelmann spruce) could dramatically contract.

IV. OLD GROWTH AND U.S. FOREST SERVICE MANAGEMENT

Foresters trained in the twentieth century …were committed to bringing order to the forest and replacing the messiness of "decadent" older forests with manageable, fast-growing plantations of uniform trees. …The messiness of natural forests was to be ordered by forest regulation. Manipulation of both time and space was fundamental to bringing order to forests. Considerations of time involved measuring how much trees of a given species grow each year and calculating volume accumulation to predict harvestable age. Space was derived from time by calculating how much area of a forest should be harvested and regenerated each year to set a harvest level that would ensure a constant supply of wood.

-Robert G. Lee

Beginning in the 1980s, long-term land management plans for the national forests were written by the U.S. Forest Service, as required under the National Forest Management Act (NFMA). The passage of NFMA was largely in response to the increasing public controversies surrounding overexploitation and clearcutting of national forest lands.

Also in the 1980s, the concern over rare wildlife species brought increased public scrutiny to federal management of old-growth forests. Litigation from environmental groups and the listing of species under the Endangered Species Act (ESA) spurred changes in management of old-

growth forests. Already old growth had been logged to a small fraction of what existed prior to EuroAmerican settlement, leading to the need "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved." (Endangered Species Act of 1973.)

The highest profile controversy over old-growth forests arose in the federal forests of the Pacific Northwest, with its iconic ancient forests of giant trees such as redwood, Douglas-fir, western hemlock, Sitka spruce, and western redcedar. Increasingly, economic exploitation of the timber resource conflicted with other social values prizing natural forests, and the habitat values native forests provided for species such as the northern spotted owl. In granting an injunction against logging, U.S. District Court Judge William Dwyer called out "a deliberate and systematic refusal … by higher authorities in the executive branch of government … to comply with the laws protecting wildlife."

At that time, the first generation of land management plans ("forest plans") reflected changing public values and to the growing scarcity of old-growth forests. For the first time, explicit protections for some old growth on national forests were adopted.

A. The Forest Service and "Old Growth Values"

In 1989, in the midst of the controversy, Forest Service Chief Dale Robertson issued a "Position Statement on National Forest Old Growth Values" (Chief's Position Statement; USDA Forest Service, 1989a). The Chief's Position Statement began, "The Forest Service recognizes the many significant values associated with old growth forests, such as biological diversity, wildlife and fisheries habitat, recreation, aesthetics, soil productivity, water quality, and industrial raw material. Old growth on the National Forests will be managed to provide the foregoing values for present and future generations. …Where goals for providing old growth values are not compatible with timber harvesting, lands will be classified as unsuitable for timber production."

In the Chief's Position Statement the Forest Service recognized old growth holds a wide range of values beyond timber, and admitted that the agency's timber program fundamentally conflicts with those values. It also included measures national forest managers were to take to reflect this range of old growth values. The direction included:

- Old growth definitions are to be developed by forest type or type groups for use in determining the extent and distribution of old growth forests.

- Old growth values shall be considered in designing the dispersion of old growth. This may range from a network of old growth stands for wildlife habitat to designated areas for public visitation. In general, areas to be managed for old growth values are to be distributed over individual National Forests with attention given to minimizing the fragmentation of old growth into small isolated areas.

- Regions with support from Research shall continue to develop forest type old growth definitions, conduct old growth inventories, develop and implement silvicultural practices to maintain or establish desired old growth values, and explore the concept of ecosystem

> management on a landscape basis. Where appropriate, land management decisions are to maintain future options so the results from the foregoing efforts can be applied in subsequent decisions. Accordingly, field units are to be innovative in planning and carrying out their activities in managing old growth forests for their many significant values.

Green et al., 1992 and Hamilton, 1993 were prepared by the Northern and Intermountain Regions, respectively, in response the that first point. Green et al., 1992 states "…old growth is valuable for a whole host of resource reasons such as habitat for certain animal and plants, for aesthetics, for spiritual reasons, for environmental protection, for research purposes, for production of unique resources such as very large trees." And Hamilton, 1993 states, "Values for such items as wildlife, recreation, biological diversity, and juxtaposition of old-growth stands with other forest conditions need to be considered in relation to Forest land management planning objectives."

Spies, 2009 notes some **scientific values** of old growth:

> (i) providing controls for measuring the effects of human activities; (ii) shifting our focus to relatively long timeframes to help us understand how and why forests change; (iii) helping us identify the unique contributions of all forest stages to biological diversity and ecological processes; and (iv) opening our eyes to the importance of structural complexity in providing habitat for organisms and the foundation for ecological processes.

B. Management policies of northern Rocky Mountains bioregion national forests

By the late 1980s, most national forests in the U.S. northern Rocky Mountains bioregion had finalized their original forest plans. This section examines some of the ways those plans evaluated old growth.

1. Definitions of old growth in forest plans

Because of the relative novelty of old growth as a scientific concept, forest plans reflected a wide variety of old-growth definitions.

Some forest plans include measurable criteria, e.g., the Nez Perce National Forest (1987):

> Old-growth stand refers to a stand of timber that, generally, meets the following criteria:
> 1. At least 15 trees per acre ≥ 21 inches diameter at breast height (DBH). Providing trees of this size in the lodgepole pine and sub-alpine fir stands may not be possible.
> 2. Two or more canopy layers.
> 3. At least .5 snags per acre ≥ 21 inches DBH and at least 40 feet tall.
> 4. Signs of rot and decadence present.
> 5. Overstory canopy closure of 10-40 percent; understory canopy closure of at least 40 percent; total canopy closure at least 70 percent.
> 6. Logs on the ground.

Other forest plans described old growth with less specific terminology, e.g., the Kootenai National Forest (USDA Forest Service, 1987g):

> Several authors have described old growth conditions (Juday, 1978; McClelland, 1977; McClelland et al., 1979; Thomas, 1979) with certain features appearing to be universal. These features include: 1) large diameter trees (often exceeding 20" dbh) with a relatively dense, often multilayered canopy, 2) the presence of large standing dead or dying trees, 3) down dead trees 4) stand decadence associated with the presence of various fungi and heartrots, 5) an average age often in excess of 200 years, and 6) a basal area ranging from 150-400 square feet per acre. Some of the individual features listed above may occur in other successional stages, but old growth stands are unique in integrating all of these features in a complex and diverse whole.
>
> … Old growth stands are representative of a variety of characteristics and it is not possible to define them with a "minimum number" for any one characteristic.

Other forest plan terminology reflected a bias toward the timber value, e.g., the Salmon National Forest (1988):

> Old Growth - A stand of trees that is past full maturity and showing decadence; the last stage in forest succession.
> Old Growth Habitat - Habitat for certain wildlife that is characterized by overmature coniferous forest stands with large snags and decaying logs.
> Overmature Timber - Trees that have attained full development, particularly in height, and are declining in vigor, health, and soundness.

And from the forest plan for the Lolo National Forest (1986): "Old-growth Timber: Individual trees or stands of trees that in general are past their maximum rate in terms of the physiological processes expressed as height, diameter and volume growth."

Yanishevsky (1987), likely the earliest comprehensive critique of old growth considerations in forest plans of the Northern Region, warned "at best, planners are managing for marginally viable populations of old-growth species." Yanishevsky (1987) states:

> With the warning that old age alone is not a sufficient criterion for old growth, researcher Dr. Riley McClelland from the University of Montana has stated that if a single age must be chosen, it at least ought to be set realistically at 200 years. At 200 years, larch/Douglas-fir forests …are just *beginning* to show many of the values associated with old growth habitat. Moreover, there are distinctly valuable ecological characteristics in much older stands. Stands with these older components are also needed to preserve natural diversity.
>
> We found that no forest in Region One used an acceptable minimum of 200 years for estimating current amounts of old growth. Minimum ages range from 100 years …to 160 years… Most forests used a minimum age of only 120 years.

> Setting an unrealistically early age for old growth grossly overestimates the amount of old growth, present and planned, in Region One forests. Using even a realistic age as the *only* criterion has limitations. On-the-ground evaluation of ecological characteristics is essential.

2. Regional old-growth definitions

Not long after forest plans were finalized in the northern Rocky Mountains bioregion the Chief's Position Statement (USDA Forest Service, 1989a) issued a policy directing regional offices to set more consistent old-growth definitions and adopted a "Draft Action Plan" for a Forest Service Old Growth Task Group (USDA Forest Service, 1989c). The number one item for the Task Group was to "Develop a generic definition of ecological old growth. It will identify characteristics for which **measurable criteria** would be established in more specific **definitions for forest types, habitat types, or plant associations**; and would help guide the design of **new inventories** that will include the **measurement of old growth attributes**." (Emphases added.) Green et al., 1992 ("Old-Growth Forest Types of the Northern Region") and Hamilton, 1993 ("Characteristics of Old-Growth Forests in the Intermountain Region") were a direct result of those regional efforts.

Green et al., 1992 admits: "Although old growth ecosystems may be distinguished functionally as well as structurally, this definition is restricted primarily to stand-level structural features which are readily measured in forest inventory." Also, "These old growth minimum criteria, associated characteristics, and descriptions were developed to apply to individual stands." (Id.)

Franklin and Spies, 1991 explain a rationale for writing definitions mainly emphasizing structural considerations within **old-growth stands**:

> Obviously, a series of ecological attributes must be considered because of the many relevant compositional, functional, and structural features. For practical reasons, however, a working definition—one for everyday use in gathering stand data—emphasizes structural and compositional rather than the conceptually important functional features that are difficult to measure.

What followed was a focus on stand-level attributes, measurable from this "practical" perspective. Green et al., 1992 and Hamilton, 1993 set screening criteria for old-growth stands, both establishing a minimum number per acre of old and large trees, varying by "forest type" and geographic area. In other words, the minimum number per acre of trees of sufficient age and diameter vary by forest type and geographic area. For example, for the "Northern Idaho Zone" (Green et al., 1992), in stands meet screening criteria for old growth for one habitat type there must be a minimum of eight trees per acre at least 150 years old and over 21 inches diameter at breast height (DBH), with Douglas-fir, ponderosa pine, or western larch being the tree species counted. For stands in another habitat type, the corresponding numbers are ten trees, 120 years old and 13" DBH of lodgepole pine. And for a third, requirements are ten trees, 120 years old, and 25" DBH of western redcedar, respectively.

This variability was later explained by Hammond, 2020:

> (O)ld-growth attributes will look different in areas of different site productivity and climate, and are influenced by the type, frequency, and distribution of natural disturbance regimes. In other words, the attributes of old-growth forests are manifested in a range of tree ages, sizes, shapes, and distribution, along with accompanying non-tree vegetation. These different old-growth composition and structures in turn shape different habitat types in different old-growth areas. …Old-growth forests that develop in landscapes where stand replacing natural disturbances are infrequent, or do not occur tend to be characterized by larger older trees than old-growth forests found in landscapes where stand replacing disturbances are common.

Green et al., 1992 includes "associated characteristics (such as number of snags, down woody material, dead tops and decay, and diameter variation)" which were to be evaluated but not treated as minimum old-growth criteria. Hamilton, 1993 includes similar discretionary considerations.

In sum, the effect of Regional definitions was intended mostly to clarify how the national forests are to identify **old-growth stands**. They did not mandate Forest Service managers to embrace wider old-growth values nor recognize old-growth landscapes or old-growth ecosystems. They mostly fine-tuned the process whereby structural criteria were used to identify old-growth stands.

The Regional definitions were not developed under the planning process governed by NFMA regulations. Appendix B examines the relationship between the Northern Region's Green et al., 1992 and forest planning.

Yanishevsky, 1994 expressed concerns regarding the Green et al., 1992 definitions for old growth: "Quality of old growth was not addressed during the definition process. The Committee did not take into account the legacy of logging that has already destroyed much of the best old growth. This approach skewed the characteristics that describe old-growth forests toward poorer remaining examples."

3. The necessity of setting aside old growth from logging

Most of the 1980s-era forest plans for northern Rocky Mountains national forests included requirements for maintaining minimum forestwide amounts of old growth, minimum amounts over smaller geographic areas such as watersheds, or both (*e.g., see* Juel, 2003 for standards in national forests of the Northern Region). Also, some forest plans include requirements to identify areas of forest nearly meeting or approximating minimum old-growth criteria, to be applied where forest plan minimums for smaller geographic areas are not being met. Forest plan requirements to identify these stands—referred to, variously as "recruitment", "step-down" or "replacement" old growth—respond to habitat distribution requirements found in the National Forest Management Act (NFMA) implementing regulations.

Those forest plans implicitly or explicitly distinguished between old growth that was not to be logged (in order to manage within minimum standards) vs. old growth in excess of minimum requirements, which could be logged. For example, the Final Environmental Impact Statement for the Kootenai National Forest's original 1987 forest plan noted, "The suitable timber base will

be smaller as a result of the removal from timber harvest of additional acres for old-growth timber management for wildlife diversity…" (USDA Forest Service, 1987h) Also, it noted the forest plan "…designated 126,000 acres of old-growth timber as unsuitable timberland. These stands were high volume-per-acre stands which, when removed, reduced the inventory and the resulting inventory per acre." (*Id*.) That Forest Plan defined "unsuitable timber land" in part as: "not selected for timber production …due to: (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met…" (USDA Forest Service, 1987g.)

This "unsuitable timber land" included a forest plan designated Management Area for old growth. Outside that Management Area, the plan allowed logging of old growth as long as minimums within the old growth analysis areas were being met.

The 1988 Forest Plan for the Salmon National Forest allows "no harvest in identified and mapped old growth stands" in one management area within the suitable timber base. The FEIS for the forest plan also recognizes the incompatibility of old growth with timber management:

> The old growth component of habitat diversity is probably the most sensitive component of Forest management activities. **Old growth is essentially a decadent stand of trees, and old growth management is an undesirable goal for timber management. When timber rotation ages are less than the length of time needed to produce old growth, a conflict results**. A downward trend of old growth on suitable acres will occur under all alternatives. Consequently, 10 percent of the suitable acres have been removed from the timber base, by specie type, to ensure maintenance of habitat for minimum viable populations of old growth obligate species. (Emphasis added.)

Also, recall that the Chief's Position Statement directed, "Where goals for providing old growth values are not compatible with timber harvesting, lands will be classified as unsuitable for timber production." (USDA Forest Service, 1989a.)

4. Stand size criteria

Aside from the features to be assessed within stands, managers considered spatial dimensions of the patches of old growth. Such considerations are often based upon habitat needs of species associated with old growth. For example, the Forest Service's Warren (1990) notes, "Of 48 old-growth-associated species occurring in the Northern Region, about 60 percent are thought to require stands larger than 80 acres (Harger 1978)" and "Wilcove et al. (1986) estimated that habitat islands should exceed 250 acres to provide for birds inhabiting forest interior."

Appendix 17 of the 1987 forest plan for the Kootenai National Forest (USDA Forest Service 1987a) exemplifies the relationship of species habitat needs and old growth:

> A unit of 1000 acres would probably meet the needs of all old growth related species (Munther, et al., 1978) but does not represent a realistic size unit in conjunction with most other forest management activities. On the other hand, units of 50-100 acres are the

> smallest acceptable size in view of the nesting needs of pileated woodpeckers, a primary cavity excavator and an old growth related species (McClelland, 1979). However, managing for a minimum size of 50 acres will preclude the existence of species which have larger territory requirements. In fact, Munther, et al. (1978), report that units of 80 acres will meet the needs of only about 79 percent of the old growth dependent species (see Figure 1). Therefore, while units of a minimum of 50 acres may be acceptable in some circumstances, 50 acres should be the exception rather than the rule. Efforts should be made to provide old growth habitat in blocks of 100 acres or larger. …Isolated blocks of old growth which are less than 50 acres and surrounded by young stands contribute very little to the long-term maintenance of most old growth dependent species.

Kootenai National Forest biologist Johnson, 1999 acknowledges, "Patch size also plays a role in habitat suitability. Small patches of old growth may not be usable, depending on surrounding forest conditions." The implication is that modeled population potential for old-growth associated species could be underestimated to an unknown extent because modeling may not quantify the lesser habitat value of smaller patches.

One of the old-growth standards in the Idaho Panhandle National Forests' original Forest Plan (USDA Forest Service, 1987c) was derived from scientific recommendations found in its Appendix 27 (USDA Forest Service, 1987d), in consideration of the habitat needs of the pileated woodpecker, a forest plan management indicator species. That standard read:

> One or more old-growth stands per old-growth unit should be 300 acres or larger. Preference should be given to a contiguous stand; however, the stand may be subdivided into stands of 100 acres or larger if the stands are within one mile. The remaining old-growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres.

Similarly, the 1988 Forest Plan for the Colville National Forest contained standards for specific old-growth management indicator species, which set minimum stand sizes along with spatial configuration and structural considerations for the pine marten, pileated woodpecker, and northern three-toed woodpecker. (USDA Forest Service, 1988a.)

Finally, although the Regional definitions recommended larger stand sizes, they did not mandate minimums nor even a consideration of their biological rationale.

5. Forestwide minimum percentages of old growth

As mentioned above, 1980s forest plans for the Northern Rocky Mountains usually included requirements for maintaining minimum forestwide amounts or minimum amounts within smaller geographic areas. At most these minimums were 10%. The Forest Service assumed that maintaining forest plan minimums would accomplish the task of meeting NFMA requirements for species population viability, as discussed below, all the while the national forests were being managed for high rates of timber production. Yet no scientifically adequate rationale is presented to support the forest plan minimum requirements.

One might assume these minimums resemble estimates of historic amounts in this bioregion prior to EuroAmerican exploitation, so that maintaining such amounts would prevent wildlife populations from vanishing from any national forest, or require listing under the ESA. But such estimates are not reliable, because so much forest had been logged long before adoption of old-growth definitions. This is explained in a Forest Service response to a comment about lack of data on presettlement amounts of old growth (USDA Forest Service, 2019c):

> Regarding the historic range of variability of old growth in the analysis area, **there is no way to accurately determine how much of the Forest may have met the Green definitions of old growth (Green et al., 1992**). To determine whether a forest stand meets those definitions, it requires detailed information on how many trees per acre exist in the stand over a certain diameter and age, the total stand density, the forest type and lastly, the habitat type group that the stand occupies. **No historical information exists that can provide that level of detail.** Therefore, a numeric desired condition or an HRV estimate for old growth is not included in this analysis. (Emphases added.)

Similarly, the Northern Region's Bollenbacher and Hahn, 2008g state, "actual estimates for the amount of OG are constrained by the limited field inventory data collected before the 1930s, and inconsistent—or absent—OG definitions."

Following his research, Lesica (1996) suggested reliance on 10% as minimum old-growth standard could result in extirpation of some species. He estimated that 20-50% of low and many mid-elevation forests were in old-growth condition prior to European settlement.

Further, analysis by the Kootenai National Forest's Gautreaux (1999) indicates 22% old growth is near the bottom of "reference conditions" on that national forest. Gautreaux, 1999 estimates include:

- (R)esearch in Idaho (Lesica 1995) of stands in Fire Group 4, estimated that over 37% of the dry Douglas-fir type was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's.

- Based on research of Fire Group 6 in northwest Montana (Lesica 1995) it was estimated that 34% of the moist Douglas-fir type was in an old growth structural stage (>200 yrs.) prior to European settlement, approximately the mid 1800's.

- Based on fire history research in Fire Group 11 for northern Idaho and western Montana (Lesica, 1995) it was estimated that an average of 26% of the grand fir, cedar, and hemlock cover types were in an old growth structural stage prior to European settlement.

- (F)ire history research in Fire Group 9 for northern Idaho and western Montana (Lesica, 1995) estimated that 19-37% of the moist lower subalpine cover types were in an old growth structural stage (trees > 200 yrs.) prior to European settlement. While this estimate is lower than suggested by Losensky's research, it is a useful representation of average conditions that may be fairly typical for the Kootenai. Lesica's estimate of historic vegetative conditions is also closer to the findings in the ICBEMP assessment

that estimated 20-30% levels for historic distributions of mature and late seral forest in moist forests.

- Lesica found an estimated 18% of the cool lodgepole pine sites was in an old growth structural stage (>200 years) prior to European settlement, approximately the mid 1800's. … This same research in Fire Group 8 in drier, lower subalpine types of Montana had over 25% of the stands in an old growth structural stage during the same historical period.

Deciding how much old growth should be preserved on any given landscape and thus included in forest plan direction is partially a question of values—specifically, those beyond timber ("biological diversity, wildlife and fisheries habitat, recreation, aesthetics, soil productivity, water quality") as per the Chief's Position Statement. Thomas et al., 1988 emphasized values pertaining to wildlife and diversity from a context of laws and regulations. In recognizing that meaningful implementation of regulatory requirements must include a simultaneous awareness of the limits of scientific knowledge, they advocate **for preserving all that remains**:

> The lack of quantitative information about functional attributes of old growth and habitat associations of potentially dependent plants and animals and the rapidly declining old-growth resource indicates that purposely conservative management plans should be developed and adopted. Our knowledge and understanding of old-growth communities is not adequate to support management of remaining old growth on criteria that provide *minimum* habitat areas to sustain *minimum* viable populations of one or several species. The potential consequences and the distinct probability of being wrong are too great to make such strategies defensible in the ecological sense.
>
> …The answer to— "How much?"—must be predicated on the relatively small amount of unevenly distributed remaining old growth and the current, inconclusive scientific knowledge of old-growth ecosystems. Therefore, the best probability of success is to preserve all remaining old growth and, if possible, produce more.

V. OLD GROWTH AND THE REGULATORY SETTING

Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area.

— National Forest Management Act planning regulations, 1982

A. Viability as a Forest Service methodology for conserving diversity

The National Forest Management Act (NFMA) requires the Forest Service to "provide for diversity of plant and animal communities based on the suitability and capability of the specific

land area in order to meet overall multiple-use objectives…" In complying with this diversity mandate, the 1982 NFMA regulations included the viability requirement stated above. Thus, those regulations required forest plans to acknowledge the strong association between many wildlife species and their reliance on a set of habitat conditions forest plans later defined as old growth—habitat which had already been heavily depleted.

The 1982 NFMA regulations also required: "(C)ertain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated." The rationale was, "These species shall be selected because their population changes are believed to indicate the effects of management activities." (*Id*.) Juel, 2003 includes a list of management indicator species adopted by the original forest plans of Northern Region national forests.

Viability claims under NFMA were the basis of the original successful litigation efforts concerning the northern spotted owl in the federal forestlands of the Pacific Northwest.

The 1987 Forest Plan for the Clearwater National Forest states that old growth "is vital to the perpetuation of old-growth dependent species of wildlife." (USDA Forest Service, 1987f.) In other words—vital for maintaining viability.

Similarly Appendix 27 of the 1987 Forest Plan for the Idaho Panhandle National Forests (USDA Forest Service, 1987d) states, "Drastic reduction in quantity of old growth not only reduces diversity, but it also makes old-growth dependent wildlife vulnerable to significantly reduced populations, extirpation, or even extinction."

And as stated in Green et al., 1992: "Old growth dependent and associated species are provided for by supplying the full range of the diversity of late seral and climax forest community types that make up habitat for these species."

Another provision of the 1982 NFMA regulations required: "Population trends of the management indicator species will be monitored and relationships to habitat changes determined." Thus, the regulations created a feedback mechanism for managers to check if management actions implemented under the forest plan were harming wildlife populations to the extent that forest plan standards needed strengthening to maintain viable populations.

The Committee of Scientists (1999) believe it is vital to "monitor those species whose status allows inference to the status of other species, are indicative of the soundness of key ecological processes, or provide insights to the integrity of the overall ecosystem."

The idea that population trends of management indicator species (MIS) could serve as a proxy for ensuring viability of all wildlife enjoys much scientific support (Committee of Scientists, 1999). It assumes that persistence of MIS populations within the context of managed landscapes would be a reasonable feedback mechanism, given that monitoring populations of all old-growth associated species is impractical.

However, management incentives to actually monitor population trends of MIS pale in comparison to those for exploiting resources in their habitat. Congress bears much of the responsibility for this situation, consistently failing to appropriate sufficient funds for fully implementing forest plan monitoring programs. In evaluating forest plans, Yanishevsky, 1994 noted, "In many cases monitoring is reliant on inadequate funding. This makes even the best intentions meaningless." At best, the Forest Service has gathered spotty data on population trends of management indicator species in this bioregion.

Committee of Scientists member and Nobel Laureate Roger A. Sedjo, (1999) explains his perspective on the problem:

> The major problem is that there are essentially two independent planning processes occurring simultaneously: one involving the creation of individual forest plans and a second that involves congressionally authorized appropriations for the Forest Service. Congressional funding for the Forest Service is on the basis of programs, rather than plans, which bear little or no relation to the forest plans generated by the planning process. There is little evidence that forest plans have been seriously considered in recent years when the budget is being formulated. Also, the total budget appropriated by the Congress is typically less than what is required to finance forest plans. Furthermore, the Forest Service is limited in its ability to reallocate funds within the budget to activities not specifically designated. Thus, the budget process commonly provides fewer resources than anticipated by the forest plan and often also negates the "balance" across activities that have carefully been crafted into forest plans. Balance is a requisite part of any meaningful plan. Finally, as noted by the GAO Report (1997), fundamental problems abound in the implementation of the planning process as an effective decision making instrument. Plans without corresponding budgets cannot be implemented. Thus forest plans are poorly and weakly implemented at best. Major reforms need to be implemented to coordinate and unify the budget process.

B. Shortcutting scientific assurance of wildlife viability

Lacking robust population trend data on management indicator species, which is the science-based substitute, or proxy, for ensuring wildlife viability under NFMA, managers chose to substitute more simplistic, less scientifically robust measures of viability. Estimating the remaining amount of old-growth habitat has been used as a secondary proxy for the population trend proxy. The 1988 Forest Plan for the Colville National Forest (USDA Forest Service, 1988a) included a commitment and intent to "Inventory … old growth forests…" and use the "old growth inventory" as a suggested method of meeting Forest Plan wildlife monitoring requirement[11]. This assumes that maintaining enough old growth to meet forest plan/forestwide minimums would adequately substitute for MIS population trend data, for the purpose of assuring viable wildlife populations. There is a lack of scientific support for this proxy-on-proxy approach. Schultz, 2010 criticizes wildlife analyses based primarily upon habitat availability, because habitat alone is insufficient for understanding the status of populations. (See also Noon et al., 2003; Committee of Scientists, 1999.) The use of the proxy-on-proxy approach glosses

[11] At the time the Colville forest plan was replaced upon revision in 2019, the Forest Service had not come close to completing the forestwide old-growth inventory promised in the original Plan. *See* West, 2011.

over many nuances of the habitat needs of native species. It also places too much faith in forest plan minimums—having been adopted without scientific validation, as discussed above. The "Complex ecological relationships, involving many wildlife species and other organisms, …evolved within old-growth forests" (Thomas, et al., 1988) are essentially ignored in substituting minimum habitat requirements for population trend monitoring.

A simplistic habitat proxy ignores that spatial distribution and connectivity of wildlife habitat across a national forest affects population persistence. It omits spatial and temporal considerations across old-growth landscapes. It also ignores the diversity of "old-growth types" dispersed across the different forest types found in a given national forest—a major outcome of the Regional definition process. Additionally, this proxy-on-proxy ignores many of the human artifacts of management that degrade habitat quality and thus profoundly affect wildlife populations. These include edge effects and habitat fragmentation (Hargis et al., 1999; Harris, 1984; Lehmkuhl et al., 1991; Moriarty et al., 2011; Potvin et al., 2000; USDA Forest Service, 2004a; Warren, 1990; Webb and Boyce 2009; Yanishevsky, 1987). The habitat proxy also ignores many indirect impacts of roads—such factors as noise disturbance (Heinemeyer and Jones, 1994), population pressures on old growth associated wildlife due to facilitation of trapper access (Carroll, et al., 2000; Heinemeyer and Jones, 1994; Jones (undated); Wisdom et al., 2000; Witmer et al., 1998), and loss the of dead tree component from public firewood cutting (Warren, 1990; USDA Forest Service, 2004a).

On occasion, federal courts have allowed the Forest Service to rely on the habitat proxy as evidence of maintaining population viability. Yet Forest Service managers have still struggled to meet forestwide minimums. In the 1990s and early 2000s, at least four national forests in this bioregion—Clearwater, Boise, Kootenai, and Idaho Panhandle—could not satisfy federal courts in this regard.

At times the Forest Service uses questionable methodology to claim it meets a forest plan minimum forestwide old growth requirement. The Nez Perce National Forest Plan requires the Forest Service to "Inventory, Survey and Delineate" old-growth habitat by 1990. (USDA Forest Service, 1987e.) Over thirty years post-deadline, the Forest Service still cannot produce a reliable forestwide old-growth inventory for the Nez Perce National Forest. In the case of this national forest, the Forest Service relies upon Forest Inventory and Analysis (FIA) data to claim it is meeting its forestwide 10% minimum. From a recent environmental impact statement[12]: "The most recent Forest Inventory and Analysis (FIA) data (Bush et al. 2010) indicate that ...approximately 13.6 percent of the Nez Perce National Forest meets the Forest Plan definition of old growth… . Based on this information, the Nez Perce National Forest is above the Forest Plan minimum standard of 10 percent old growth forest-wide."

But this FIA methodology faces insurmountable barriers to calculating old growth at the landscape level. For one, it does not verify the size of old-growth stands in consideration of wildlife habitat needs. In discussing such methodology, a Northern Region report (Bollenbacher, et al., 2009) states, "All northern Idaho plots utilized a primary sample unit (PSU) composed of four fixed radius plots with trees 5 – 20.9 inches tallied on a 1/24th acre plot and trees 21.0 inches DBH and larger tallied on a ¼ acre plot." And the Forest Service's Czaplewski, 2004

[12] Hungry Ridge Restoration Project Final Environmental Impact Statement, November 2019

states, “Each FIA sample location is currently a cluster of field sub-plots that collectively cover an area that is nominally one acre in size and FIA measures a probability sub-sample of trees at each sub-plot within this cluster.”

Sample design for FIA plots is semi-systematic; a sample taken randomly within a systematically placed grid. As stated above, at most each plot samples a maximum of one acre—far smaller than an old-growth stand—and so resulting estimates cannot determine the capability to meet biological needs of the associated wildlife.

Moreover, the location of plots is confidential, and for good reason. Managers are not allowed to know the location of FIA plots, to prevent selective management at plot locations which could skew the FIA data. As a result, conclusions such as the forestwide old-growth percentage claimed by the Nez Perce National Forest cannot be verified by independent investigators. This thwarts independent peer review—a hallmark of the scientific method.

FIA statistics have no correspondence to forest plan minimum old-growth stand sizes, nor to the spatial habitat needs of wildlife species. No mapping of existing old growth is possible using FIA data because the specific location of old-growth stands is not derived from FIA data. Therefore, there can be no scientific study to determine correlation of FIA estimates with estimates based on actual, publicly available data gathered in the forest using forest plan or other old-growth definitions.

The Forest Service does not use the FIA in all analyses on all national forests in the study bioregion. But the use of even a robust, reliable database or other inventory must be supportable by scientific validation, which means results can be replicated. To this author’s knowledge, such research does not exist.

C. Removing the viability requirement altogether

For any regulatory structure to be effective, accountability to and empowerment of the public must be built into the equation. Flournoy et al., 2005 discuss how this has played out regarding viability:

> The …requirement that the Forest Service obtain data sufficient to analyze population trends of indicator species and their relationship to habitat changes caused by management activities in the National Forests has been a benchmark against which the public has been able to track the agency’s performance. Numerous lawsuits brought by parties tracking Forest Service compliance with that requirement have resulted in judicial invalidation of harmful site-specific projects.

Following those litigation successes, the all-too predictable response of the federal government ultimately led to viability requirements being weakened to the extent that they are virtually unenforceable and/or nonexistent. In commenting on an earlier version of a replacement for the 1982 NFMA Regulations, Flournoy et al., 2005 identify this shift in power as reducing the role of science:

> Given that the Forest Service has freed itself from such scientific constraints as the need to: …ensure species viability through monitoring population data; and …monitor progress toward anything but self-established and broadly stated objectives, it is apparent that the 2004 forest planning rule significantly diminishes the overall role of science in planning.

After multiple attempts, when the NFMA Regulations were finally replaced in 2012 the new 36 CFR § 219.9 at (b)(1) made assurance of viability altogether discretionary. And at (b)(2) the discretion was further watered into merely suggesting "plan components, including standards or guidelines, to maintain or restore ecological conditions within the plan area to *contribute to* maintaining a viable population of the species within its range." (Emphasis added.)

VI. THE FINAL DEVOLUTION OF MANAGEMENT: TARGETING OLD GROWTH FOR LOGGING

(I)t is built into the agency culture that they must always find a way to log trees and that, in turn, feeds back on the science that is cited or requested by the agency. There is a complete lack of objectivity and independence.

—DellaSala and Baker, 2020

Prioritizing non-timber old-growth values constrains exploitation of old growth for timber, and to an extent even hinders the logging of potential future old growth. Since preserving old growth is the antithesis of management and is therefore a natural enemy to the Forest Service—as the old saying goes—truth is the first casualty of war.

A. National Forests and politics

The legacy of overcutting public forests resulted in litigation that reduced public land logging in the 1990s and early 2000s. But the Forest Service, a bureaucracy of the administrative branch of government, is very much a political animal. So in attempting to pacify growing public distaste for logging of national forests while appeasing political pressure and financial interests, managers have concocted layers of rationale attributing ecological benefits to logging.

Steel, 2009 notes "special interests and symbolic politics, a powerful combination that has proven its worth in muddying the waters of public knowledge and stopping intelligent progress in the thoughtful management" of old growth.

In order to muddy the waters, the Forest Service purposefully conflates tree farming techniques—known to grow wood more quickly for harvest on tree farms—with ecological benefits. Ecological damage is justified with a promise of healthier trees—a classic case of missing the forest for the trees. Terminology such as "improving forest health" and "increasing resilience and resistance to wildfire and insect pests" are ubiquitous in timber sale environmental analyses and in public relations campaigns by land management agencies and industry representatives. Yet the results bear much resemblance to the unsustainable logging of the past[13], with no scientifically proven ecological benefits for forests, including old growth.

[13] See, e.g. "The Clearcut Kings: The US Forest Service Northern Region and its obsession with

Under this politically inspired misinformation campaign, logging proponents demonize "unhealthy" forests to justify management "prescriptions." One finds such language in every timber sale NEPA document[14] prepared by the Forest Service.

One campaign tool is fire. The fear incited by raising the specter of imminent destruction to property and forests distracts from a sober evaluation of any science that might question the application of logging as the solution. Kerr, 2009 notes the "timber industry …exploiting the public's unbounded ignorance of wildfire. The public loves old trees, scenic forests, healthy watersheds, and roadless areas. The public does not love burned forests. Yet."

The federal government, in its "Smokey Bear" role (*Id*.) helps facilitate this charade, with administrative policies such as the 2002 Healthy Forest Initiative (HFI) "to improve regulatory processes to ensure more timely decisions, greater efficiency, and better results in reducing the risk of catastrophic wildland fires." This led to Congress passing the 2003 Healthy Forest Restoration Act (HFRA) to:

> …conduct hazardous fuel reduction projects (fuel projects) on specified types of Federal lands, including on certain lands that contain threatened and endangered species habitat. Directs the Secretary concerned to fully maintain, or contribute toward the restoration of, the structure and composition of old growth stands according to the pre-fire suppression old growth conditions characteristic of the forest type, taking into account the contribution of the stand to landscape fire adaptation and watershed health, and retaining the large trees contributing to old growth structure.

An explicit goal of these programs is to reduce occurrences and severity of wildland fire. This disregards the fact that the ecosystems of this bioregion evolved with fire at all severities. It also ignores the fact that many wildlife and other organisms actually depend upon fire to create their favored habitat conditions. (Hutto 1995, 2006, 2008, Hutto et al. 2016, Saab and Dudley 1998). Even high-severity fire is ecologically important. (Bond et al. 2012.) Snag forest habitat "is one of the most ecologically important and biodiverse forest habitat types in western U.S. conifer forests (Lindenmayer and Franklin 2002, Noss et al. 2006, Hutto 2008)." (Hanson 2010.)

Tingley et al., 2016 note the diversity of habitats following a fire is related to the diversity of burn severities: "…within the decade following fire, different burn severities represent unique habitats whose bird communities show differentiation over time… Snags are also critical resources for many bird species after fire. Increasing densities of many bird species after fire—primarily wood excavators, aerial insectivores, and secondary cavity nesters—can be directly tied to snag densities…"

In claiming to avert so-called catastrophes, both the HFI and HFRA shortcut the public review and environmental assessment processes required by NEPA and other laws. And what of the old

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supersized clearcuts" (Bilodeau and Juel, 2021), which documents an increase in size and extent of clearcuts in recent years.

[14] The National Environmental Policy Act (NEPA)—requires the Forest Service to analyze the environmental impacts of timber sales in the context of public involvement.

growth the HFRA mentions? The Forest Service focuses on the clause, "contribute toward the restoration of, the structure and composition of old growth stands **according to the pre-fire suppression old growth conditions characteristic of the forest type**…" (Emphasis added.) The emphasis on re-creating historical conditions is not limited to old-growth forests. Old growth is merely a subset of the larger target of exploitation—forests. But before discussing how a distortion of science has been used to promote logging all across forest ecosystems, this report examines how seeking so-called "healthy forests" thwarts the natural processes that create habitat for old-growth associated wildlife. Likewise, vilification of "unhealthy forests" demonizes old growth itself.

B. Disqualifying old growth

Proponents of the tree farming, manipulate-and-control management paradigm portray natural agents of tree mortality as a sign of ecological dysfunction. In old-growth stands, mortality of large trees may disqualify them from old-growth status because the number of live, old trees may decline below a set minimum. In many cases the Forest Service subsequently conducts aggressive "salvage" timber sales in such stands.

Several natural events potentially disqualify old growth from minimum criteria. A fire may be the agent of tree mortality. It could be native insects or fungi. A windstorm could blow down some of the large, old live trees. It doesn't matter if the event is natural and fully expected of old-growth ecosystems; and it is irrelevant if the rest of the structural components of this "former" old-growth stand continue to provide habitat diversity and therefore serve old-growth associated wildlife species. When a stand no longer meets the minimum numerical criteria, often no other forest plan protection remains to constrain logging. (E.g., USDA Forest Service 2017e, USDA Forest Service, 2016b, USDA Forest Service, 1999a).

Large trees die and are transformed into snags pocked with nesting or denning cavities. They eventually topple to form structures providing cover from predators. They finally become incorporated into forest soil—providing water-holding capacity and soil nutrients as they rot, potentially sequestering carbon for centuries. Such events are natural and expected of old-growth forests—and in fact vital for the cycle of life. But when these events cause a stand to fall below minimum live tree requirements, forest plan old growth protections are removed.

C. Biased diagnoses and false cures

Fire, insects, and tree diseases are vital natural processes comprising the ecosystems within which old growth develops. They create essential and vital habitat conditions for wildlife. Yet today, forestry practiced on national forests is promoted as minimizing the effects of fire, insects and tree diseases. In other words, it is thinly veiled tree farming.

The Forest Service brazenly asserts that national forests across the western U.S. are greatly suffering from exclusion of fire, to justify "treatments" necessary to "restore" forests. Such claims are made in the absence of representative data on historic forest conditions, as discussed in the next section.

Further, since enlightened fire suppression policies are not possible when the Forest Service stokes the terror of fire, the agency's manipulate-and-control paradigm must forever dominate. Odion and DellaSala, 2011 describe this situation as untenable: "…fire suppression continues unabated, creating a self-reinforcing relationship with fuel treatments which are done in the name of fire suppression. Self-reinforcing relationships create runaway processes and federal funding to stop wildfires now amounts to billions of tax dollars each year." Such a management paradigm implicitly or explicitly denies the fact that forest ecosystems have evolved under highly varying climate conditions and disturbances over the millennia and therefore can be expected to exhibit a wide range of conditions and evolutionary recovery mechanisms which truly embody the notion of "resilience."

Insects are also scapegoated as a scourge to forests. Again, this is ecologically absurd. Black, 2005 states:

> Insects, including those that feed on and sometimes kill trees, are integral components of healthy forest ecosystems. They help decompose and recycle nutrients, build soils, maintain genetic diversity within tree species, generate snags and down logs that wildlife and fish rely on, and provide food for birds and small mammals. (Id.)

And Rhoades et al. (2012), state, "…researchers are …finding that beetles may impart a characteristic critically lacking in many pine forests today: structural complexity and species diversity."

In playing the fire card, the Forest Service often claims that trees killed by fire or disease would lead to more severe fires. However DellaSala (undated) summarizes results from dozens of recent field studies from multiple regions and forest types on effects of mountain pine beetle tree kill on fire severity. He states, "There is now substantial field-based evidence showing that beetle outbreaks do not contribute to severe fires nor do outbreak areas burn more severely when a fire does occur." Congressional testimony by Kulakowski (2013) agrees, and also identifies weather and climate as much more relevant to increased fire severity. Hart et al. (2015) found that "that the observed effect of (mountain pine beetle) infestation on the area burned in years of extreme fire appears negligible at broad spatial extents."

D. The myth of ubiquitous low-severity wildland fire

Another Forest Service false premise specific to old growth in the Northern Rockies is that, prior to the advent of logging and fire suppression in the twentieth century, most old growth was maintained under a low severity fire regime. This notion was nurtured at least as early as in the development of the Northern Region's old-growth definitions—Green et al., 1992: "In reviewing historic data it has recently been determined that the bulk of the presettlement upland old growth in the northern Rockies was in the lower elevation, ground-fire maintained ponderosa pine/western larch/Douglas-fir types (Losensky 1992)." When this Losensky cite ("Personal communication. Jack Losensky, Ecologist, Lolo National Forest, Missoula, MT") was requested under FOIA, the Forest Service replied that it had no record of it. (Marten, 2020.)

Green et al., 1992, also states:

> Many of the oldest stands of old growth are dominated by seral tree species that are maintained as dominants and protected from crown fire, by repeated underburns that reduce ladder fuels and competition from more tolerant tree species. These relationships are **well documented by Arno and others (1985), Arno (1980), Fisher and Clayton (1983), and Fisher and Bradley (1987)**. (Emphasis added.)

Yet none of the references cited in Green et al. 1992 specify the geographic extent of the alleged short fire-interval forests in the Northern Rockies. At best, the Forest Service relies upon anecdotal information. There is no credible science supporting the agency's portrayal of most forest conditions in this bioregion being maintained in an orderly, relatively open-canopy status by low severity fire. The basis of rigorous science is data, which the Forest Service lacks.

This lack of scientific certainty is discussed by scientists such as Baker, 2017 who notes the limitations of tree-ring and fire scar studies. Baker observes biases that result in significant underestimates of average between-fire intervals on landscapes in western U.S. dry forests[15]:

> Past reconstructions of low-severity fire in dry forests, using tree-rings, focused on long records of dated fire years in small plots, and most were not intended to accurately estimate key rate parameters of low-severity fire needed to restore and manage low-severity fire across large landscapes. These small-plot reconstructions have known inaccuracies and biases if inappropriately used for this purpose.

Baker, 2017 found that only about 14% of historical dry forests in the western U.S. had average between-fire intervals of less than 25 years. This 14% was "concentrated in Arizona and New Mexico (and) were scattered across parts of all other states."

Also, Northern Region scientists Bollenbacher and Hahn, 2008g acknowledge, "Estimating the historical extent of old forests is also constrained by incomplete fire scar data and imprecise fire histories from the pre-settlement era (Baker and Ehle 2003)."

Baker and Ehle, 2003 state:

> For most of the ponderosa pine forests of the western United States there are no data at all that would allow a determination of whether crown fires or mixed-severity fires were present or absent before EuroAmerican settlement, or have increased or decreased.
>
> … No one, in any study anywhere in the West, has yet estimated how frequent crown- or mixed-severity fires were in ponderosa pine forests, how large these fires may have been, or what the fire rotation for these fires might have been prior to EuroAmerican settlement. … It may be difficult or impossible to determine whether large, high-severity fires did or did not occur in ponderosa pine landscapes prior to EuroAmerican settlement.

[15] "Dry forests in the western USA cover 25.5 million ha and include dry pine forests, dominated by ponderosa pine (Pinus ponderosa) or other dry pines, and dry mixed-conifer forests that also have firs (Abies concolor, A. grandis, Pseudotsuga menziesii) and other trees." (Baker, 2017.)

Lesmeister et al., 2019 assert, "The extent of these (low-severity) forest types was often overrepresented in historical records due to the ease of traveling through them and the opportunities for pleasing photographs (Van Pelt 2008). In truth, these open, parklike forest conditions do not represent many forests in western North America (Odion et al. 2014)."

Forests of the intermountain west, including ponderosa pine forests, have burned at various severities historically, and high-severity fire is a natural part of this mix (Pierce et al. 2004, Baker et al. 2006, Hessburg et al. 2007).

Overestimating the amount of forest maintained naturally by low severity fire is another aspect of the agency cover story, told to support "treatments" of allegedly unhealthy northern Rocky Mountain forests using wide-scale "thinning" and prescribed burning. Lacking scientific, time-tested validation, the agency still blusters it is "increasing resiliency" and "restoring" forests from the damage its previous heavy-handed management has inflicted—using essentially the same heavy-handed management techniques.

In contrasting to the agency's exaggerations of the geographic extent of landscapes experiencing mostly frequent, low severity fire are Forest Service statements in recently revised forest plans acknowledging that mixed-severity fire regimes dominate the northern Rocky Mountains (*see* e.g., Nez Perce-Clearwater National Forests Draft EIS, Kootenai National Forest Final EIS, Flathead National Forest Final EIS, Colville National Forest Final EIS).

E. Fire refugia and post-disturbance legacies

Certainly, in the fire prone ecosystems of the northern Rockies, wildland fire presents challenges for managers, given that these landscapes have already been logged to well below historic levels of old growth. Also, old growth definitions existing at the time of the Chief's Position Statement were heavily influenced by the notion of old growth based on iconic Pacific Northwest forests, where intervals between severe, stand replacing fires are commonly hundreds of years. Yet despite acknowledging a dynamic landscape caused by the prevalence of fire in the Northern Rocky Mountains bioregion, the Forest Service has no management strategy providing spatially and quantitatively explicit measures to assure old growth will remain well distributed across landscapes over time. And if climate change increases the prevalence of severe wildfire as some climate projections suggest, old growth will be placed even more at risk.

Many areas of forests in this bioregion have longer fire return intervals, allowing forests to develop old-growth character. However, in landscapes where fire intervals may be shorter, "fire refugia" is a term referring to more isolated locations disturbed less frequently or less severely by wildfire than the surrounding landscape matrix. (Krawchuk et al., 2016; Camp et al., 1997; Meddens et al., 2018.)

Fire refugia are more likely than their surroundings to exhibit old-growth habitat characteristics. Camp et al. 1997 say "Before Euro-American settlement, late-successional species and compositions were found within fire refugia-stands that burned less frequently than the surrounding matrix …by virtue of topographic position, soil type, or a combination of environmental conditions and vegetation attributes." The latter "include areas adjacent to stream

confluences, on perched water tables, and within valley bottoms and headwalls, especially at higher elevations (higher total precipitation) and on northerly aspects (more terrain shading, less insolation and thus reduced evapotranspiration)."

Ecologically, fire refugia "provide habitat for individuals or populations in which they can survive fire, in which they can persist in the postfire environment, and from which they can disperse into the higher-severity landscape." (Meddens et al. 2018.) The Forest Service has no management strategy that recognizes—let alone conserves—fire refugia. This is a problem during wildfire suppression operations, when burnouts might even target these locations (*Id.,* also *see* Zimmer, 2018).

Lesmeister, et al., 2019 explain why dense, late-successional forest tended to burn with high severity less frequently:

> The microclimate and forest structure likely played a key role in lower fire severity in nesting/roosting habitat compared to other forest types. As succession progresses and canopy cover of shade-tolerant tree species increases, forests eventually gain old-growth characteristics and become less likely to burn because of **higher relative humidity in soil and air, less heating of the forest floor due to shade, lower temperatures, lower wind speeds, and more compact litter layers** (Countryman 1955, Chen et al. 1996, Kitzberger et al. 2012, Frey et al. 2016, Spies et al. 2018). In addition, as the herbaceous and shrub layer is reduced by shading from lower to mid-layer canopy trees, **the connection between surface fuels and the canopy declines**, despite possible increases in canopy layering (Halofsky et al. 2011, Odion et al. 2014). (Emphases added.)

Finally, even where fire severity is such that vegetation is highly altered, patches of older, fire-resistant trees and even larger dead wood remain, providing many of the habitat features sought by old-growth associated wildlife. The Colville Forest Plan Final Environmental Impact Statement defines "biological legacy" as "Organisms, organic matter, and biologically created patterns that persist from the pre-disturbance ecosystem and influence recovery processes in the post-disturbance ecosystem." The Nez Perce-Clearwater National Forest's draft revised forest plan recognizes "live legacy trees and snags" as important as habitat and "are primarily the largest." Still, at best only a fraction of such biological legacies are specifically required for retention during logging operations, allowing continued depletion in managed landscapes.

F. Old growth logging promoted in revised forest plans

Forest plans recently revised or proposed for revision in the northern Rocky Mountain bioregion promote a worldview wherein extensive management actions are necessary to restore and maintain forest ecosystems, including old growth. Scientific information is lacking in support of such assumptions. Wales, et al. 2007 modeled various potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon, and projected that the natural disturbance scenario resulted in the highest amounts of all types of medium and large tree forests combined, and best emulated the Natural Range of Variability for medium and large tree forests by potential vegetation type after several decades.

Next, this section explores examples of forest plan revisions or amendments using false premises and pseudoscience to devolve from conservation oriented approaches to those emphasizing logging. And in every case, following plan changes the Forest Service omitted minimum forestwide old-growth standards.

1. Boise National Forest

Following extensive wildfires on the Boise National Forest, in the early 2000s the outcome of litigation dramatically reduced logging because the Forest Service could no longer meet forest plan minimum old-growth requirements. So the Forest Service sought to sidestep its failed viability proxy by amending it out of the forest plan. This started with changing the term itself—from old growth to "old forest." The Forest Service[16] justified this change:

> Because old forest characteristics have been aggregated into **two basic categories**, it is generally easier to identify, monitor, and compare the characteristics of these old forest types with desired vegetative conditions than it is with "old growth." …Definitions of old growth generally vary by forest type, depending on the disturbance regimes that may be present. Also, within a given forest type, considerable variability can exist across the type's geographical range for specific ecological attributes that characterize late seral and climax stages of development. **This variability among and within multiple (often 10-20) forest types makes old growth characteristics difficult to identify, monitor, and compare to desired vegetative conditions**. (Emphases added.)

In other words, since the Forest Service found it difficult to conserve the diversity of old-growth types while conducting timber sales, the agency chose to remove old growth from the forest plan so it could no longer be held legally accountable for not preserving this diversity.

Boise National Forest managers further explain, "old forest habitat …includes old growth, but is also broader to **include the mid-seral, fire maintained systems**."[17] Yet their previous Hamilton, 1993 old-growth definitions already included such forest types. Furthermore, the "old forest" definition lacks minimum age criteria for the large trees, as found in Hamilton, 1993. This is, ecologically speaking, a critical omission because much of what defines old growth takes much longer to develop that typical timber harvest rotation periods.

Also, substituting "old forest" obscures the fact that forestwide levels of old growth had been reduced below original forest plan minimums because of extensive logging and wildfire. With "old forest habitat" being much more common than old growth, the agency need no longer consider the scarcity of the remaining old growth.

Furthermore, even managing for a minimum of "old forest" is sidestepped, because the agency further devolves from using measurable parameters to instead pursue nebulous "Desired Conditions." In defining that term, the Boise's 2010 forest plan amendment stated, "Also called Desired Future Condition, a portrayal of the land, resource, or social and economic

[16] Passage is from the Final Environmental Impact Statement of Boise National Forest's 2010 Wildlife Conservation Strategy forest plan amendment.
[17] *Id.,* emphasis added

conditions that are expected in 50-100 years if management goals and objectives are achieved. A vision of the long-term conditions of the land." So instead of doing its duty to conserve biological diversity, the agency resorts to making promises to "achieve" vaguely stated goals at some point in the distant future.

Furthermore, this ecologically empty "desired conditions" approach has become disturbingly ubiquitous in forest planning, as seen in the 2012 revision of the NFMA implementing regulations.

2. Colville National Forest

As noted above, the original 1988 Forest Plan for the Colville National Forest stated a commitment and intent to "Inventory … old growth forests…" and to use said old growth inventory as a method of meeting Forest Plan wildlife monitoring requirements. (USDA Forest Service, 1988a.) In 2019, the Colville National Forest's revised forest plan was approved, and the words "old growth" were completely omitted—even though the associated Final EIS acknowledged[18] that "Old Growth Dependent Species Habitat …provide(s) essential habitat for wildlife species that require late and old forest habitat components (e.g., structure such as large and old trees, large snags, and downed wood) and contribute to the maintenance of diversity of wildlife habitats and plant communities." In place of old growth, here the Forest Service also uses the term "old forest" in the revised forest plan; and in further obfuscation uses the terms, "late forest" and "late successional forest" without defining either one.

So under the revised Colville forest plan's Orwellian scheme, "…timber harvest would be used as a management tool in the late forest structure MA to maintain and improve resiliency of the late and old forest habitat components (e.g., structure such as large and old trees, large snags, and downed wood)." In other words, logging is explicitly marketed as benefitting old growth and associated wildlife.

Yet the long-term development and persistence of old growth, with its characteristic complexity, proves its inherent natural resiliency and therefore precludes the need for active management. DeLuca, 2009 states, "Old growth forests, having survived the fires, droughts, and insect and disease outbreaks of the past, have shown themselves to be resilient elements of the forest ecosystem. The diversity of species and tree sizes in old-growth forests makes them inherently resistant to dramatic change." The provisions placed into forest plans that allow logging of old growth to increase resilience or resistance are not based in science. Rather, they are loopholes for allowing management (logging) of the entire Forest—old growth included.

3. Kootenai and Idaho Panhandle National Forests

Unlike the original 1987 forest plans of these national forests—which featured old growth forestwide minimum standards of 10%—the 2015 revised forest plans include no minimums. Instead, the newer plans sanction logging in old growth, using the Green et al., 1992 stand-level criteria as minimum retention requirements when logging within stands of old growth. Both

[18] In the Final Environmental Impact Statement for Colville National Forest's 2019 Revised Forest Plan.

revised plans[19] include the following standard: "Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the (Green et al.) definition of old growth…"

Under such a management regime, where the Forest Service is less and less willing to abstain from logging old-growth, the best quality old-growth habitat is highly attractive to agency managers seeking to achieve timber targets. The following is an example of what happens under a regime encouraging active management within old growth, using Green et al., 1992 old-growth definitions as minimum qualifying criteria.

Green et al., 1992 recognizes a fairly common "old growth type" in the North Idaho Zone where one often finds large, old Douglas-fir, grand fir, western larch, western white pine, Engelmann spruce, subalpine fir, and western hemlock trees on cool, moist environments. (*Id.*) Such old growth is relatively dense: "There are an average of 27 trees per acre 21 inches DBH or more. The range of means across forests and forest types is from 12 to 53." (*Id.*)

However, Green et al., 1992 sets the "minimum number" of trees per acre 21 inches DBH at only ten. (*Id.*). Which means, under the above Idaho Panhandle Forest Plan standard, the "average" stand could experience logging 17 of its 27 largest, oldest trees and still qualify as old growth.

So why does Green et al., 1992 specify such a small minimum number of large, old trees—so far below the recognized average, and even less than the bottom limit of the recognized range? The answer lies in how those authors intended the criteria to be used: "The number of trees over a given age and size (diameter at breast height) were used as **minimum screening criteria** for old growth. …The **minimum screening criteria** can be used to identify stands that **may meet** the old growth type descriptions. " (*Id.*, emphases added.) Green et al., 1992 further explain:

> The minimum criteria in the "tables of old growth type characteristics" are meant to be used as a screening device to select stands that maybe suitable for management as old growth, and the associated characteristics are meant to be used as a guideline to evaluate initially selected stands. They are also meant to serve as a common set of terms for old growth inventories. Most stands that meet minimum criteria will be suitable old growth, but there will also be some stands that meet minimum criteria that will not be suitable old growth, and some old growth may be overlooked**. Do not accept or reject a stand as old growth based on the numbers alone; use the numbers as a guide.**

(*Id.*, emphasis in the original.) So the abuse of the Green et al., 1992 minimum large tree screening criteria results in logging of large, old trees from old growth. And even if the existing stand in the above example possesses only the bare minimum large, old trees, managers could still log smaller and/or younger trees in the old-growth stand without disqualifying it, because numbers of such trees are not a part of the minimum criteria.

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[19] *See* Idaho Panhandle National Forest revised forest plan and Kootenai National Forest revised forest plan.

Likewise, the Green et al. 1992 minimum total basal area was set well below the recognized range, again presumably for its utilization as a screening device. For the same old growth type discussed above, the "average basal area is 210 ft^2 per acre. The range is 160 to 270 ft^2". Yet the minimum is either 80 or 120 ft^2 depending upon type sub-categorization.[20] Basal area is a measure of stand density, or the square footage of an acre that is occupied by tree stems. So logging a stand with a basal area of 270 ft^2 (upper end of range) down to 80 ft^2 ("minimum") could result in the loss of medium diameter trees—another enticement for managers with timber priorities to log within old-growth stands.

In the above examples, the artificially reduced abundance of younger, smaller trees has unknown but dubious implications for the stand's potential development and habitat quality, since it is deviating from a natural trajectory.

Collateral damage of this forest plan-sanctioned logging in old growth includes the loss or reduction of old-growth habitat components. Green et al., 1992 recognize "Associated characteristics (such as number of snags, down woody material, dead tops and decay, and diameter variation)…". These "associated characteristics" are not included as minimum screening criteria, but represent the very diversity defining old growth in its truest meaning. These associated characteristics are typically and inevitably reduced during logging activities, which would squeeze the diversity out of old growth and the old-growth ecosystem.

4. Nez Perce-Clearwater National Forests

As of this writing, the original forest plans for these two national forests are undergoing revision for the administratively combined unit. Here, the Forest Service concocts yet another scientifically-challenged rationale for logging old growth. The draft forest plan advances the notion that some old growth is "non-desired" and may be "converted to a desired old growth type to meet desired conditions…" The draft Environmental Impact Statement vaguely identifies "Douglas fir, grand fir, western larch, Engelmann spruce/subalpine fir, western hemlock, western white pine, and ponderosa pine forest types on cool, moist environments" as undesirable. Notably, no definition of these "types" is provided. And if the agency determines the conversion of these "types" cannot be engineered—which is likely because there is no science to support such a notion—then the plan would promote "regeneration" (clearcutting) of such old growth.

G. Creating old growth?

Fully embedded within the Forest Service's perspective on old growth is an assumption that management can facilitate or accelerate development of fully functioning old growth. There is simply no science supporting the position that vegetation manipulation can help to maintain old growth over time, or foster development of non-old growth into old growth. As stated by Thomas et al., 1988:

> The ecological complexity of old growth makes it unlikely that forest managers can create functional old growth through silvicultural manipulations of younger-aged, second-growth

[20] With the issuance of the Green et al. 1992 (**errata correction 2007**) the Forest Service emphasizes and clarifies that stand basal area is one of the "minimum criteria."

> forests. Certainly, such knowledge does not now exist. …If silviculture is used to expedite this process, it should be done with the understanding that such action is experimental, and **results lie many decades or centuries in the future**. Accordingly, management options that include retention of existing old growth must be given priority. (Emphasis added.)

Pfister et al., 2000 agrees that the outcome of legitimate experimentation to help create old growth can only be known far into the future:

> (T)here is the question of the appropriateness of management manipulation of old-growth stands… Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future—likely quite far in the future—considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed guess at best and, therefore, encompasses some unknown level of risk. In other words, producing "old-growth" habitat through active management is an untested hypothesis.

Hunter, 1989 quotes from writing by the Society of American Foresters:

> With present knowledge, it is not possible to create old-growth stands or markedly hasten the process by which nature creates them. Certain attributes, such as species composition and structural elements, could perhaps be developed or enhanced through silviculture, but we are not aware of any successful attempts. Old growth is a complex ecosystem, and lack of information makes the risk of failure high. In view of the time required, errors could be very costly. At least until substantial research can be completed, the best way to manage for old growth is to conserve an adequate supply of present stands and leave them alone.

Speaking to the hubris exhibited by forest managers, Franklin and Spies, 1991 ask, "How can we presume to maintain or re-create what we do not understand?"

The Forest Service implicitly or explicitly denies that the natural processes that created and maintained our old-growth landscapes over countless millennia can continue to do so without management intervention. The 2018 revised forest plan for the Flathead National Forest is exemplary of the manipulate-and-control management paradigm:

> Forest plan direction for old-growth forest supports the enhancement of the successional process towards old growth that could be achieved in some stands through management activities.
>
> Vegetation management within old-growth forest (see glossary) shall be limited to actions that
> - maintain or promote old-growth forest characteristics and ecosystem processes;
> - increase resistance and resilience of old-growth forest to disturbances or stressors that may have negative impacts on old-growth characteristics (such as severe drought, high-severity fire, epidemic bark beetle infestations);
>
> … treatment prescriptions that would promote the development of old-growth forest in the future should be considered.

Thus it is unsurprising the Flathead National Forest's revised forest plan claims its general forestwide logging direction promotes the development of old growth:

> …many of the desired conditions for vegetation characteristics (e.g., forest composition and size classes), and the standards and guidelines developed to achieve those desired conditions, also contribute to the long-term development of old-growth forest.

Therefore, much skepticism is justified concerning the Flathead National Forest's proposed Mid-Swan Landscape Restoration and Wildland Urban Interface Project, wherein the agency blusters that up to 35,000 acres of clearcuts could "contribute to the long-term development of old-growth forest."

There has been little research, if any, by the Forest Service to validate the old growth active management paradigm. Independent researchers investigated the ecological effects of forest restoration treatments on several old-growth forest stands in the Flathead National Forest. Hutto, et al., 2014 found:

> Relative abundances of only a few bird species changed significantly as a result of restoration treatments, and these changes were characterized largely by **declines in the abundances of a few species associated with more mesic, dense-forest conditions, and not by increases in the abundances of species associated with more xeric, old-growth reference stand conditions.** (Emphasis added.)

In its zeal to promote the benefits of its active management (logging and burning) of old growth, the Forest Service downplays and ignores the damage it causes.

VII. CONCLUSIONS AND RECOMMENDATIONS

If no management practices are performed for a long time, stands may gradually evolve into so-called "old-growth forests". In the absence of anthropogenic disturbances, forests may slowly recover the natural disturbance dynamics (forest fires and windstorms, parasite outbreaks, fungal decay, gap creation due to insects) and develop those stand structural features (large living trees, large amount of deadwood, canopy gaps of various size, coexistence of senescent, mature and initial stages) typical of primary forests...

—Tomao et al. (2020)

If the worldview prevails where old-growth on national forests is valued more for timber than for other values such as "habitat for certain animal and plants, for aesthetics, for spiritual reasons, for environmental protection, for research purposes, for production of unique resources such as very large trees" (Green et al., 1992)—old growth simply will not persist in our shared landscapes. The natural processes that create and maintain old growth, operating necessarily over large landscapes, will continue to be hijacked and thwarted by Forest Service management policies, and old growth will dwindle into small, isolated remnants. The continuing assault on science, weakening of regulatory protections, and rapidly changing climate do not bode well for

our old-growth landscapes and values.

On the other hand, if non-timber values are to hold any sway, management policies of government agencies including the U.S. Forest Service need a drastic overhaul before it's too late. Mildrexler et al. (2020) sum up the benefits of prioritizing these non-timber values:

> Given the urgency of keeping additional carbon out of the atmosphere and continuing carbon accumulation from the atmosphere to protect the climate system, it would be prudent to continue protecting ecosystems with large trees for their carbon stores, and also for their co-benefits of habitat for biodiversity, resilience to drought and fire, and microclimate buffering under future climate extremes.

As, Keith, et al., 2009 recognize, "Conserving forests with large stocks of biomass from deforestation and degradation avoids significant carbon emissions to the atmosphere."

The urgency to act on the climate crisis is reason enough to change society's relationship to forests from exploitation to preservation. If our elected officials and the managers they appoint were to strongly lead in objective consideration of what scientists are telling us about the critical role forests play in sequestering carbon and mitigating the effects of climate change, we would also enjoy the other benefits of conserving old growth. However, the emphasis of these conclusions and recommendations is based upon more traditional forest ecology, to help empower those effecting policy changes over their more local or regional landscapes.

A. Recovering old-growth landscapes

In order for old growth to persist on the landscape and return to an extent and condition resembling its past splendor, clearly forest managers are not able to actively create it, as discussed above. Nor can management necessarily choose the specific locations for stands of old growth to develop. This is because ecologically, the dynamics of **old-growth landscapes** operate at very broad scales—both geographically and temporally. From Kaufmann et al. (2007):

> The arrangement of patches—the landscape mosaic—is not constant over time. Rather, natural processes, such as fire, insect activity, disease, wind, regeneration of new seedlings, and competition among individual trees, interact to maintain a variety of conditions across the landscape. Just as the components of patches, stands, and landscapes vary spatially, so do the characteristics of ecological processes vary with time. A wind event may be as brief as a moment or as long as hours or days, fire an hour or a day or months, drought a season or a year or more, regeneration a year or decades or a century or more, and reaching an old-growth condition a matter of centuries. Under the influence of climate and fire, the patches in the mosaic changed with time, and in a fully functioning ecosystem, the old-growth forest landscape was maintained even though the locations and proportions of various patch types varied. And through all the changes of fire-adapted forests, fire remained a primary factor that, with some regularity, shaped the spatial arrangement of patches and stands in the landscape.

Franklin and Spies, 1991 state, "Old-growth forest is a biological or ecological concept that

presumes ecosystems systematically change as they persist over long periods. An ecosystem has, in effect, a series of linked life stages …which vary in composition, function, and structure. Such progressions can take a very long time in forests because the dominant organisms, trees, typically live very long."

In a 1983 document that was later adopted into the 1987 Forest Plan for the Idaho Panhandle National Forests (USDA Forest Service 1987d), biologist Danielle Jerry recognized the spatial and temporal "shifting mosaic" created by natural disturbance processes:

> Episotic high and low mortality caused by fire, disease and insects are balanced by primary production. Borman and Likens (1979) describe this condition as a "shifting-mosaic steady state." Over a large area the average condition (steady state) of the vegetation is a forest dominated by old-growth trees. Within the gross boundaries of the old-growth forest are found patches representing every successional stage. The location of these patches of seral vegetation shift over time, for as one stand passes from pole to mature to old-growth trees, another stand may be eliminated by an insect attack. Thus, within the gross boundaries of an old-growth ecosystem a mosaic of varying age class stands constantly shift internal boundaries. Traditional ideas about climax vegetation are not really appropriate, for seral species and a heterogeneous age class are important elements in this "shifting mosaic steady state."

Noon, 2009 describes the multiple scales of this "shifting mosaic" and its importance for biological diversity:

> The distribution of different-aged, small-scale patches embedded within the larger old-growth forest patch is an important source of habitat diversity. Thus, old growth conservation requires management at both landscape and local scales. At the landscape scale, the extent of forest management must be sufficiently broad to accommodate the shifting mosaic of forest age classes generated by large-scale disturbances. At the local scale, individual old-growth reserves must be sufficiently large to incorporate most small-scale disturbance events that promote fine-grained habitat diversity.

Harris (1984) states, "biotic diversity will be maintained on public forest lands only if conservation planning is integrated with development planning; and site-specific protection areas must be designed so they function as an integrated landscape system." Harris, 1984 also states:

> Because of our lack of knowledge about intricate old-growth ecosystem relations (see Franklin et al. 1981), and the notion that oceanic islands never achieve the same level of richness as continental shelf islands, a major commitment must be made to set aside representative old-growth ecosystems. This is further justified because of the lack of sufficient acreage in the 100- to 200-year age class to serve as replacement islands in the immediate future. …(A) way to moderate both the demands for and the stresses placed upon the old-growth ecosystem, and to enhance each island's effective area is to surround each with a long-rotation management area.

And Marcot, et al., 1991 recommend integrating the biological needs of old-growth associated

wildlife species across large landscapes to better inform management policies.

Although there are few specifics insofar as designs to restore and maintain old-growth over large landscapes, the following are general recommendations from scientists and other experts.

Yanishevsky, (1987) stated, "It is important to have areas set aside for old growth to curtail timber harvesting, reduce habitat fragmentation or insularization, and ensure the long-term retention of quality old-growth habitat." Also:

> Management schemes based on island biogeographic theories may help reduce impacts of adjacent management on old growth. These schemes (1) dedicate an existing core of old growth with no timber harvesting, (2) surround the core with a long rotation management island (thereby increasing the habitat effectiveness by providing adjacent mature stands), and (3) provide timbered corridors connecting the old growth management areas. (*Id*.)

Foster et al., 1996 state:

> The maintenance of many natural ecosystems requires the protection not only of current old-growth areas, but also of naturally disturbed forests that represent future old-growth. To ensure the continued presence of old growth, these areas must be maintained **within a landscape that is adequate in size to allow for the continuing mosaic of disturbance and for the dispersal of organisms and processes among patches**. (Emphasis added.)

Harrison and Voller, 1998 assert "connectivity should be maintained at the landscape level." They adopt a definition of landscape connectivity as "the degree to which the landscape facilitates or impedes movement among resource patches." Also:

> Connectivity objectives should be set for each landscape unit. …Connectivity objectives need to account for all habitat disturbances within the landscape unit. The objectives must consider the duration and extent to which different disturbances will alienate habitats. … In all cases, the objectives must acknowledge that **the mechanisms used to maintain connectivity will be required for decades or centuries**.
>
> Corridor is another term commonly used to refer to a tool for maintaining connectivity. …(T)he successful functioning of a corridor or linkage should be judged in terms of the connectivity among subpopulations and the maintenance of potential metapopulation processes. (Emphasis added; internal citations omitted.)

Noon, 2009 believes "issues of landscape connectivity, measured in terms of the likelihood of successful movement between patches of old-growth forest, become critical to sustaining wildlife over the long term. …Therefore, the matrix in which old-growth reserves are embedded must be managed so as to maintain connectivity among reserves."

Harris, 1984 discusses connectivity and effective interior habitat of old-growth patches:

> Three factors that determine the effective size of an old-growth habitat island are (1) actual size; (2) distance from a similar old-growth island; and (3) degree of habitat difference of the intervening matrix. …(I)n order to achieve the same effective island size a stand of old-growth habitat that is surrounded by clearcut and regeneration stands should be perhaps ten times as large as an old-growth habitat island surrounded by a buffer zone of mature timber.

Thomas et al., 1988 states:

> … Management plans for providing old growth must be based on existing stands because replacement stands cannot be produced by silvicultural practices; they must come from stands that are allowed to develop naturally into old growth.

Warren (1990) states:

> In devising a conservation strategy, Forman and Godron (1981:738) emphasize the importance of recognizing that "no patch stands alone", but is influenced by surrounding patches. Harris (1984) recommended surrounding old-growth habitat islands with a long-rotation management area, and interconnecting these with riparian corridors and other linkages. Similarly, Noss and Harris (1986) suggest that a regional landscape level be used, wherein high-quality nodes, such as an old-growth patch, be integrated with interconnected "multiple use modules" where management activities are scheduled to maintain the integrity of the nodes.
>
> …Natural disturbance regimes such as fire often occur on a spatial scale larger than a landscape patch (Urban et al. 1987). Providing for well-distributed habitat patches with interconnections between habitat patches thus are necessary to maintain species diversity of the long term.
>
> …A complex, multi-storied structure and a mosaic of both early and late successional stages often are important attributes (Bormann and Likens 1979).

Green et al., 1992 recognize, "Stands are elements in **dynamic landscape**. We need to have representatives of the full range of natural variation, and **manage the landscape mosaic as a whole** in order to maintain a healthy and diverse systems." (Emphases added.)

Spies, 2009 describes the important perspective of old growth existing in the whole forest ecosystem:

> Old forests are inextricably intertwined in space and time in a continuum of forest development, just as young, mature, and mixed-age forests are. Focusing on only one part of the continuum is like trying to understand light by examining only one color or wavelength, or like trying to understand a river by looking only at the deep, quiet pools and ignoring the rapids.

Marcot, et al., 1991 bring wildlife into this discussion:

> Landscape attributes affecting the perpetuation of old-growth dependent and associated wildlife include the spatial distribution of old growth; the size of stands; the presence of habitat corridors between old-growth or old-forest stands; proximity to other stands of various successional stages and especially for well-developed mature-forest stages and species with different seasonal uses of habitats; and the susceptibility of the old-growth habitat to catastrophic loss (such as wildfire, insects, disease, wind and ice storms, and volcanic eruptions.
>
> Stand size, in combination with its landscape context (the condition, activities, or both on the adjacent landscape that affect the stand) …can have a major effect on their use by wildlife. …If such stands are separated by unsuitable habitat or disruptive activities, however, the remaining old-growth stands become smaller in effective (interior) size, more fragmented, and possibly not suitable for occupancy or for successful reproduction.

DeLuca, 2009 discusses considerations for recruitment of future old growth:

> A fundamental question that must be addressed is: What developing stands should be priorities for recruitment as old growth stands? What are the dominant characteristics of the stand and the surrounding landscapes that should be considered when identifying sites for old growth recruitment? The following is a simple list of possible attributes that could be considered when identifying priority candidates for old growth recruitment:
>
> 1) Stands should have importance or relevance to the surrounding landscape from a connectivity perspective (largest intact units of naturally functioning forests, species migration potential, and proximity to important (e.g. T&E) habitat).
> 2) Stands should exhibit characteristics of natural forest succession for that forest type and physiography (e.g. multi-aged, understory species diversity, occurrence of fire as appropriate, presence of snags and coarse woody debris)
> 3) Stands should be capable of achieving old growth characteristics without a great degree of human effort or intervention
>
> Fundamental to the notion of maintaining and recruiting old growth forests is the role of natural disturbances on the landscape. Landslides, wildfire, microbursts, etc… will occur and will help shape the landscape. If these processes cause the mortality of a majority of the standing timber, then the question must be asked: Is a dead forest an old growth forest? Clearly there would be a lack of mature trees, but disturbance is a given and is an important part of the natural forest succession pattern.

DeLuca, 2009 believes "Wildlife inhabitation of these stands should also be considered an important index of success in recruitment of old growth condition."

B. Initiatives for protecting old-growth landscapes

The implication is clear: for old growth and its intrinsic values to exist, natural processes must be the main agents of disturbance and change over large landscapes and for long intervals of time. This means active management must be constrained more than it currently is. Major policy

changes and reordering of priorities for national forests must be undertaken for old growth to persist.

1. Endangered Species Act

Listings of species under the Endangered Species Act (ESA) have achieved habitat protection over large landscapes, depending upon the ranges of the species protected. Implementing mechanisms under the ESA that restrain or reduce exploitation of ecosystems include creating Recovery Plans and designating Critical Habitat. See this Defenders of Wildlife website for more details on the ESA. Less directly, ESA requirements for consultation with federal agencies such as the U.S. Fish and Wildlife Service (USFWS) result in review of Forest Service management projects that potentially improve outcomes for listed species' habitat, one project at a time. However attempts to attain listing of species are met by USFWS resistance, which can result in rare species not being listed or long delays when they are (e.g., Bechtold, 1999 regarding the bull trout). And subsequent to listing, designation of Critical Habitat and creation of Recovery Plans are likewise vulnerable to political meddling and bureaucratic opposition.

Unlike the northern spotted owl in the Pacific Northwest, listing efforts for old-growth associated wildlife in the Northern Rocky Mountains bioregion have been mostly unsuccessful. The Canada lynx, listed in the 1990s, relies upon old-growth conditions for some of its life functions, but its largely higher-elevation habitat doesn't sufficiently overlap with the forests most targeted by logging, so lynx listing has not resulted in adequate landscape-level protections for old growth.

Wildlife advocates have petitioned the USFWS to list other old-growth associated species, with no success so far. These include petitions for the northern goshawk and fisher—old-growth management indicator species in some forest plans and species of conservation concern across much of this report's landscape of interest. Eventual success in listing such species would open the door for science-based habitat protections not found in current forest plans or other Forest Service direction.

2. Habitat protections under forest plans

Forest Planning under NFMA is a potential opportunity to preserve old-growth ecosystems over large landscapes. The best example is the Northwest Forest Plan (NWFP), which revised existing land management plans following the controversial management of old-growth forests on federal lands in the range of the northern spotted owl. Success of the NWFP has been a mixed bag. It "protected remaining old-growth forests from clearcutting and enabled growth and development of vegetation conditions to support threatened species" (Spies, et al. 2019). And yet, "populations of northern spotted owl and Washington populations of marbled murrelet, along with other bird species associated with older forests, have continued to decline" (*Id.*). Others are even less complimentary of the NWFP's ecological outcomes. According to a web page by Oregon Wild:

> The Northwest Forest Plan was a compromise that did not go far enough to protect the region's remaining old-growth forests, sensitive wildlife species, or, arguably, a sustainable economy. The Plan allows logging and road building in ecologically critical areas, across

> all land use allocations. The Northwest Forest Plan did not fully protect mature and old-growth forests, roadless areas, municipal watersheds, and complex young forests that are recovering from fire. The Plan is also too dependent on under-funded, but necessary, restoration and monitoring efforts. And the Plan expects an unattainable amount of timber production from public land.

Although most of the forest plans in the Northern Rocky Mountains bioregion have been revised in recent years, or are undergoing revision, none improved protection of old growth as did the NWFP. The Flathead National Forest Amendment 21 to its original 1986 forest plan is the only significant forest plan amendment in this bioregion with a central focus on old growth, and it came in response to litigation. Conservationist groups Swan View Coalition and Friends of the Wild Swan submitted an alternative for consideration in the Amendment 21 Final Environmental Impact Statement (USDA Forest Service, 1998). That alternative proposed designating all existing old growth as management indicator species (MIS) habitat blocks and making them off-limits to commercial logging, and managing all younger forests as recruitment old growth with logging subject to strict requirements[21] until the amount of old-growth forest recovers to above the median of the historic range of variability. (*Id*.) It also proposed designating some old-growth recruitment as MIS blocks and providing robust linkage corridors between all MIS blocks based upon the biological needs of the MIS. (*Id*.) The Forest Service ignored the nuances and portrayed the conservationist's alternative as banning all logging, and unsurprisingly did not select it.

As discussed above in this report, more recent plans are written to allow managers wide discretion to authorize logging just about anywhere, including within old growth. Only in cases where other laws prohibit commercial exploitation, such as with the Wilderness Act, is old growth safe from logging on these national forests. Even Inventoried Roadless Areas, supposedly protected by the Roadless Area Conservation Rule and the Idaho Roadless Rule, are subject to heavy logging (Friends of the Clearwater, 2020a).

An avenue for installing into forest plans the notion of how old-growth ecosystems and landscapes actually work involves widening the interpretation of "desired conditions." Forest Plans revised in recent years include this component, which the 2012 regulations define as: "a description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates."

The Forest Service's current interpretation of desired conditions result in management actions striving "toward"—at some vague future time—the attainment of forest conditions conforming to static descriptions, rather than integrating the dynamic nature of ecosystems into management as discussed above in the subsection, **Recovering old-growth landscapes**. For example, the revised Forest Plan for the Kootenai National Forest includes this Desired Condition for old growth:

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[21] "(O)n a very limited and experimental basis, and efforts to change the structure or composition of these forests would be paired with control plots and subject to a scientifically valid and peer-reviewed monitoring program of sufficiently long duration to assess the effectiveness of the treatments in moving the forest toward old growth forest MIS habitat." (USDA Forest Service, 1998).

> The amount of old growth increases at the forestwide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old growth stands that contain substantial amounts (i.e., 30% or more of the total species composition) of one or more of the following tree species: ponderosa pine, western larch, western white pine, and whitebark pine. Old growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old growth stands (or patches of multiple contiguous old growth stands) increase and they are well-distributed across the five Geographic Areas on the Forest.

How "old growth increases at the forestwide scale" is not explained. The statement merely describes a trend, with no target numbers specified nor any specific date of achievement. This is typical of current forest plans' interpretation of "desired conditions." However, an abundance of scientific opinion indicates that fully functioning natural processes should be the desired "conditions"—or better yet, **dynamics**. The key phrases are emphasized in the following cites.

McClelland (undated) critiques Forest Service management that "concentrates on the products of ecosystem processes rather than the processes themselves. It does not address the most critical issue—long-term perpetuation of diverse forest habitats, a mosaic pattern which includes stands of old-growth... **The processes that produce suitable habitat must be retained or reinstated by managers**."

Hessburg and Agee, 2003 also emphasize the primacy of natural processes for management purposes:

> Ecosystem management planning must acknowledge **the central importance of natural processes and pattern–process interactions**, the dynamic nature of ecological systems (Attiwill, 1994), the inevitability of uncertainty and variability (Lertzman and Fall, 1998) and cumulative effects (Committee of Scientists, 1999; Dunne et al., 2001).

From Sallabanks et al., 2001:

> Given the dynamic nature of ecological communities in Eastside (interior) forests and woodlands, particularly regarding potential effects of fire, **perhaps the very concept of defining "desired future conditions" for planning could be replaced with a concept of describing "desired future dynamics."**

Noss, 2001: "If the thoughtfully identified critical components and **processes of an ecosystem are sustained**, there is a high probability that the ecosystem as a whole is sustained."

Hutto, 1995: "Efforts to meet legal mandates to maintain biodiversity should, therefore, be directed toward **maintaining processes like fire**, which create the variety of vegetative cover types upon which the great variety of wildlife species depend.

Noss and Cooperrider (1994):

> **Considering process is fundamental to biodiversity conservation because process determines pattern**. Six interrelated categories of ecological processes that biologists and managers must understand in order to effectively conserve biodiversity are (1) energy flows, (2) nutrient cycles, (3) hydrologic cycles, (4) disturbance regimes, (5) equilibrium processes, and (6) feedback effects.

The Environmental Protection Agency (1999):

> (E)cological processes such as natural disturbance, hydrology, nutrient cycling, biotic interactions, population dynamics, and evolution determine the species composition, habitat structure, and ecological health of every site and landscape. **Only through the conservation of ecological processes** will it be possible to (1) represent all native ecosystems within the landscape and (2) maintain complete, unfragmented environmental gradients among ecosystems.

Forest Service researcher Everett (1994) states:

> To prevent loss of future options we need to simultaneously **reestablish ecosystem processes and disturbance effects that create and maintain desired sustainable ecosystems**, while conserving genetic, species, community, and landscape diversity and long-term site productivity.
>
> …We must address **restoration of ecosystem processes and disturbance effects** that create sustainable forests before we can speak to the restoration of stressed sites; otherwise, we will forever treat the symptom and not the problem.

3. Legislation

A legislative effort to preserve large landscapes in the northern U.S. Rocky Mountains is the Northern Rockies Ecosystem Protection Act (NREPA). NREPA has been introduced and re-introduced into Congress repeatedly since the early 1990s. Unfortunately Congress has yet to make a serious attempt to pass the bill. NREPA would designate the remaining roadless areas on federal lands in this bioregion as Wilderness. Importantly for old-growth landscapes, between the core roadless areas NREPA proposes to restore integrity of habitats for the purpose of providing connectivity, within twenty-eight "biological connecting corridors …essential for wildlife and plant migration and genetic interchange" totaling roughly 2,358,000 acres. Within these corridors:

> The practice of even-aged silvicultural management and timber harvesting is prohibited within the special corridor management areas. … ensure that road densities within the biological connecting corridor approach, as nearly as possible, zero miles of road per square mile of land area. Such road density shall not exceed 0.25 miles per square mile…

Furthermore NREPA designates nine "Wildland Restoration And Recovery Areas" covering approximately 1,023,000 acres:

> …managed so as to restore their native vegetative cover and reduce or eliminate invasive non-native species, facilitate native species diversity to the extent possible with climate change, stabilize slopes and soils to prevent or reduce further erosion, recontour slopes to their original contours, remove barriers to natural fish spawning runs, and generally restore such lands in their entirety to a natural roadless and wild condition.

With government agencies and elected officials firmly opposed to protecting old-growth landscapes, it falls upon citizens who appreciate old growth for non-timber values to take the lead. In the words of Margaret Mead, "Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it's the only thing that ever has."

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APPENDIX A

Wildlife species in U.S. Northern Rockies bioregion associated with old-growth habitat

I. Forest Plan old-growth associated wildlife species list, 1987 Kootenai National Forest

The species listed below find optimum habitat in the "old" successional stage. They may also utilize the "mature" stage if adequate sizes and numbers of snags/down logs, or large live trees are present.

B= breeding F=feeding

Species	Habitat Need	Species	Habitat Need
Dusky flycatcher	F	+ Common flicker	B,F
Hammond's flycatcher	B,F	Black-backed three-toed woodpecker	B,F
Olive-sided flycatcher	B	Northern three-toed woodpecker	B
Black-capped chickadee	B	Downy woodpecker	B,F
Boreal chickadee	B	Hairy woodpecker	B,F
Chestnut-backed chickadee	B	Lewis' woodpecker	B
Bald eagle	B	Williamson's sapsucker	B,F
Goshawk	B	Yellow-bellied sapsucker	B,F
Osprey	B	+ Varied thrush	B,F
Great blue heron	B	Hermit thrush	B,F
Rocky mountain wolf	B	Common raven	B
Marten	B,F	Kestrel	B
Northern flying squirrel	B	+ Clark's nutcracker	B,F
Red squirrel	B	Evening grosbeak	B
Hoary bat	B	Pygmy owl	B,F
Long-eared myotis	B	Saw whet owl	B,F
Little brown myotis	B	Screech owl	B
Silver-haired bat	B	Pygmy nuthatch	B,F
Pacific giant salamander	B	+ Red-breasted nuthatch	B,F
Van Dyke's salamander	B,F	White-breasted nuthatch	B,F
Pacific treefrog	B,F	Tree swallow	B
Spotted frog	B	Violet green swallow	B
Tailed frog	B	Vaux's swift	B,F
Common merganser	B	Golden-crowned kinglet	B
Hooded merganser	B	Winter wren	B,F
Wood duck	B		
Dipper	B		
Western bluebird	B		

In addition, the five species listed below are believed to have an especially strong preference or possibly a dependence on the old successional stage:

Barred owl
Great grey owl
* Pileated woodpecker
Boreal redback vole
* Brown creeper

* = old growth indicator species
+ = indicators of other types of habitat (riparian tree, for example)

II. List of wildlife in the USFS Northern Region associated with old-growth habitats (Bollenbacher and Hahn, 2008)

Birds

Northern goshawk	*Accipiter gentilis*
Great gray owl	*Strix nebulosa*
Flammulated owl	*Otus flammeolus*
Northern Pygmy owl	*Glaucidium gnoma*
Saw-whet owl	*Aegolius acadicus*
Boreal owl	*Aegolius funereus*
Barred owl	*Strix varia*
Vaux's swift	*Chaetura vauxi*
White-headed woodpecker	*Picoides albolarvatus*
Pileated woodpecker	*Dryocopus pileatus*
Three-toed woodpecker	*Picoides dorsalis*
Black-backed woodpecker	*Picoides arcticus*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Williamson's sapsucker	*Sphyrapicus thyroideus*
White-breasted nuthatch	*Sitta carolinensis*
Red-breasted nuthatch	*Sitta canadensis*
Pygmy nuthatch	*Sitta pygmaea*
Brown creeper	*Certhia americana*
Hermit thrush	*Catharus guttatus*
Varied thrush	*Ixoreus naevius*
Townsend's warbler	*Dendroica townsendi*

Mammals

Silver-haired bat	*Lasionycteris noctivagans*
Long-eared bat	*Myotis evotis*
Long-legged myotis	*Myotis volans*
California myotis	*Myotis californicus*
Fisher	*Martes pennanti*[22]
Marten	*Martes americana*
Lynx	*Lynx canadensis*
Wolverine	*Gulo gulo*
Woodland caribou	*Rangifer tarandus*
Boreal red-backed vole	*Clethrionomys gapperi*
Northern flying squirrel	*Galucomys sabrinus*

[22] Based upon recent genetic studies scientists have placed the fisher in a monotypic genus, classifying it as *Pekani pennanti*.

APPENDIX B

Old-Growth definitions: Forest Plan or Regional?

The Regional definitions (Green et al., 1992 and Hamilton 1993) were not developed under the planning process governed by NFMA regulations. Appendix D of Green et al., 1992 explains that its creation was part of a wider 1990 Regional Action Plan—of which step 8 would invoke the forest planning process:

ACTION PLAN: **The Regional Old Growth Committee has revised the action plan (5/90) to accomplish the Chief a objectives and continue the old growth strategy for the Region.**

	ACTION	DATE	RESPONSIBILITY RO/Forest
1.	Initiate analysis to develop definitions Form zone OG Teams for Eastside forests, Western Montana forests, and northern idaho forests	1/90	Hann/Zone OG ID Teams
2.	Initiate public involvement	3/90	Forests
3.	Evaluate inventory procedures	3/90	Hann/Naumann/Deden
4.	Complete draft definitions & descriptions	7/90	Hann/Zone OG ID Teams
5.	Correlate definitions between zones	7/90	Hann/Zone Representatives
6.	Coordinate definitions with adjacent Regions	8/90	Naumann
7.	Initiate development of old growth management strategies (Deferred for SES analysis)	8/90	Subcommittee (Naumann will coordinate)
8.	Develop guidelines for integrating definitions, inventories, and management strategies into the Forest Plan process (Deferred for SES analysis)	9/90	Prather/Forest Planners
9.	Field work to fill data gaps for definitions	7-10/90	Forest Inventory
10.	Write a chapter on old growth for the Effects Analysis Handbook (Deferred for SES analysis	8-10/90	Subcommittee (Prather/Hann will coordinate)
11.	Analyze data for old growth definitions	10/90 - 4/91	Hann/Zone OG ID Teams
12.	Identify values for each old growth type (Deferred for SES analysis)	8/90 – 4/91	Subcommittee (Davis will coordinate)
13.	Correlate definitions between zones	5/91	Hann/Zone Reps
14.	Coordinate definitions with adjacent Regions	6/91	Naumann
15.	Complete summary report on old growth	9/30/91	Naumann-OG Committee Zone OG Committees

However, Action Plan step 8 ("Develop guidelines for integrating definitions, inventories, and management strategies into the Forest Plan process") was cryptically "Deferred for SES[23] analysis" as were steps 7, 10 and 12. Green et al., 1992 states, also cryptically, "These definitions will be used in the implementation of Forest Plans. Where there are conflicts with existing plan requirements, differences will be worked out on a case by case basis." That has played out as the utilization of Green et al., 1992 at the **project** analysis level, ranging from citing it as best available science to proposing "site-specific" forest plan amendments for substituting Green et al., 1992 in place of existing forest plan old-growth definitions.

[23] "SES" refers to a "current Regional effort of Sustaining Ecological Systems" (Green et al., 1992) of which that document was clearly a part of, since it is headed, "NORTHERN REGION USDA FOREST SERVICE APRIL 1992 R-1 SES 4/92."