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Comments: Please accept these as my personal comments on the "Draft Environmental Impact Statement" and "Definition, Identification, and Initial Inventory" documents prepared by the U.S. Forest Service and Bureau of Land Management in response to Executive Order 14072. Include by reference comments provided by Heartwood, Indiana Forest Alliance, the John Muir Project, and other organizations of which Protect Our Woods is a member or on whose comments Protect Our Woods is a co-signatory.

The Forest Service is at an inflection point in the history of what has been and could again be a proud history of service to the American people.

Sadly the motto of "Caring for the Land and Serving People" has been replaced by "It's All About the Money"

and Smokey Bear has been replaced by Buzzy the Chainsaw and Drippy the Drip Torch

For the last thirty years when the agency should have been reimagining the relationship between the agency and the land, and with the American people, to reflect climate instability and a dramatically changing landscape, with unprecedented challenges, it has instead become a parasite on the very forests the American people have invested in their care; managing the land to benefit the agency, with decision-making authority invested in those who put the needs of the agency ahead of either the land or the people; and using self-serving, often self-funded and highly selective "science" which conveniently focuses on the handful of species that benefit from abused and degraded landscapes, to justify predetermined outcomes that always seem to generate more funds for the agency, by cutting and selling the largest, healthiest and straightest trees and retaining the proceeds in such appropriately named funds as the "Timber Sale Pipeline Restoration Fund," indicating most clearly what is truly being "restored."

Especially disturbing are all the new rationales for wholesale logging ostensibly for "Forest Health" or "restoration" when in fact what is being restored is the abused and degraded condition much of the land was in (in Regions 9 & 8 for instance) when first acquired and of course restoration of the agency's timber sale preparation budget.

Even more obscene is the use of Congressional appropriations to address catastrophic wildfires in dry Western states to deliberately and repeatedly burn forests in Regions 8 & 9 in order to spend as much of that money as possible on scientifically and historically dubious and unquestionably deleterious burns intended to convert moist fire-resistant forests in the hardwood region to drier fire adapted forests in a time of accelerating climate change.

And perhaps most obscene of all is a seemingly nationwide attempt by the agency to lock in historically large, and unprecedented, often multi-decade logging and burning projects in virtually every national forest in the country, using Forest Plans that were written twenty or more years ago, that barely reference and certainly fail to adequately address climate change, but that would give the agency essentially free rein to keep their own coffers full while the planet (and the forest) burns.

I implore you to work with leaders within the agency to honestly address the challenges ahead and invite the public into the process in a real and meaningful way, not just doing the minimum necessary to meet NEPA

requirements, but recognizing the growing scientific consensus on the importance of keeping as much mature and old growth standing as possible, especially on public lands, instead of continuing to approve projects whose principal beneficiary is neither the land nor the American people but what is increasingly viewed as a short-sighted, backward looking and self-serving bureaucracy

Executive Order 14072 has a clearly defined purpose, and it should be noted that it is titled an "order," not a directive or suggestion. The goal is, for the sake of addressing climate change, to identify and inventory all mature and old-growth (MOG) forests in the United States. Note that the E.O. specifies mature AND old-growth, not either, or. This E.O. was in the recognition that MOG forests play a major role in sequestering and storing carbon which will be vital in our on-going efforts to address the dramatic impacts of climate change. The clear directive is to not only identify and inventory mature AND old-growth, but to amend every Forest Plan in the U.S. to both make these forests more resilient into the future, and to recruit more old-growth over time. Climate change will continue for many decades, maybe even centuries. Increasing the amount of the best carbon sequestration method we have available is essential. The preparation of the DEIS and the subsequent comment period must be in full compliance with NEPA regulations.

The DEIS does not meet the demands of the E.O. Instead, the documents redefine and reinterpret the E.O. in a manner that clearly violates both the letter and intent of that E.O. This is unacceptable and clearly illustrates a bad faith relation to the public and to the President. The DEIS and Definition and Inventory do not meet NEPA requirements, as will be shown below.

Beginning with the Definition and Threats documents (April 2024 and June 2024), the analysis provided is completely inadequate for acknowledging, much less inventorying, the diversity of ecological zones and widely variant forest types, especially for those in the east. The U.S. basically has two evolutionarily divergent forests, one in the west and one in the east. Each contains its own complex mosaic of unique forest types, especially in the east. It is unacceptable that the eastern forests were not even analyzed due to the Forest Service having inadequate inventory data.

What would count as MOG in one forest type would vary dramatically from others, thus complicating the job of identifying and inventorying. Bristlecone pine, for example, can be very old yet relatively small at high elevations, so size will not serve as a generic criterion. Shortleaf pines, among other species, are relatively short-lived, so the forest may be very old, but the trees are not, so age of the trees cannot serve as a generic criterion. The forest structures will vary depending on region, past glaciation, geography, aspect, soil type, and climate. This implies that to adequately inventory MOG forests across the nation we must look for complexity of species composition as an indication of the age of a forest, not just the individual trees (Leverett, 1996; Pelton, 1996). Both the DEIS and the Inventory focus on trees but ignore the forest.

This raises a distinction that will be central in these comments. Silvicultural science is very different from ecological science. As a Forest Service Area Supervisor recently said in a public meeting, "Logging is in the DNA of the Forest Service; it's what we do." This is consistent with the origins of the Forest Service within the Department of Agriculture. Its employees are trained and educated with one mission: produce a sustainable yield of board feet from the nation's ravaged forests. This was a progressive goal when the Forest Service was established, and even when the Weeks Act was passed in 1911. However, it does not and cannot meet the

goals of Executive Order 1407 to manage the forests as a natural solution to the climate change crisis. A different approach must direct the MOG goals. To be in compliance with NEPA regulations, a full range of alternatives must be provided for public comment. By not, in good faith, applying the principles of ecological science to the goal of finding natural solutions to the problem of climate change that MOG forests can offer, the public was not provided a full range of alternatives.

Rather than the goal of producing as much money from tall and straight trees as possible, the focus must be on the ecological health of the MOG forest system: How can it be retained and allowed to do its job as naturally as possible? How can old-growth acreage be expanded to meet the growing crisis? This much larger, and critical, goal cannot be handled as a normal project proposal on an individual forest unit with the goal of meeting cut prescriptions. Limiting alternatives to the goal of continued logging of the very MOG forests the E.O. intends to be preserved and expanded is unacceptable.

The Definition and Threats document does not give clear guidance on how to distinguish between mature and old-growth forests, nor does it provide guidance on how to move mature forests into their natural seral development. There is much research on this, (Davis, 1993; Mladenoff and Forrester, 1996; McGee, 1996) by ecological scientists, and it should have been utilized. There are also many good efforts at identifying and inventorying old-growth in the east, which were not utilized.

The extreme variation in forest types in the east makes this a complex task, and there is growing literature on how to do it, and what is left to be done (Braun, 1950; Barton and Keeton, 2018) The E.O. does not say to produce an inventory and definitions of MOG, unless it is complicated. The document produced in response to that E.O. grossly oversimplifies this task, especially for the eastern forests where it is admitted that no analysis was done because of a lack of data. Data does exist, and is growing, but it comes from ecological science, not silvicultural science. To do its job, the Forest Service should have reached beyond its own ranks and relied on appropriate outside scientific expertise, as NEPA requires. The Forest Service is in a unique position to contribute to this effort, if it were willing to shift focus.

The documents state, numerous times, that no "change in management direction" should be anticipated. This is an explicit refusal to meet the demands of the E.O. The documents provided in the Inventory and DEIS admit that, prior to the 1990s, Forest Service logging was a major factor in the loss of MOG forests. This was somewhat curtailed, as was admitted, due to public pressure and litigation. Given that the DEIS preferred alternative would dramatically increase logging in the MOG forests, the Forest Service is likely to, again, become a major stressor on the small bits of MOG forests remaining in the east...barring renewed public pressure and litigation, which is likely given the provided range of alternatives. Changing to an ecological approach to management of the MOG forests would be a major change in management direction for the Forest Service and is what is required to meet the objectives of the E.O. of allowing MOG forests to provide a natural solution to climate change. Not considering that as an alternative, nor utilizing the available science, in the DEIS is a clear violation of NEPA requirements. Given the recent overturning of the Chevron ruling, this should become a major issue going forward.

The preferred alternative clearly does not meet the requirements of the E.O. and will eventually result in the loss of the last remnants of old-growth in the east through a combination of increased logging of the surrounding mature forests and increasing natural disturbances in old-growth stands (which are mostly very small in the east) that will come with climate change. If

there is no plan to allow mature forests to develop into old-growth, those stands that are disrupted due to natural disturbances, and subjected to increased logging, will not be allowed to recruit to old-growth status. Old-growth stands will be lost, but not replaced.

The documents provided for public comment, which purport to be in response to the E.O., fail to meet the basic requirements of NEPA by not providing a full range of alternatives for the public to comment on. The basic difference between the alternatives that are provided is the terminology used to describe increased logging and burning. A full range of alternatives must be produced. The agencies must do their job!

As for the DEIS document, it does NOT use the best or most current science, as required by NEPA. Silvicultural science and ecological science have very different objectives and purposes. The Forest Service may be proficient in silviculture. The use of terms such as "decadent" and "over mature" and "wolf tree" apply when the purpose of the management is to produce a maximum yield of board feet as efficiently as possible, but they have no place in an ecological approach to forest management. In fact, the presence of fully mature trees, with at least some reaching their maximum age, many misshapen and broken trees, downed woody debris and standing snags, is part of the definition of a MOG forest ecosystem. (Battaglia and Conner, 2018; Mladenoff and Forrester, 2018) The harvesting of a tree having reached marketable size is NOT an appropriate definition of maturity for the goals set forth in the E.O. In fact, many ecologists use the species diversity in the canopy, below the canopy, on the ground, and under the ground, as the best identification of old-growth. That diversity is not just in the tree species, or even their size variation (which is a requirement), but diversity of birds, insects, animals, fungi, lichens, mosses, etc., each of which contributes to the functioning ecosystem. Moss and lichens developing on the trunks of standing trees and fallen trees, provide habitat for a suite of insects and mycorrhiza that only exist in very old forests. (White, et al, 2018; Pelton, 1996; DellaSalla, et al, 2022) These very conditions that make the MOG forest habitat resilient reduce the market value of the trees. These conditions should be encouraged, not prevented as outlined in the preferred alternative. Silviculture is baked into the fiber of the Forest Service and therefore input from ecological scientists should have been sought.

Complex features that only exist in old-growth forests are not removed by a natural event like wind throws that can remove much of the canopy. In fact, often the understory remains intact. The trees in the understory can be very old, yet their growth has been slow, with nutritional requirements being enhanced by the connecting fungi underground. Those fungal connections, of increasing diversity, are a major part of what makes the forest soil "old." (McGee, 2018; White, et al, 2018; Lynch, 1996; Davis, et al, 1998) The disturbance event that opened the canopy releases those understory trees by creating natural gaps in the canopy. Those understory trees can now grow to eventually form a new canopy. The mosses, fungal networks, lichens, bird and animal species, the decomposers in the fallen and rotting logs, all remain, thus preserving the old-growth characteristics, even though the canopy trees may be damaged. The seed bank is also in place, and with the naturally created openings and the mineral soils exposed by the pit and mound topography, can germinate readily. The down and decaying stems even provide refugia for a wide range of species, including seedlings (McGee, 2018).

The Forest Service is notorious for changing terminology while keeping the same practices to make their management practices less offensive to the public, especially to those that do not venture into those forests to see for themselves. It is very common now to describe the purpose of a proposed timber sale as "restoration." The goal, it would seem, is to return the forests to a condition that supposedly existed at some point in the past.

But what conditions and from what time period? Restoration of what? What is the baseline that we should be returning to? This raises an important question: with climate change producing major impacts to our ecosystems that we cannot adequately predict, should we be planning for the forests of the past? Or the forests of the future? Climate change has always produced major restructuring of our forests. At the end of the last glacial period all vegetation was removed from major portions of the continent, forcing a complete restart. Within an estimated 1000-year period those areas were recovered in forests, (Trombulak, 1996) with no intervention by humans and definitely no "management" by the Forest Service. The forest operates on a different time frame than humans. Nature knows how to adapt; it is what it does best. We must not try to capture some historic forest type in amber and work to prevent it from changing. As the old saying goes: Nature always bats last. Humility is a virtue in dealing with nature. Not interfering with these natural processes actually works best, as modern science tells us (DellaSala, et al, 2022; Hilderbrand, et al, 2005; Chapman and McEwan, 2018; Kreton, et al, 2018; Leverett, 1996; Selva, 1996; Trombulak, 1996; Keeton and Barton, 1996).

We do not fully understand the ecosystem, though ecological science is making strides. We know changes are happening, but we cannot adequately predict what changes or to what extent. It is thus fool hearted to try to manipulate the entire natural system with crude tools like logging and prescribed fire. The best strategy is to promote as much biological diversity as possible (and not just the trees!) to allow for as great a range of adaptations as possible. Active, but light, management would be appropriate to facilitate the full ecosystem's natural adaptations. What that management should be will vary forest by forest, and should be guided by ecological science, not silviculture. The proposed alternatives in the DEIS are a one-size-fits-all approach, attempting to apply strategies from the western forests to the eastern forests. Utilizing ecological science and what inventories of MOG in the east do exist, done by independent, not agency, researchers would have avoided this.

Certain species will be more resilient to the coming changes, and they should be allowed to flourish. Certain combinations of species will be more beneficial to the continued health of the forests, but we cannot predict which combinations in which places. What we should not do, which is what the preferred alternative would do, is try to preserve the forest types we have preferred in the past, especially when those preferences were usually based on commercial value.

The documents also attempt to justify logging in the old-growth remnants based on carbon storage. The claim was made that old trees store more carbon than younger trees, but younger trees absorb carbon faster. Thus, removing the old trees allows the younger trees to grow faster, which would absorb more net carbon. This is just wrong. Modern science tells us that trees not only store more carbon as they age, but that the rate of carbon absorption actually increases. (DellaSala, et al, 2022; NASA, 2022; Stephenson, et al, 2014) The prejudice against older trees is clearly based on the silvicultural principle of the age at which the rate of increase in DBH slows, thus indicating the tree has reached marketable maturity and should be removed to continue the economic gains (Lynch, 1996; DellaSala, et al, 2022). Failure to use the best science is a violation of the most basic requirements of NEPA regs. Again, this is a failure to transition from a silviculture approach to an ecological approach, and does not meet the requirements of the E.O.

It is claimed that the carbon remains sequestered if the tree is harvested and converted into wood products and lost if it is allowed to remain in the forest. This is also just not supported by science (DellaSala, et al, 2022; Fanous and Moomaw, 2018). Carbon is put into the atmosphere by the mere act of cutting and removing the trees, while only minimal amounts remain

sequestered in the products produced from that wood (Nunery and Keeton, 2010). Only a small fraction of the timber harvested is converted into durable furniture, and the hardwood forests of the east are not turned into dimensional lumber for construction. Most of the timber recently harvested in the Shawnee forest was converted into livestock bedding. When a tree falls and is left to decompose on the forest floor, little of the stored carbon is lost. A downed log does not decompose on its own. That happens due to the action of fungi, and a host of other decomposers, which move the captured carbon into the ground where it is stored long term and becomes available as nutrients for seedlings and the herbaceous layer of vegetation (Prescott, 2024). What is lost to the atmosphere is released very slowly, over decades or even centuries.

Also, when trees are allowed to age naturally they will eventually succumb to senescence, or wind will topple them, by which pit and mound topography is created. This is an essential feature of a mature forest (Fahey, 2018; Davis, 1996). It creates micro habitats producing a greater variety of species diversity. The pits help retain moisture in the forest. The decaying logs form biological refugia for numerous species, including new seedlings from the extant seedbank. Logging does not produce the essential pit and mound topography but destroys what is there as heavy equipment operates to compact the loose forest soil and diminishes species diversity, above and below ground.

The inventory and analysis document describes most of the eastern forest as oak/hickory. This, also, is just not true. E. Lucy Braun's (1950) seminal work classifying the forest types in the east is still considered the essential work in eastern forest ecology. It was updated by Jim Dyer (2006), but is still regarded as the authoritative source on eastern forests. The oak/hickory forest is located on the western edge of the eastern forest, in the Ozark region. The forests to the east, with the exception of the pine savannahs along the coasts, are mostly varieties of mesophytic and mixed mesophytic. As the analysis admits, the oak/hickory forests are more open and drier and will become even dryer as climate change continues. This will make them far more prone to wildfire. The only time mesophytic forests are mentioned in the document (as if the Appalachian, Adirondack, Allegheny, Mississippian Plateau, etc., forests don't exist!!) is to discuss the ongoing mesophication of the eastern forests as a problem that needs to be solved by logging and burning to convert them to oak/hickory. This is an inexcusable management direction.

The mesophytic forests are becoming more moist as they develop full canopies, pit and mound topography, and deepening layers of duff and decomposing woody debris. This makes them cooler and far more resistant to fire. The eastern forests seldom burn, and when they do the fires are relatively small and less intense. The rate of fire return on any particular mesophytic forest is very long. (D'Amato, et al, 2018; Selva, 1996; Runkle, 1996; Matlack, 2013) The exceptions are those portions that have been logged in order to "open them up." The temperatures are increasing rapidly in the west, but the region with the most mesophytic forests has escaped the worst of this warming (Barnes, et al, 2004). Also, the diversity of tree species in the eastern forests absorbs more carbon than the western forests, or even the oak-hickory forest. Thus, rather than mesophication being the threat the analysis claims it is, mesophication is the solution we should be promoting. Once again, the best science was not used. The preferred alternative seems to clearly be based on the higher commercial value of oaks and hickories. This is, again, the application of silviculture assumptions when ecological science should have been used, and a failure to use the best science available.

So, to summarize so far, the eastern mesophytic forests are more biologically diverse, which gives them more pathways to adapt to a changing climate (ecological filtering). They temper

the warming effects of climate change for the entire region. They are becoming more moist due to their enhanced growth, which is an indication of their efficiency at carbon absorption, which increases as they age and grow larger. They are far less prone to wildfires of any significant scale. This is the region (roughly Regions 8 and 9) that the Forest Service has so little information on that it did not bother to do an analysis of the MOG in the east. This is the portion of the continent in which the Forest Service did not even acknowledge the existence of the most prominent forest type (mesophytic), and, instead of treating it as the best tool for a natural solution for climate mitigation, proposes to convert it to a more open and thus much dryer, more fire prone forest with less species diversity. This is beyond not using the best available science. This is beyond using common sense!

Ecological stability and resilience requires biological diversity, and not just of the trees. MOG forests have more of that than a "production" forest. Natural disturbances enhance structural diversity of the forest, which is a benefit for enhanced species diversity. The old-growth characteristics can be retained even when a particular stand of trees is reverted to an earlier seral stage by natural disturbance. (White and White, 1996; Dunwiddie et al, 1996; Frelich and Reich, 1996; Keeton, et al, 2018) The forest remains old, even if the majority of the trees are not. The "desired condition" of most Forest Service projects is to reduce species diversity by removing less commercially valuable trees, thus reducing overall species diversity. Old-growth consists of misshapen and broken trees, which produce more habitat options for the diverse species. Logging removes these. "Best practices" in forest plans stipulate how many snags per acre are to be left, but this is an artificial standard and inadequate for natural MOG conditions. There are no protections for MOG forests or pathways to expand them in the alternatives that are provided, just ways to increase extractive management. The option of declaring MOG forests as inappropriate for timber harvest was not provided in the alternatives. The range of alternatives provided is woefully inadequate. Tweaking terminology is not the same as providing alternatives! One obvious administrative tool would be to designate MOG forests as Natural Research Areas, which would be appropriate considering their vital role in our changing climate, and our need to better understand the ecology and natural processes of these small remnants as climate change progresses. This should have been an alternative for consideration by the public.

There is no pathway provided, or even discussed, in the alternatives to recruit more old-growth forests by allowing the surrounding mature forests to move through their successional stages. This progression will be directed more by the changing climate than by any management tool the Forest Service can offer. Every old-growth stand should be surrounded by a protected buffer zone of mature forest. This not only provides protection from wind and even fire events, but also provides a pathway to recruit more old-growth over time. It would allow the invaluable pit and mound topography, age, size and structural diversity to gradually extend into the mature buffer zone. It would dramatically increase the refugia for the full range of species. It would also meet the direction of Section 4 of the E.O. to provide "natural solutions" to the climate crisis. There is nothing natural about logging, especially selective logging which would select which species humans would prefer for economic reasons, vs. what nature would select.

Without the buffer zone of mature forests, especially in the east where the old-growth stands tend to be small and widely dispersed, a single disturbance, be it wind or fire, could result in the loss of an entire stand of rare old-growth. (Tyrrell, 1996; Zahner, 1996) The "preferred alternative" will result in the loss of old-growth over time. It is the Forest Service/timber industry's obsession with early successional forests (straight, high dollar trees) that has produced what is now euphemistically called "habitat restoration." It is this practice that removed all but the last remnants of old-growth in the east and continues to leave them at risk.

It is no accident that these rare remnants from the primeval forests, or older second growth forests are, almost entirely, either inaccessible or non-marketable. Others are in the form of "cryptic old-growth" where the trees are on high ridges, infertile soils, or for other reasons have remained of small size, while actually being very old. Mary Byrd Davis, and others, (Davis and Davis, 1996) have produced a substantial inventory of these remnant stands in the east and provided guidance on how to locate more. By not utilizing these studies the DEIS does not use the best available science, as required by NEPA.

Natural disturbances are stochastic, and thus unpredictable, even though we can statistically model their effects after the fact. It is well known that natural disturbances produce MOG structure, including canopy openings, woody debris on the forest floor, standing snags, and a variation in seral stages across the forest. All this increases habitat and thus species diversity (not just trees). Even aged stands can be established by natural disturbances, but they will self-thin over time and reestablish stand diversity as the forest ages and the more resilient species (which will change as climate changes) reproduce. This is the means by which a forest ecosystem is a complex and shifting mosaic across the entire forest. MOG is not uniform in age or size or suite of species, and definitely not static. MOG forest conditions are ephemeral, and this must be taken into account. The DEIS does not do this.

The common thread in all of the alternatives (which happen to amplify existing Forest Service management trends) is to artificially replicate these natural disturbances by logging and burning. This, it is claimed, will provide a short cut to MOG forest. This does not take into account that the natural disturbances will not only continue but will increase with climate change. The attempt to artificially produce disturbances, no matter how much it placates human hubris, will not prevent the increase of natural disturbances. The result will be to increase the disruption of natural processes and make the ecological conditions worse. Again, we should plan for the future forest, not the past forest. A clear guiding principle should be to do no harm. Protect, but do not make the situation worse.

There is no recognition at all of the incredible variability of forest types in Regions 8 and 9. Instead, a one size fits all approach, which is the model currently driving Forest Service decisions, is proposed. No wonder no modification of current planning direction is proposed! Instead, there should be a moratorium on all logging, especially in the east, until a legitimate inventory and analysis can be provided. Then, adequate planning, forest by forest, can begin. This should have been included in a full range of alternatives, but it was not. This violates both the E.O. and NEPA.

All mature AND old-growth should be protected to the USGS GAP 1 and 2 standards. This was addressed in NASA's response to the E.O., (NASA, 2022) but not addressed at all in the documents the public was provided in response to the E.O., nor was the directive to meet the 30x30 goals. In order to do this, redesignation of MOG forests as Natural Research Areas would go a long way.

Stand size qualifications would have to be considered, and these would be very different in the east than in the west. Smaller stands should be acknowledged and provided with mature buffer zones, and connectivity between these larger forest landscapes should be a goal when possible. The old-growth should be allowed to naturally extend into the buffer zones. Time is an unavoidable variable in this, but that should not be considered a disqualifying factor for expansion of old-growth. The preferred alternative is based on a rather arrogant assumption that the Forest Service can impose shortcuts on natural processes. These attempts have been on-going for some time and there is no evidence of any success.

This approach to providing a pathway for the expansion of old-growth would improve stream health, water quality, insect diversity, bird and animal diversity, mycorrhizal diversity, lichen diversity, increases in mosses, etc. All these are much greater in old-growth forest as compared to a managed forest. (Davis, et al, 1996; DellaSala, et al, 2022) Logging reduces all of these. The need to preserve as much diversity as possible in preparation for an unpredictably changing climate should make this a priority, but it was not included as an alternative. It's not just the trees. Not seeing the forest for the trees is an old cliché, but it accurately describes Forest Service directives.

A most revealing element in the threat analysis document is the claim that one of biggest challenges facing the Forest Service is the lack of sawmills. In a recent salvage sale in Land Between the Lakes National Recreation Area, huge piles of logs remained piled on the landings for months. The reason: the local market was saturated to the point that the loggers could not sell them for a profit, and they were waiting for the glut to pass through the local economy and demand for the timber to return. The problem was not a lack of mill capacity, but a lack of demand.

The impact this had on private landowners with woodlots should be taken into account. Should a federal agency harm the local private economy by trying to make money for itself? Of course, the taxpayers lose money on every timber sale, even if the agency benefits. Not considering the impact on private woodlot owners is irresponsible. Given that over 90% of domestically produced forest products come from private lands (USDA Forest Service), this is a major factor. Reducing the harvest from publicly owned forests would not significantly reduce the lumber supply, but would enhance the value of privately owned forests, thus stimulating local economies, as directed by the E.O.

The narrow range of alternatives include the proposal to offset this lack of sawmills by encouraging an increase in biomass wood pellet production. There was no alternative which disallowed this, which is a violation of NEPA. This does prove, despite claims to the contrary, that the Forest Service is driven by money. It would be cheaper to allow the forests to recover on their own than for the Forest Service to log them. Nature works for free, though it doesn't always follow our economic priorities.

Wood pellet production should be excluded from any consideration, which would have been an alternative if NEPA had been followed. This also indicates another failure to use the best science. It is now well known that biofuels, including wood pellets, produce more harmful pollutants, including carbon, than burning coal. (Fanous and Moomaw, 2018) This is hardly a solution to climate change. It is also well documented that preserving the carbon in wood products is a false solution. But, leaving windthrown logs and burned forest trees on the ground allows fungi and other decomposers to move the carbon into the soil, where it is stored long term and becomes nutrients and refugia for species recovery. Even charred trees still retain most of their stored carbon. (NASA, 2022; Hanson, 2021) The decomposing logs hold moisture, making the forest more resistant to fire while promoting growth. Throughout the threat analysis and DEIS it is recognized that downed woody debris is a defining feature of MOG forests and is necessary for increasing species diversity and resilience. But that same downed woody debris is also described as "fuel load" and used as a justification for salvage logging and burning. Fuel load conditions are very different in the west than in the east. This inconsistency is not random, it merely indicates the preferred management direction away from nuanced ecology and towards silviculture. This is counter to the fact that wildfires are more frequent and of higher severity when the forest has been thinned and prescribe fire used. (Hanson,

2021; DellaSala, et al, 2022)

The Wildland Urban Interface (WUI) is rightly listed as a threat that needs to be addressed. There is a token mention of the distinction between the threat in the west and the east, but this should have been more thoroughly addressed. It should also be acknowledged that the worst fires happen in areas that have been thinned and subjected to salvage logging. Rather than continuing to throw millions of taxpayer dollars into methods that clearly have not produced the desired results, that money should be invested in hardening structures in the WUI to make them more resistant to fire. Dollar for dollar, this is a much more effective approach and more likely to yield the desired results (FEMA, 2022). It also removes the excuse for logging and burning in the backcountry. It is also beneficial to the communities, especially as compared to the social and economic harm done by pellet mills. This was not included among the alternatives for the public to consider, in violation of NEPA.

Based on the above observations, it is my conclusion that:

- 1) There should be a moratorium on all logging projects, many of which are clearly targeting MOG forests at this moment, until a proper inventory and analysis for the eastern forests can be completed.
- 2) The DEIS should be withdrawn and a new one prepared based on input from ecological scientists independent of the Forest Service.
- 3) A full range of alternatives should be provided to the public, based on ecological science and the goal of allowing MOG forests to most effectively provide a natural solution to climate change.

The existing DEIS is a failure and must be withdrawn until it can be done properly, and a full range of alternatives provided for public comment.

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RE: Official comments to the Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System Draft Environmental Impact Statement

The Indiana Forest Alliance (IFA) is honored to assist in the planning for the future care of our public mature and old-growth forests in the US National Forest System (NFS). These public comments, representing our members and supporters, our staff, and board, are respectfully submitted by the non-profit IFA, founded in 1996 as an environmental organization dedicated to the long-term health and well-being of Indiana's native forests. Our mission is to preserve and restore Indiana's native hardwood forest ecosystem for the enjoyment of all. Thank you for the opportunity to comment on this Draft Environmental Impact Statement (OGDEIS) for the Land Management Plan Direction for Old-Growth Forest Conditions Across the National Forest System (NFS) by the US Forest Service (USFS).

IFA has followed with great interest the developments in this discussion towards the protection of our country's mature and old-growth across our NFS leading up to this OGDEIS in response to Executive Order #14072 (EO14072). Namely;

? April 2022, EO14072 acknowledged the important role of mature and old-growth forests on Federal land stating that they are "critical to the health, prosperity, and resilience of our communities."

1 Furthermore, in response to their importance, the current administration mandated the Bureau of Land Management (BLM) and the United States Forest Service (USFS) to "manage forests on Federal lands, which include many mature and old-growth forests, to promote their continued health and resilience; retain and enhance carbon storage; conserve biodiversity; mitigate the risk of wildfires; enhance climate resilience; enable subsistence and cultural uses; provide outdoor recreational opportunities; and promote sustainable local economic development."

2 Since then, the USFS has issued new publications in an effort to

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ibid.

1 <https://www.federalregister.gov/documents/2022/04/27/2022-09138/strengthening-the-nations-forests-communities-and-local-economies>

define, inventory, and analyze threats to mature and old-growth forests pursuant to this order.

? December 2023, the USFS proposed to amend all National Forest Management plans that contain mature and old-growth forests. You can view IFA's official public comments for the scoping as an upload from us with these comments,

? January 2024, the USFS published Analysis of Threats to Mature and Old-Growth Forests on Lands Managed by the Forest Service and Bureau of Land Management.

? June 2024, the USFS released the Draft Environmental Impact Statement for Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System.

It is at this point that we need to highlight a significant change in the language and scope from the original EO14072 to the current OGDEIS that is critical to our comments. The mandate from the administration directly addressed the scope of its order to include both mature and old-growth forest. However, when the OGDEIS was published for comment in June, mature growth was conspicuously missing from the title. At some point after the published threats analysis, it was determined by the agency that policy changes and protection measures would nearly exclude the protection of mature growth from the agency's response to the administration mandates.

3 Old-growth forests across the country have exhibited a dramatic and severe decline since pre-colonial times. They have undergone such a decline that in many areas across the eastern continental US, including here in Indiana, literally less than 1% of the original old-growth acreage remains of that prior to European colonial settlement.

4

It is without exaggeration to say that our old-growth forests are an endangered forest ecosystem particularly in the Eastern US.

5 Without the preservation and protection of mature growth stands, old-growth acreage will never increase significantly in the Eastern national forests nor produce a substantial landscape effect across the system as a whole against climate change and achieve the intended results as stated in EO14072.

The agency in your initial NFS inventory found 47% of forests within the NFS in mature growth.

6 However, the OGDEIS states that there is very limited intent to allow these stands to mature into old-growth conditions. It states, "Past management - such as fire suppression, previous vegetation management, and/or reforestation - and natural succession or regeneration may have created mature forest or species distribution/composition that does not support desired ecological functions and conditions

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." We strongly disagree with this contention in most cases. Mature forest stands are meeting the desired ecological functions and conditions for mature growth as clearly stated in EO14072 and this needs to be reflected as by

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Ibid pg S-5.

6 Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System Draft Environmental Impact Statement, pg. S-5. File uploaded.

5 Foster DR, Donahue B, Kittredge DB, Fallon-Lambert K, Hunter M, et al.. (2010) Wildlands and woodlands: A forest vision for New England. Cambridge, MA: Harvard University Press.

4 <https://www.in.gov/dnr/nature-preserves/old-growth-forests/>

3 https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/MOG-Threats-Intro.pdf

2

the agency in the final EIS for this plan amendment. The 47% of NFS stands classified as mature must fall under the mandate of conservation and restoration of old-growth forests. The agency must recognize mature forests as recruitment stands for future old growth and accordingly the plan amendment must halt timber extraction from mature stands. Anything otherwise directly goes against the stated purposes in the OGDEIS which are, "Demonstrate compliance with Executive Order 14072 to institutionalize climate-smart management and conservation strategies that address threats to mature and old-growth forests on Federal lands," and "developing geographically informed adaptive management strategies for the retention of existing and recruitment of future old-growth forests."

8 Given that old-growth

conditions are so rare and diminished across the landscape, particularly in the Eastern national forests, it is imperative that all 47% of mature stands be recruited for old-growth conditions. Otherwise, as the varying alternatives presented in this DEIS proposed, none provide for the increase of old-growth except Alternative 2 and it is entirely too vague, giving no quantification of what amount of old growth will be recruited.

Age class identifications by the USFS fail to properly include the full potential range of species' lifespans, stopping at 120-140 years of age. To arbitrarily stop at an age that coincides with the merchantability of timber, speaks as though there is no value in forests past this age. Although many tree species can live for centuries, there is no age-class category for anything beyond what is considered harvestable or "mature". Many native deciduous tree species exhibit potential life spans from 120 to upwards of 500 years, far beyond ages at which these trees are considered to be mature. The forest conditions at varying ages are unique and change over time. A forest ecosystem is a very dynamic system. Further refined definitions for varied age classes from 100 years and upwards need to be completed and studied before definitive prediction standards can be created.

The forests across the NFS are extremely diverse and varied with complex and diverse make-up of floral, faunal and fungal species, ecosystem functions, geological, hydrological and cultural features, and microclimates. This is most evident in the Central Hardwoods Region. When IFA attended the in-person information sessions on this plan amendment in July in the Shawnee National Forest (SNF) sponsored by the USFS, officials from the agency repeatedly referenced the extreme diversity of old-growth conditions of Eastern deciduous hardwood forests and a need for site specific management applications when addressing their conservation. Also, officials at this meeting, the Analysis of Threats to Mature and Old-Growth Forests on Lands Managed by the Forest Service and Bureau of Land Management and the OGDEIS, all acknowledged that old-growth forests have not been properly evaluated in Regions 8 and 9 due to a lack of inventory data and complete definitions.

9 The OGDEIS states,

"Currently in Region 9 there are no regional old-growth narrative definitions or criteria for units to tier to for field applications, and most units have either a narrative definition without quantitative criteria or a narrative definition and an age threshold. While the region is currently

working with the Northern Research Station to develop operational definitions, they are not expected to be available until completion of the Adaptive Strategy for Old-Growth Forest

9 https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/MOG-Threats-Intro.pdf

8

Ibid, pg S-6.

3

Conservation (NOGA-FW-OBJ01)."

10 These definitions need to recognize that beyond specific features, e.g., minimum basal area, number of large trees, snags, or age thresholds, research on old growth forests in the Eastern U.S. consistently identifies the lack of human disturbance for an extended period of time, typically 80 to 100 or more years, as a precursor to old growth conditions. Consistent definitions that recognize this lack of disturbance have to be created, and complete inventories must be conducted before a Forest Management plan can be modified to address the care and maintenance of these stands and a strategic path created for growing and encouraging old-growth conditions in the Eastern US. A moratorium MUST take place for all projects until an independent inventory can be completed, otherwise many projects will proceed forward from planning to implementation that are clearly NOT in compliance with EO14072 (emphasis added).

For example, two such USFS projects in the Eastern US that contain mature and old-growth that are in the Hoosier National Forest (HNF) and fall into this category include the proposed Buffalo Springs Restoration Project (BS project) and the Houston South Vegetation Management and Restoration Project (HS project). While we recognize that your national agency has released this OGDEIS that addresses a proposed amendment to all national forest management plans to conserve mature and old-growth forests, at the local level, these two Projects which have not undergone the analysis and public comment required under the National Environmental Policy Act (NEPA) until more than two years after EO 14072 was issued and many months after the NOI was issued for the plan amendment, will inappropriately lock in management practices in the HNF for over 30,000 acres or approximately 15% of the HNF for the next 20-25 years with activities that retard the development of old-growth conditions. By implementing human disturbance through management activities which involve logging, repeated prescribed burning, construction of roads and scraping of skidder trails and fire lanes, and application of herbicides on thousands of acres of mature forest stands, these Projects are restarting the clock in these stands. The mature and old-growth in these projects will not reach old-growth conditions, according to definitions widely accepted in most research on Eastern old growth forests, for 80 or more years if the projects are allowed to proceed. All protections that will be provided by this plan amendment will be effectively stripped away. In addition, these planned treatments were conceived without the substantial body of knowledge on climate and forest science that has emerged in the last 15 years, much less with the benefit of the analysis or direction charted in this OGDEIS. Accordingly, we respectfully request that these projects be held in abeyance until further analysis and modification can ensure their compliance with the pending national forest plan amendment.

We agree with the importance of monitoring and necessary research for our Eastern forests as is seen in this letter to Secretary Vilsack from 8 US Senators that states, "This amendment must also incorporate strong monitoring, accountability, and adaptation measures to ensure that old-growth forests are appropriately stewarded over time. Monitoring of these forests must also account for the climate benefit these forests provide by assessing the amount of carbon

10 Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest

they capture and sequester."

11 No agency is capable of conducting a fair and unbiased self-examination. Proper study must be completed by independent third parties, using the best available science.

On April 25, 2024, the HNF issued a Final Supplemental Environmental Assessment (SEA), Draft Decision Notice (DN) and Finding of No Significant Impact (FONSI) for the HS project. Six months earlier, in joint written comments, IFA, Monroe County, Hoosier Environmental Council and the Friends of Lake Monroe raised substantive concerns that activities of the HS project as outlined in the Draft Supplemental Environmental Assessment (DSEA) contradict the objectives of EO 14072 outlined in the April 2023 French memorandum to regional foresters to protect mature and old-growth forest conditions.

12 We further outlined these concerns again in Pre-decision Objections to the SEA filed on June 10, 2024 and in a September 6 letter to Chris French, Forest Service Deputy Chief, et al. For our pre-decisional objections meeting regarding the HS project the above groups presented the following proposal to the USFS HNF and Mike Chaveas, Supervisor of HNF and SNF:

1. Form an advisory committee (including objectors) to work collaboratively with HNF on project implementation and oversight.
2. Reduce total project area to 1/4 of original project size
--Remove proposed Deam Wilderness expansion area North of Maumee Boy Scout Camp from project.
3. Monitor for stream sediment and erosion before, during and after treatments in treatment areas and downstream of treatment areas and in control sites. Monitoring should be performed by an independent third party.
4. Work with an advisory committee to increase monitoring and evaluation of BMP's to ensure they are being followed and share results with the public.
5. No broadcast of herbicides.
6. Monitor and maintain the duff layer on all prescribed burns.
7. Follow all US Fish and Wildlife guidelines for bats including the latest draft" guidelines for northern long-eared and tri colored bats and exclusion of locations detected in audio surveillance.
8. No timbering in stands that are greater than 99 years old.
9. Conduct threatened and endangered species inventories in stands before burning or timber harvest.
10. No timber harvest on slopes greater than 35%.
11. Specify what watershed improvement projects will be done.
12. Put these agreements into the Record of Decision.

With the exception of some collaborative monitoring, the Agency would not accept any of these points or make any counter offers including any offers to reduce proposed logging or other

12 <https://www.fs.usda.gov/sites/default/files/mature-old-growth-guidance-regional-foresters.pdf>

11

https://www.wyden.senate.gov/imo/media/doc/wyden_letter_to_usda_on_nationwide_old_growth_amend

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management activities in substantial acres of stands a century or more in age. Should a moratorium be put in place for the HS project pending a final decision on the proposed old-growth amendment, IFA is prepared to continue working with the USFS HNF on the above points.

13

Under the HS project some 13,500 acres of mixed mesophytic hardwood forest that has never been prone to natural fires, will be burned repeatedly, 4,370 of these acres will be subjected to timber harvests and 1,970 acres to herbicide applications to artificially enhance oak species dominance. According to the stand data for this project, over 48% of the forest that will undergo vegetative treatment is 100 years of age or older, 34% over 110 years, and 15% over 120. In fact, many of the dates of origin for the stands to be logged are in the 19th century with one stand of 30 acres as old as 1807! Yet despite many public comments urging the protection of mature and old growth stands, none of the proposed treatments or acreages involved were modified in any way from the 2018 Scoping Notice for this project to reflect the directive of EO14072 to conserve mature and old-growth forest or the objectives of the proposed nationwide amendment of national forest plans to implement that directive. In the HNF, this plan amendment should protect the abundant mature hardwood forest in the HS area as old-growth recruitment stands. It should also conserve old-growth conditions that are evident in tracts to be logged. The project is clearly contravening both of these objectives.

Although the forests in the BS Project area are somewhat younger than forests in the HS project, an examination of stand data reveals that more than half of the mature and older forests that exist in the BS project area are proposed to be logged. On September 12, 2024, the HNF issued a Final Environmental Assessment (SEA), Draft Decision Notice (DN) and Finding of No Significant Impact (FONSI) for the BS project. Clearly, the local management of the HNF is attempting to "lock-in" these projects before the old-growth amendment is implemented in its Forest Management Plan. A moratorium must be established on these projects and other similar projects in the NFS until such time as the proposed amendment to the outdated Forest Management Plans to protect mature and old growth stands can be completed. Doing otherwise, allowing these projects to proceed as is, is directly in violation of EO14072 and poses a serious threat to mature and old-growth forests in the NFS for decades into the future.

The report, Analysis of Threats to Mature and Old-Growth Forests on Lands Managed by the Forest Service and Bureau of Land Management, states, "From 1950 through 1990, tree cutting was the number one disturbance, removing substantial areas of mature and old-growth forests; however, this is no longer the case as agency policy has since changed significantly."

14

However, actual forest management practices today include the same treatments that were applied up to 1990. Prior to 1990 an intended goal of timber management and timber extraction was economical. Even though the intended purpose and need today is identified as addressing forest health by the USFS on nearly every proposed forest management project,

14 https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/MOG-Threats-Intro.pdf, pg 4.

13 This information is from data transmitted by the HNF to IFA by email on August 1, 2024. IFA will provide the data upon request.

6

there are no significant changes in the timber management practices actually employed. Simply calling something by another name, without making any substantive changes, does not change or prevent the adverse impacts of that activity. The only significant difference in these USFS projects from the previous era to those currently is the size and scope. The HS and the BS projects are the largest proposed timber extraction projects ever proposed in the history of the HNF.

Seemingly to legitimize today's "vegetative treatments" that are actually the same as yesterday's "logging" the Forest Service is incorrectly stating that logging is no longer a significant threat to mature and old-growth forests. The introductory report for the Threats Analysis states, "Tree cutting (any removal of trees) is currently a relatively minor threat despite having been a major disturbance historically."

15

If no changes in tree cutting practices have been conducted by the agency when previously they were a threat, how can they not be a threat today? The USFS presents Alternative 2 as their preferred alternative, claiming that commercial logging is an ecological management tool in old-growth forests. The incongruence of this claim with current practices by the agency is obvious. There is absolutely no ecological equivalent to a timber sale. Even in the most catastrophic natural disturbance, there is no set of circumstances whereby the larger trees are removed entirely from the forest. Furthermore, beyond removing just the larger trees, the HS and BS projects will use the same commercial shelterwood cutting that has been in use for decades to remove the entire forest canopy from at least 36 stands of hardwood forests that are 100 to 150 years old. Uneven-aged, multi-story conditions, complex vertical structures and diverse compositions of native tree species in these stands will be converted to even aged stands of pole timber oak. Any ideas that such logging will enhance the health, resilience, biodiversity, structure or function of these stands as mature or old growth forests are not credible. In fact by applying these timber extraction management practices, any stand that is classified as mature or old-growth are effectively taken back from those classifications by at least 90-140 years and no longer afforded the protection as an old-growth age class, the exact opposite from the stated goals of this Draft Environmental Impact Statement (DEIS)..

The DEIS should clearly state that its purpose is to examine the impacts of amending forest plans to conserve and restore more old growth forests throughout the NFS. A check of the internet for the definition of old growth forest immediately finds the following statement by Wikipedia:

"Old Growth Forest, also known as "virgin forest" is a forest that has developed over a long period of time without disturbance. The Food and Agriculture Organization (FAO) of the United Nations defines old growth forests, which it calls primary forests, as naturally regenerated forests of native tree species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed. One-third (34 percent) of the world's forests are primary

15 Ibid, pg 1.

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forests."

...

"A forest regenerated after a severe disturbance, such as wildfire, insect infestation, or harvesting, is often called second-growth or 'regeneration' until enough time passes for the effects of the disturbance to be no longer evident. ... Hardwood forests of the eastern United States can develop

old growth characteristics in 150 to 500 years."

16

The lack of human disturbance prevails in other sources as well. In the 2017 Forest Sustainability Audit of Indiana's State Forests by the Forest Stewardship Council, the Indiana Division of Forestry stated "Type 2 Old Growth Forest", that which recovers from human disturbance, has dominant canopy trees with a mean age exceeding 150 years on mesic sites and 175 years on drier sites. The IDOF further defined such old growth as follows:

"Developing Old Growth (a.k.a. "Type 2 Old Growth"): 20 acres of forest that that have been logged >80 years ago and retain significant old growth structure and functions. Additionally, developing old growth stands have had little or no human-caused understory or groundstory disturbance within the previous 80-100 years, depending on site quality. Examples of understory/groundstory disturbance could include, but are not limited to prescribed fire and grazing."

17

And in Old-Growth Forest of the Central Hardwoods Region, Purdue forester, George Parker states:

"Mesic odd-growth deciduous forests are defined here as those with overstory canopy trees older than 150 years and with little or no understory disturbance (human caused) during the past eighty to 100 years."

18

Additionally, in Characteristics of Old-growth Mixed Mesophytic Forests, biologist William Martin states:

"Existing old-growth forests and forests recommended for management for old-growth development should not show evidence of recent logging and

18 Parker, G.R., Old-Growth Forests of the Central Hardwood Region, Department of Forestry and Natural Resources, Purdue University, West Lafayette IN 47907, Originally published in the Natural Areas Journal 1989. 9(1): 5-11.

17 SCS Global Services Report, FOREST MANAGEMENT AND STUMP-TO-FOREST GATE CHAIN-OF-CUSTODY SURVEILLANCE EVALUATION REPORT, Indiana Department of Natural Resources,

Division of Forestry, State Forest Properties, SCS Contact: Brendan Grady, Director, Forest Management Certification, 1-512-452-8000, bgrady@scsglobalservices.com, 7-9 November, 2017, Go to: <http://info.fsc.org/> for Section A of the Audit report, p. 22.

16 https://en.wikipedia.org/wiki/Old-growth_forest

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other human activities."

19

As well as in An Old-Growth Definition for Dry and Dry-Mesic Oak-Pine Forests, ecologist David White and research forester F. Thomas Loyd of the USFS state:

"We consider oak-pine stands that have minimal evidence of post settlement human disturbance and contain pines exceeding 100 to 125

years to be approaching, if not already functioning as, old growth. . . .

In general, we recommend that most stands with pines and oaks that exceed 100 to 125 years and have experienced little recent human disturbance, be considered to be in the early stages of old growth."

20

Today's logging in the NFS by the USFS appears to be motivated by the proceeds from the sale of the timber from our public forests and budgetary funds from the US govt for wildfire prevention, with an attempt to cloak this intent behind a veil of ecological justifications. There is no other way of putting it. The agency is allowed to keep the money from the commercial sale of timber, yet bill the taxpayers for its expenses. This approach should also be halted to ensure that the agency's analysis of the purposes and needs for "vegetative treatments" and "ecological restorations" are based on an objective assessment and application of the latest research to site specific conditions, and constrained by an understanding that genuine compliance with EO 14072 will necessitate a substantial reduction in the agency's present logging program.

The OGDEIS blanketly mischaracterizes the whole Eastern deciduous forests as an historic oak-hickory dominated forest and identifies a process of mesophication as a detriment to the future of old-growth. We fundamentally reject the tenet that the natural ecological process of forest succession in the Eastern US is detrimental to the future of old growth Eastern hardwood forests. The DEIS states, "Structure and composition of old-growth forests in the eastern United States are threatened by mesophication, a process characterized by the transition of oak, hickory, and other frequent-fire deciduous forests to shade-tolerant, late successional species-dominated forests."

21 This fails to recognize the rich diversity of a variety of dominant and co-dominant tree species that characterize the upper canopy both historically and currently in the majority of these Eastern forests. Forests in the Eastern US are a rich mosaic of many different forest types and more aptly are mixed mesophytic rather than just an oak-hickory dominated forest ecosystem. The fact that tulip poplar, beech, sugar maple, black walnut, and various ashes, elms, gums and other species have long been present and in many cases have dominated old growth stands in the Central Hardwoods Region attests to this reality.

21 Draft EIS for Amendments to LMPs to Address Old-Growth Forests Across the NFS, pg 65.

20 White, D.L., Loyd, F.T., An Old-Growth Definition for Dry and Dry-Mesic Oak-Pine Forests, USDA Forest Service, Southern Research Station, General Technical Report SRS-23, Sept. 1998, p. 29.

19 Martin, W.H., Characteristics of Old-growth Mixed Mesophytic Forests, Division of Natural Areas, Eastern Kentucky University, Richmond Kentucky 40475, Originally published in the Natural Areas Journal 1992. 12(3): 127-135.

9

For example, the HNF claims that the BS project area in Southern Indiana was historically dominated by *Quercus alba*. One of the major goals of the project is to eradicate the shade tolerant species such as beech and maple that are outcompeting the oaks.

22

In actuality, the

project will replace the more mixed mesophytic hardwood forest ecosystem that existed throughout the BS project area before the European-American settlement of southern Indiana according to the original U.S. Government Land Surveys. These surveys were undertaken at

the beginning of the 1800s to create the boundaries of townships and dispense land to settlers. Researchers at Indiana University's Historical Landscapes Laboratory have compiled the data from those surveys stored in the Indiana Archives.

23 This data includes the section corner trees

("monuments"), witness trees, and other trees and vegetation identified by surveyor teams who surveyed the Buffalo Springs area from 1804 through 1807.

IFA has examined 120 of those surveys that spanned a rectangle approximately 12 miles long from east to west and 10 miles across from north to south across nearly all of the BS proposed project area. Of the 576 trees identified in those surveys by federal government surveyors to describe the forest of this area, 248, or 43%, were identified as beech. Oaks made up 119 trees, or 21%, of those identified. Maples made up 67 trees, or 12%, of those identified.

Poplars and hickories each comprised 6% of the trees identified (35 poplars and 34 hickories) and gums comprised 5% of the trees (27). Black walnut, butternut, white ash, ash, mulberry, dogwood, redbud, chestnut, elm, sassafras, sycamore and ironwood made up the remaining 7% of trees identified. Thus, based on the government's actual survey data from the relevant time period, oaks and hickories comprised only 27% of the trees in the project area, or just over one fourth of all trees identified in these surveys. More than twice as many beeches and maples were found (315) than oaks and hickories (153). These data indicate that oaks and hickories were significant and played a role in the old-growth forests within the project area, but they were by no means the most numerous of the large trees present. The results of these surveys are shown in the pie chart below.

23 <https://storymaps.arcgis.com/stories/5fecb88a73d43caa70377e77a932c15>

22

file:///C:/Users/Stewarts/Desktop/Current%20Project/Save%20Hoosier/Buffalo%20Springs/FINAL%20EA%20and%20Desision/Final%20Environmental%20Assessment.pdf, pg 7-10.

10

Rather than an oak-hickory predominant forest, these surveys indicate the pre-colonial settlement forest in the BS area was a more diverse, mixed mesophytic hardwood forest. As a result, the USFS HNF has not remotely satisfied its duty to coherently explain the basis for the underlying "need" to justify the goal of "improving the sustainability of the oak-hickory ecosystems" in this project. The work of biologist E. Lucy Braun from 1950 remains the definitive foundational work identifying forest types in the eastern US. This was affirmed and updated by James Dyer, 2006, *Revisiting the Deciduous Forests of Eastern North America*.

24

In fact, instead of being the dominant component of most healthy, natural Eastern hardwood forests, the current dominance of oak in the canopy of many Eastern hardwood forests has been recognized by researchers as an artifact of human disturbance and stressed environments. In "Fire and the Development of Oak Forests," fire researcher Mark Abrams states,

"After European settlement, a regime of recurring logging and fire through the 1800s associated with charcoal iron production (Pearse 1876) and other activities (e.g., land clearing and producing timbers for coal mines) perpetuated or even increased oak dominance in the mid Atlantic region (Table 2). In New Jersey, cutting trees for charcoal favored oak and birch

24 <https://academic.oup.com/bioscience/article/56/4/341/229041>

11

(Russell 1980). Former white oak-white pine forests in central Pennsylvania became dominated almost exclusively by white oak and black oak after clear cutting and burning in the 1800s (Abrams and Nowacki 1992).

Conclusions

... Indian burning practices and other disturbance factors may have elevated oak dominance in certain presettlement forests. Further increases in oak occurred after European settlement, whose activities included fire exclusion in tall grass prairie and southeastern pine forests; logging and burning of northern pine-hemlock forests; and the charcoal iron industry, land clearing and the chestnut blight in the mid-Atlantic region. Thus, the postsettlement distribution of oak greatly exceeded that of the pre-settlement era in various regions of eastern North America. However, the evidence indicates that oak is not a typical dominant in late successional forests, and its stability is probably limited to sites of extreme edaphic or climatic conditions or areas that are periodically burned."

25

In addition, the agency must take a hard look at the impacts of prescribed burns in Eastern National Forests on mature and old-growth because the individual National Forests are failing to do so at the project level and most are operating under outdated Management Plans that did not meaningfully examine the impacts of prescribed fire. Yet widespread prescribed burning on unprecedented scales is being proposed by the USFS in the HNF and throughout the NFS during all seasons of the year without studies or inventories of the numerous species of invertebrates, amphibians, reptiles, small mammals, bats, and ground and shrub nesting birds that did not evolve in fire dependent forest ecosystems and will be harmed by these burns. Many of these are declining and/or listed as rare, threatened or endangered species across much of the Central Hardwoods Region..

Despite agency claims that the carbon released from prescribed burns is negligible, there is also no attempt by the USFS that we are aware of to estimate or model the release of carbon from prescribed burns. Even though prescribed fire is cited as a form of "nutrient release" that can fuel plant growth, there have been virtually no adequately scaled studies of the impacts on water quality of nitrate and phosphorus release by prescribed burns routinely being proposed over projects of landscape scale sizes, i.e., 5,000 to 15,000 acres that cover the entire watersheds of streams and lakes. While the USFS extolls the values of its projects in promoting forest health and biodiversity, it engages in no discussion in these projects or in this DEIS of how prescribed fire is designed to dry out moist conditions in forest duff layers and markedly reduce the existence and resilience of most native tree species in mixed mesophytic hardwood forests that are facing added stresses from climate change. If this OGEIS is to

25 Abrams, Marc D., Fire and the Development of Oak Forests, Bioscience; May 1992; 42, 5; Research Library Core pages. 346 - 353.

12

assess the management needed to help mature and old-growth forests, including those in Eastern National Forests, remain resilient to the stresses of climate change, surely it must examine management practices such as prescribed burning that are designed to weaken the health and resilience of most Eastern hardwood trees.

The discussion of definitions for old-growth Eastern deciduous forests of Region 9 in Mature and Old-Growth Forests: Definition, Identification, and Inventory states, "Tree age, size, and

carbon storage capacity differ dramatically across old-growth and mature forest types depending on species, local ecosystems, site conditions, and more. Despite these challenges, a common understanding of which forests are old-growth or mature, and the extent of these forests on lands managed by the BLM and Forest Service, is the foundation for assessing the status, condition, and restoration needs to mitigate the effects of climate change."

26 A mature

or old-growth stand, is a complex ecosystem with a broad network of species interacting beneficially for the individual, and for the system as a whole. As an example, endangered bat species rely on the karst features for hibernaculum and specific bat trees for summer roosts. Also, the moisture intake from the life in mature and old-growth stands is dependent on the deep hummus and canopy and root systems that the older trees in a forested area provide over time. Also in nearby canopied areas ambient temperatures are consistently lower further helping to retain moisture.

27 Many mature and old-growth stands across the NFS provide these

benefits sustaining a greater biodiversity and a longevity to their life cycles. If forest management continues to extract the largest trees and codominant trees around them and the understory is burned on 2-5 year cycles by "prescribed fire", these benefits are lost. Such management to transform Eastern mesophytic hardwood forests into much drier, xeric oak forests reduces their absorption of precipitation and protection of our precious water resources. As originally described by Braun 1950 and later by Dyer 2006 both current and historical mature and old-growth stands in Indiana and much of the midwest are Mesophytic. Forest management, like the methods proposed to be employed in the HS and BS projects in the HNF, under the guise of increasing climate resilience and promoting forest health, will on the contrary, proliferate the negative effects of climate change and global warming rather than mitigating their destructive impacts to our region's forests. Targeting shade loving species like maple and beech in order to propagate unnatural domination by oaks is the exact opposite of what is needed in mature and old-growth in the HNF. Mesophication is a process, not a disease that must be treated in an already predominantly mixed mesophytic forest. It is a part of natural succession that has happened in our mature and old-growth in much of the Central Hardwoods Region for millenia. Site specific strategies have to be utilized with appropriate site specific research; otherwise, not only are our mature and old-growth trees in danger but so is our whole Central Hardwoods Region ecosystem.

27 De Frenne, P., Zellweger, F., Rodriguez-Sanchez, F., Scheffers, B. R., Hylander, K., Luoto, M., Vellend, M., Verheyen, K., Lenoir, J. 2019. Global buffering of temperatures under forest canopies. *Nat. Ecol. Evol.* 3:744-749.

26 <https://www.fs.usda.gov/sites/default/files/mature-and-old-growth-forests-tech.pdf>, pg 3.

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If mature and old-growth amendments of the national forest management plans for the Eastern forests do not:

- 1) Include mature growth protections that encourage recruitment of future secondary old-growth,
- 2) Conduct site specific regional research for old-growth stands of 100+ years to fill the void of scientific data that currently characterizes mature and old-growth forests in our Eastern US,
- 3) Discontinue all plans to timber and apply unnatural fire regimes on mature and

old-growth stands which sets back the time clock for old-growth regeneration by 80 or more years, and

4) Collaborate with third-party research in the conservation and ecological restoration scientific community,

the intended goals of this OGDEIS will not be reached and a failure of compliance with EO14072 will occur. Rather than strengthening, perhaps our best climate change mitigation tool, our mature and old-growth forests, and practicing sound management based on the principles outlined in these comments, future NFS forest management will be complicit in contributing to nothing less than the potential extinction of an endangered forest ecosystem. Again, we at the Indiana Forest Alliance extend our gratitude to the Forest Service, the Biden Administration and the National Environmental Policy Act for this opportunity and look forward to collaborating with the Forest Service to protect our Nation's treasured old-growth forests.

The following are the comments of the undersigned on the old growth plan amendment, as described in the draft environmental impact statement (DEIS) and other documents available on the project web page. We incorporate by reference our previous comments: on the Request for Information (comments dated August, 22, 2022), on the Advanced Notice of Proposed Rulemaking (ANPR) dated June 28, 2023; and on the notice for the proposed amendment dated February 1, 2024.

All of the undersigned have long been involved with efforts to secure protection for the nation's older forests, especially on national forest lands.

I. INTRODUCTION

It is universally agreed that older forests are valuable ecologically, culturally, and for fighting climate change. With the President's Executive Order 14072 of April, 2022, the Forest Service was given a golden opportunity to institute long overdue, real protection for our older forests on national forest lands. Unfortunately, the proposed action would mostly waste this opportunity for a scheme that seems to emphasize logging and other treatments, rather than emphasizing protection and retention of these forests and allowing cutting of older forests in only a very narrow set of circumstances. The proposed action would not protect old growth and doesn't require sufficient attention to mature forests, i. e., future old growth.

Below, we describe how the proposal is seriously off-track in term of mature and old growth forest protection, and how to correct this.

II. DIRECTION IN THE AMENDMENT FOR IDENTIFYING EXISTING AND POSSIBLE FUTURE OLD GROWTH MUST BE STRONGER

As we discussed in our NOI comments, forest stands will best achieve old growth status and retain it if they are left alone; i. e., no manipulative management is done. See Faison et al, 2023.

2

The amendment must provide stronger direction for identifying and protecting existing and future old growth. Under the proposed amendment, management of old growth would occur via implementation of the "Adaptive Strategy for Old Growth Forest Conservation". However, development of the strategy is not required, as it is only a management approach (MA). See MA 1.a, DEIS at 21. MAs are not required plan content under the Planning Rule. 36 CFR 219.7(e)(1), (f)(2). Language under "Intent" for MA 1.a states:

Management approaches and strategies are optional plan content to include in a land management plan (LMP); however, once included they are not optional to follow.
DEIS at 21.

Note, however, that in determining the consistency of proposed projects with their respective plans, management approaches are not considered. See 36 CFR 219.15(d).

In other words, units could evade the intent of the amendment and any required protection of old growth by merely choosing not to develop an Adaptive Strategy.

The following provision of MA-1.a is especially important and cannot be a mere MA:

v. Identify and prioritize areas for the recruitment, retention and promotion of old-growth forests, based on: ecological integrity, inherent capability, threats, stressors, and opportunities relevant to the plan area in order to provide for the long-term resilience of old-growth forests conditions within the plan area.

DEIS at 21. Without this, there is essentially no direction for protection of existing and potential old growth. This must be a standard.

Similarly, units could decline to pursue the following MA, designed to ensure retention of mature forests that can become future old growth, MA-1b states:

Identify areas that have the inherent capability to sustain future old-growth forest (i.e. areas of likely climate or fire refugia) over time and prioritize them for proactive stewardship for one or more of the following purposes...

Id. at 23. This must also be a standard.

The proposed amendment does not have sufficient provisions for protecting future old growth, i. e., recruiting stands for future old growth.

3

III. THE ROLE OF FIRE

See section III of our comments on the ANPR for additional discussion of this issue.

Fire can help maintain old growth in areas that historically had frequent fire, such as in some lower elevation areas of the west. See section IV of our February 1, 2024 comments. Fire is part of the life cycle of almost every forest type in at least the western U. S.

A. OLD GROWTH FORESTS SHOULD NOT NECESSARILY BE MANIPULATED IN ANTICIPATION OF POSSIBLE FIRE, EVEN IN AREAS WITH FREQUENT FIRE

The Forest Service considers fire to be the biggest threat to older forests FS-BLM, 2024 at 1.

Yes, old growth can be changed or eliminated (at least temporarily) by fire. But fire is part of the life cycle of almost all forests, including old growth forests, even if it is very infrequent. ¹ It is likely that many existing old growth forests have burned in the past. After fire, they are renewed, and may become old growth again a century or more into the future. Existing and developing old growth forests should not be treated just because they could be adversely affected by fire.

In areas with frequent fire, some stands have become denser than they were historically due to human suppression of fires. Treatment, particularly if it includes fire, can help restore these forests and promote old growth, but not all such forests need or could benefit from treatment, as is discussed below.

A sizable majority of old growth on national forest lands is in areas with infrequent fire. See DEIS at 62. Thus for most old growth forests on national forest land, treatment is likely neither needed nor appropriate because fire was never frequent in their respective eco-types, and ecological processes are continuing as they have historically in these forests.

Even ecological types thought to have been shaped exclusively by frequent, low-intensity fire may have actually had mixed severity fires, including some stand-replacement fires. With regard to the Front Range (of Colorado) ponderosa pine, long thought to be unnaturally dense across its landscape because of decades of fire suppression, Kaufmann et al, 2007, stated:

Lower overstory and understory productivity, and often a lack of continuous fine fuels to carry surface fires across large areas, historically resulted in less frequent fires than typically found in ponderosa pine forests elsewhere.... Fuels accumulated

¹ In many old growth stands, fire will be very infrequent. See, e. g., Sibold et al, 2006, concerning Englemann spruce-subalpine fir.

during periods of 3-7 or more decades between fires, largely in the form of fuel ladders caused by gradual growth of smaller trees, shrubs, and combustible fuels beneath taller trees. Thus, periodic fires often killed patches of overstory trees (including old ones), thinned the overstory in other areas, burned as surface fires, or missed some areas altogether—classic features of a patchy, mixed-severity fire regime. It is likely that some stand-replacing fire occurred even in very sparsely forested patches dominated by shrub communities. ...

Old ponderosa pine trees were very common across historical landscapes in the Colorado Front Range, and a surprising number of old trees still exist after more than a century of human activities. In the unlogged ponderosa pine landscape at Cheesman Lake on the South Platte River (recently burned over and effectively destroyed during the Hayman Fire [of 2002]), trees more than 200 years of age (many more than 400) were found in considerably more than half of the patches... (Citations omitted, emphasis added.)

Another study of the Colorado Front Range (Sherriff and Veblen, 2006) concluded as follows: These findings for the *P. ponderosa* zone above ca. 2200 m [7200 feet] (i.e. most of the zone) contradict the widespread perception that fire exclusion, at least at the stand scale of tens to hundreds of hectares, has resulted in unnaturally high stand densities or in an atypical abundance of shade-tolerant species. At relatively mesic sites (e.g. higher elevation, north-facing), the historic fire regime consisted of a variable-severity regime, but forest structure was shaped primarily by severe fires rather than by surface fires.

The variable fire regime in forests in the Front Range of Colorado area dominated by ponderosa pine created patches with different structures, some of which were likely old growth at times. Conditions like those described above likely appear in other forests of the west. Manipulating these forests, at least on a large scale, e. g., by uniformly thinning from below, would create an unnatural structure, and if maintained, prevent old growth character from developing.

Even areas with dense stands in the ponderosa pine type of the Colorado Front Range need to be examined before it is assumed that they became dense only because of human fire suppression. Some areas of ponderosa dominated forests were logged, often taking the largest trees, as they made the most house logs, railroad ties, and other products manufactured during the settlement era 2. Thus the absence of large, older (pre-settlement) trees in some of these stands today may be

a result of this high-grade logging. Also, previous manipulation, if it coincided with a good pine seed year and adequate winter and early growing season precipitation, may have led to dense regeneration, the genesis of the dense mature stands we see in some lower elevation areas today. Also, livestock grazing, where it occurred, acted as a human fire suppressant. Cows and sheep ate grasses, shrubs, and forbs that would have otherwise propagated low-intensity fires. The absence or paucity of ground vegetation made it easier for pines to establish, allowing denser stands to form. See Belsky and Blumenthal, 1997.

The bottom line is that dense stands in areas thought to have had frequent fire may have been caused by human manipulation other than solely suppressing fires. Data must be gathered locally to determine whether areas of dense forest historically were more open before any manipulation of existing or developing old growth is approved. If forests were historically different, the analysis must show that any proposed treatment would be beneficial and would aid in retention or recruitment of old growth.

B. THE INFLUENCE OF "CULTURAL" BURNING IS GREATLY OVERSTATED

Suppression and the absence of frequent cultural burning and other Indigenous stewardship practices have led to dense forests of today that are vulnerable to drought, forest insects and diseases, and wildfires...

DEIS at 72; citations omitted. The concept that "cultural" burning, i. e., intentional burning by indigenous peoples, was widely prevalent prior to European settlement, and thereby had a large influence on the structure and composition of historical forests, is strongly refuted by Barrett et al, 2005. For the northeastern United States, see also Russell, 1983.

Burning by indigenous people in the pre-European settlement era did occur but appeared to have been "highly localized and unpredictable", and "was probably rare to absent in wet or cold forest types, where climate seems to be the limiting factor for fire regimes...". Barrett et al at 32; citations omitted. In other words, burning by indigenous peoples did not shape the broad landscape forest structure or composition to more than a very minor degree in most areas. Clearly, the lack of indigenous burning over the last century or so has NOT led to widespread, overly stocked forests. The Threats Analysis (FS-BLM, 2024) admits that the frequency and extent of cultural burning is debated. Id. at 27.

Note that the majority of national forest old growth is in areas with infrequent fire, as discussed above.

2 This is known as "high-grade" logging, taking the largest trees from a stand and leaving the other trees.

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C. PROTECTION OF RESIDENCES IS BEST ACHIEVED BY TREATMENT ON AND ADJACENT TO THE BUILDINGS.

As Cohen, 1999 and 2008, demonstrated, treatment is only needed in the "home ignition zone", about 30 meters surrounding each building, to protect the respective homes. Fire will not directly ignite even pure wood structures from a distance greater than this. Removal of fuels on and around buildings will make it hard for them to burn, even in the hottest wildfires. Thus homes can be protected without cutting much mature and old growth forest, where homes adjoin national forest land with such stands.

See additional discussion in section III of our comments on the ANPR.

IV. LOGGING REMAINS A MAJOR THREAT TO OLDER FORESTS

Logging is said to not be a major threat to old growth. DEIS at 68, FS-BLM, 2024, at 37 et seq. However, nationally, approximately 25 percent of old growth is in the wildland-urban interface. DEIS at 81, 99; USDA Forest Service, 2024b at 91. In three Forest Service regions, it is over 40 percent. Id at 81. Given the high level of concern over fire susceptibility because of recent fires, there will be considerable pressure to log in and near the WUI to reduce fuels, especially in areas near infrastructure.

This will likely affect old growth forests. The DEIS admits that

There may be instances where fuels reduction efforts in the WUI do not necessarily align with maintaining ecological integrity.

Id. at 81 (citation omitted); USDA Forest Service, 2024b at 91. 3

Modifying fire behavior will remain a priority in the Wildland-Urban Interface (WUI), which is typically, but not always, compatible with stewardship of old-growth ecosystems.

DEIS at 99.

3 The DEIS Glossary does not include a definition for WUI. The definition most commonly used is from the Healthy

Forest Restoration Act at 16 U. S. C. 6511 (16). This very broad definition includes, in some cases, areas up to 1.5 miles from at-risk communities as being in the WUI. See further discussion below in section VI.

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FS-BLM, 2024 cites statistics "suggesting significant growth in housing near mature and old growth forests" between 1990 and 2020. Id. at 62. This will increase the pressure to treat forests in and near the WUI, some of which will be mature and old growth.

It is also clear that the agency is attempting to increase timber output generally. See FY 2022 Timber Program Performance. 4 That document notes that the Pacific Northwest, Eastern, and Southern regions are the "geographic regions most likely to contribute to increased output". Some of this increased timber output is likely to come from old growth stands, or mature stands that could become old growth if they are left alone.

The consumer demand, aided by Forest Service grants, for a relatively new timber product, cross-laminated timber (CLT), which can be used to construct buildings, is increasing. See: <https://www.fs.usda.gov/about-agency/features/forest-products-support-healthy-forests>. This web page notes that "Forest Service Wood Innovations grants created strong momentum for mass timber construction." The desire for trees to make CLT will, among other factors, continue to put pressure on the Forest Service to increase timber sales.

We note that the agency will continue to have access to large amounts of appropriated money for vegetation management, courtesy of recent laws passed by Congress and signed by the President. For example, the Inflation Reduction Act (IRA) appropriated \$1.8 billion for fuels reduction in the WUI and \$200 million for vegetation management projects done under the Healthy Forests Restoration Act. IRA at section 23001 (a)(1) and (2). 5 Section 40804 (a) of the Infrastructure Act appropriated \$2.13 billion for a variety of national forest projects through 2026.

As the Threats Report states, some of the money from the infrastructure law will be used to treat landscapes identified for the Wildfire Crisis Strategy. Some of these landscapes to be treated contain mature and old growth forests, as is discussed below.

In response to wildfires, the agency developed a Wildfire Crisis Strategy. See USDA Forest Service, 2022a, 2022b. Initially, the agency prioritized ten landscapes for implementation of the strategy (USDA Forest Service, 2022d), then added 11 more in 2023. These landscapes cover about 13 million acres, on which \$131 million from the Infrastructure Act will be applied. FS-BLM, 2024 at 59. As it turns out, some of these landscapes have old growth:

4 This is available at: <https://www.fs.usda.gov/sites/default/files/fy2022-agency-timber-target-report.pdf>. Accessed August 8, 2024.

5 This law also appropriated "\$50,000,000 for the protection of old-growth forests on National Forest System land and to complete an inventory of old-growth forests and mature forests within the National Forest System." Given the desire to treat mature and old growth forests, as discussed throughout these comments, some of this money could be used to treat old growth, under the guise of "protection", in ways that would be detrimental to existing and potential future old growth.

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Estimates show that 16 percent of all estimated mature forest and 13 percent of all estimated old-growth forests on lands managed by the Forest Service are found within Wildfire Crisis Strategy Landscapes...

Ibid.

It is safe to say that logging on national forest lands will increase in the next decade at least, and some mature and old growth forests will be affected.

To make any timber sales and vegetation management projects more attractive to industry, the agency will be tempted to include large trees, as more wood product(s) can be made from such trees versus smaller trees. The biggest concentrations of larger trees will be in mature and old growth forests, as older trees are usually larger than younger ones, all other factors being equal. Has the Forest Service forgotten its relatively recent history - the demand for timber from national forests lands and the agency's willingness, if not eagerness, to fulfill it, led to an ecological crisis in the form of near-extinction of at least two species (northern spotted owl and marbled murrelet) in the Pacific Northwest in the late 1980s?

The only thing that could prevent increased logging of old growth forests on national forest lands in this pro-treatment environment would be a strong rule protecting these forests. However, as is discussed throughout these comments, the proposed old growth amendment would allow, if not encourage, logging of old growth and mature forests; it does not provide confidence that they will be protected. At the same time, the agency is attempting to increase output of timber. Therefore, it is quite likely that more than a minor area of old growth forests would be cut to satisfy these perceived needs.

The bottom line: logging remains a major threat to mature and old growth forests.

V. THE PROPOSED AMENDMENT IS SLANTED HEAVILY TOWARD MANIPULATION OF OLD GROWTH

Reading the proposed amendment and associated text (like the DEIS and Threats Report), one gets the strong impression that the Forest Service believes that old growth and mature forests, far more often than not, will need to be manipulated by humans. This is the exact opposite of a framework that would best retain old growth. The assumption should be that old growth does not need to be treated, with exceptions for public safety, removing roads and exotic species, and some situations in frequent fire forests. See our February 1, 2024 comments at 6-7 and further

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discussion below. See also Faison et al, 2023, who found that forests which are not actively managed develop the most complexity, biological diversity and carbon storage. (See section VII below for more on the latter.)

We appreciate standard 3, which would prohibit the use of proactive stewardship (i. e., vegetation management; see more below) in old growth for the purpose of timber production. DEIS at 32. However, as is discussed below, units would be allowed, if not strongly encouraged, to conduct vegetation management in old growth forests. And notably, none of the alternatives would change suitability of lands for timber production. DEIS at 15. 6 Thus areas of old growth or developing old growth currently suitable for timber in forest plans would remain suitable. Even if they were not cut to produce commercial timber, they would still be used to calculate the long-term sustained yield, the projected timber sale quantity, and the projected wood sale quantity for each respective unit. (See FSH 1909.12 at 64.23.) These calculations should not include areas with old growth or developing old growth forests because these areas must not be considered for commercial wood production per standard 3.

Under the proposed amendment, management approach 1.a encourages units to develop an "Adaptive Strategy for Old Growth Forest Conservation", under which units should:

v. Identify and prioritize areas for the recruitment, retention and promotion of old-growth forests,...

Similarly, MA 1.b encourages focus on future old-growth forests in the Adaptive Strategy: Identify areas that have the inherent capability to sustain future old-growth forest

(i.e. areas of likely climate or fire refugia) over time and prioritize them for proactive stewardship for one or more of the following purposes...

i. To provide for long-term resilience;

ii. To reduce fire hazard, spread or severity, or the spread of potential insect or disease outbreaks; ...

DEIS at 21, 23.

The DEIS Glossary provides the following definition of proactive stewardship:

6 We find no analysis or discussion the DEIS about how much land containing mature and old growth forest is considered suitable for timber production under existing plans for each unit. This calculation should be made and displayed in the FEIS for each unit.

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Proactive stewardship: Refers to vegetation management that promotes the quality, composition, structure, pattern, or ecological processes necessary for old-growth forests to be resilient and adaptable to stressors and likely future environments...

DEIS at G-2; emphasis added.

In standard 2.a:

For the purposes of this standard, the term "vegetation management" includes - but is not limited to - prescribed fire, timber harvest, and other mechanical/non-mechanical treatments used to achieve specific silviculture or other management objectives (e.g. hazardous fuel reduction, wildlife habitat improvement).

DEIS at 29.

Thus the proposed action directs units to develop strategies that will manipulate old growth vegetation.

However, leaving older forest ecosystems alone will in most cases be the best, if not the only, way to ensure retention of existing old growth and development of mature forest into old growth.

See Faison et al, 2023. Forest stands take time, in some cases centuries, to fully develop old growth characteristics. Trees need time to grow to the large sizes found in such ecosystems.

Trees die, providing snags, which are critically important for numerous avian and some mammalian species. New trees regenerate and grow in the openings that result from large tree mortality, forming the all-aged structure common in old growth stands. Soil needs time to develop its productivity from years of slow decay of down dead trees and other plant material. Human manipulation delays or thwarts old growth development.

There are a few circumstances where some treatment of old growth forests may be appropriate.

See our 2023 comments at p. 7 for a discussion. One of those circumstances is old growth in areas with frequent fire that have a different structure and/or composition due to human fire suppression. That is discussed in section III A of these comments above.

The DEIS touts the benefits of treating forests to retain old growth characteristics to help them develop:

Silvicultural approaches can aid in restoring old-growth attributes by mimicking natural forest dynamics and promoting structural complexity and biodiversity...

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Id. at 74; citations omitted. However, one essential fact is that treatment usually results in the removal of biomass from the system, where it would normally be retained and contribute to various ecological functions. Thus any kind of treatment that results in wood (including down dead material) being removed from the ecosystem rather than recycled within it does not mimic natural processes, except in some historically frequent-fire areas that have grown dense because

of fire suppression.

The Threats Report cites a specific forest type where potential future old growth could supposedly benefit from treatment:

limited tree cutting in mature forest may stimulate areas of spruce/fir forest to develop more complexity and more characteristic species composition and therefore old-growth characteristics more rapidly.

FS-BLM, 2024 at 44.

However, Englemann spruce-subalpine fir forests, in Colorado at least, are naturally quite complex, often having two, three, or more age classes. Due to long fire-free periods (because these upper elevation areas burn very infrequently) and natural forces such as windthrow, localized insect and disease attacks, and deaths from old age, these forests develop gaps in the canopy and thus structural complexity. See Alexander, 1987 at 6-7. Treatment should never be needed in spruce-fir forests to help develop old growth characteristics.

Note that the Threats Report states that current conditions of old growth forests in areas with infrequent fire do not need to be changed:

In forests where fire was historically less frequent, the [current conditions] likely represent the forest conditions appropriate for the environment and disturbance regime.

FS-BLM, 2024 at 63. This report also states that:

Tree cutting (harvest, thinning, or otherwise), is rarely recognized as a restoration prescription to reduce vulnerability for infrequent-disturbance old-growth forest ecosystems.

Id. at 45.

Most older forests are naturally more resistant to fire, at least stand-replacing fire. They have high canopy closure, which shades the forest, keeps it cooler, and retains more moisture than

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younger or more open forests. Down dead logs, after they begin to decompose, also retain moisture and resist ignition. Large trees are much more difficult to ignite than smaller ones, as it takes more sustained, higher heat to do so.

One of the purposes of sustaining future old growth, "i.e. areas of likely climate or fire refugia", through proactive stewardship is:

To promote climate adapted species assemblages in areas where changing climatic conditions are likely to alter current conditions and change species assemblages over time.

MA 1.b (viii), DEIS at 23.

Climate refugia will indeed be needed as the Earth's climate continues warm. Some wildlife species will seek cooler, more moist environments. Given its attributes as described above, what better place, aside from more northerly latitude or higher elevation, exists to provide refugia than old growth forests? This is yet another reason to retain these ecosystems, i. e., not manipulate them to where they begin to lose their value as climate refugia.

To significantly reduce the fire susceptibility of any stand, as is contemplated by MA 1.b, considerable manipulation would need to occur. That is, removing just a few trees or a little ground fuel would not reduce the ignition likelihood by more than a very minor amount because the fuel load would still be high. Reducing the fire susceptibility would thus require major manipulation, likely including all of the following: removal of a sizable percentage of trees to achieve adequate spacing between trees so as to reduce the susceptibility of the area to crown fire; significant reduction of the canopy cover provided by tree crowns (an effect of the above); cutting of most small trees to reduce ladder fuels; removal or other treatment of down dead wood; removal of standing dead trees (snags); and the use of heavy equipment to perform the

work. In a dense stand, treatment would likely cause more than 25 percent tree mortality, the threshold for disturbance. See FS-BLM, 2024, at 10.

Effective fuel reduction could lead to a change in classification of what was an old growth stand to one that was not.

tree cutting [based on land management plans] seldom results in transformation of old-growth forest to an earlier developmental stage-but sometimes it does change the status of mature forests.

FS-BLM at 37.

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However, many of the national forest units do not have standards for old growth in their management plans, including almost all of Region 3 and most of Region 2. DEIS Appendix C, Table 4 at C-5 et seq. In any case, the pressure to treat forests to reduce fuels in some areas would often require radical reduction of biomass (via the methods described above), leading to a classification change for old growth and mature forests, or at a minimum a significant degradation of old growth quality and function.

Such classification changes would be a threat to the ecological structure of any mature/old growth stands in general. See FS-BLM, 2024, at 9.

One of the activities specifically allowed under proactive stewardship is: reduction of hazardous fuels to reduce the risk of loss of old-growth forests to uncharacteristic wildfire, and to facilitate the return of appropriate fire disturbance regimes and conditions; ...

Standard 2.a, DEIS at 29. To reduce the risk of uncharacteristic wildfire, a stand would have to be manipulated to the point where it was no longer old growth, as is further discussed above and below.

Manipulation of old growth stands as allowed under the proposed action would surely result in degradation, or even elimination, of old growth characteristics. At a minimum, any kind of treatment in old growth ecosystems could, and likely would, have the following impacts (not listed by rank in intensity or priority, nor is this necessarily a complete list):

- construction and reconstruction of roads and the use of other paths like skid trails for log removal. Roads fragment ecosystems by degrading the habitat effectiveness of numerous wildlife species and causing soil erosion (see FS-BLM, 2024 at 4);
- removal of snags, which are critically important for numerous avian species and some mammals (like marten (*Martes Americana*));
- in Regions 1-4, removal or destruction, intentionally or not⁷, of young conifers that provide the dense horizontal cover needed by snowshoe hare (*Lepus Americanus*), the favorite prey of the threatened lynx (*Lynx Canadensis*);

⁷ At least for fuel reduction projects, small tree removal would be emphasized, as such trees can form fire ladders to the crowns of larger trees. In other projects, small trees would easily be crushed, broken, or uprooted by the use of heavy equipment.

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- removal or burning of down dead wood, the presence of which has many benefits, including small mammal habitat, formation of new soil over time, and help in adding nitrogen to the soil (see Franklin et al, 1981 at 43, fn 18);
- compaction of soils from the use of heavy equipment, with a possible long-term loss of soil

productivity. See, e. g., Bowd et al, 2019; and Rhodes, 2007 (at 16);

--elimination or reduction of hiding and thermal cover for big game species such as deer and elk;

--reduction or elimination of habitat for species needing well-forested, closed canopy habitat, such as spotted owls (*Strix*, various subspecies), northern goshawk (*Accipiter gentilis*), and boreal owl (*Aegolius funereus*);

--introduction and/or spread of non-native plant species, i. e., weeds; and

--reduction of the carbon absorbing and storage capability of the residual forest versus the uncut one.

None of these impacts are consistent with maintaining or attaining old growth characteristics. Indeed, treatment would not have to retain old growth under any alternative, even more restrictive alternative 3:

There is no requirement that [current old growth forests] continue to meet the definition of old-growth when managed for the purpose of proactive stewardship... DEIS at 16.

Older forests with dead and/or dying trees are often salvage logged. However, Salvage logging is inappropriate since it removes at least two of the major structural components-dead and down-that are key elements of the system. In all likelihood, some of the more decadent, live trees would also be removed. Salvage logging is also inappropriate because of the damage inevitably done to root systems and trunks of the residual stand which results in accelerated mortality of trees and overall deterioration of the stand. ...

To summarize, if the objective is perpetuation of an old-growth forest ecosystem, a minimum amount of disturbance should be allowed. Snags and logs perform important functions and are essential structures.

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Franklin et al, 1981 at 41, 42; emphasis added.

Other purposes for treatment of old growth forests include:

v. To recruit and promote the development of future old-growth forests where current conditions in mature forest are likely to achieve the old-growth forest definitions and associated criteria in the shortest timeframe possible;...

MA 1.b, DEIS at 23. We agree with the emphasis here - to focus on development of future old growth stands. However, this needs to be a standard. But if the area is already likely to achieve old growth status (based on the definition for the forest type), then why would there be a need to do any "proactive stewardship" or at least any actions that manipulated the vegetation?

Under objective 2, units are directed to initiate at least three proactive stewardship projects/activities" identified in the unit's Adaptive Strategy within two years. DEIS at 27.

Objective 3 directs units to initiate at least one co-stewardship project from the Adaptive Strategy with Native American tribes within two years. Thus the proposed action directs units to initiate projects that will manipulate old growth vegetation, whether that old growth needs manipulation or not.

Further evidence of pro-treatment bias in old growth within the proposed action:

In many situations, intentionally accepting alternative climate-driven outcomes without implementing proactive stewardship may slow the development of old-growth forests or result in a reduction of old trees and old-growth forests...

DEIS at 102; citations omitted. In other words, lack of treatment is believed to thwart old growth development. That is highly unlikely for most old growth stands, as the opposite is much more likely to be true - manipulation will delay, degrade, or thwart altogether the development of old growth character.

Even commercial harvest could occur under the proposed action. The DEIS states that alternative

3's prohibition on commercial harvest

would have the effect of limiting proactive stewardship activities and other vegetation management in cases where adherence to NOGA-FW-STD-2a would otherwise yield commercially viable material as a byproduct of proactive stewardship. ...

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Overall, for Alternative 3, from an ecological perspective, the anticipated negative effects of reducing the rate of proactive stewardship by limiting vegetation management tools - and thereby accepting avoidable loss of old-growth - likely outweighs any potential benefits of ensuring that commercial timber harvest does not negatively influence old-growth management decisions.

Id. at 107; see also USDA Forest Service, 2024b at 101. Even if treatment in old growth is supposed to be for purposes of promoting or retaining old growth, treatment could yield commercially valuable products. This would encourage units to sell timber in old growth areas to meet timber targets. The more trees that are cut commercially, the less the cut stand is likely to maintain its old growth character, as commercial sales generally offer the largest trees, the ones most in need of retention for old growth protection. Notably, "there will be no change in forest Allowable Sale Quantity (ASQ), Projected Timber Sale Quantity (PTSQ) or land suitability". DEIS at 121.

If there is still any doubt about the proposed amendment's intention to allow and encourage treatment of forests and production of salable products, the following passages lay it to rest: The ability of proactive stewardship to positively affect old-growth is partially dependent upon the ability to sell forest products to manufacturing companies and to use harvesting processes (including the residual slash disposal activities) to positively affect the forest vegetation and reduce hazardous fuels. If the forest products industry declines in areas surrounding NFS units to the degree that it is difficult to sell forest products, or if "stumpage prices" decrease substantially, it would affect how many acres could be treated. While some treatments could be accomplished by using prescribed burning only, it is generally very risky in the wildland-urban interface and expensive, leading to fewer acres treated. DEIS at 125.

Agency funds will go further under Alternatives 2 and 4 and treat additional acres of old-growth with the sales of commercial products covering a portion of restoration costs or "goods for services"; unlike Alternative 3 where appropriated funds will be needed to treat acres.

Id. at 127.

...managing the mature and old-growth forest threats identified in this analysis will be challenged by existing mill infrastructure and timber processors. ...

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...lack of mills presents barriers for conducting management activities aimed at reducing risk from fire, insects, and diseases in an economically viable way. FS-BLM, 2024 at 60.

The proposed amendment thus envisions treatment of mature and old growth forests across the landscape via proactive stewardship projects which by definition include vegetation management. Indeed, cutting in mature and old growth forests is predicted to increase over the next 50 years. Id. at A.69.

Note that under current agency direction for managing old growth forests, units may need to

modify or eliminate existing protections for older and larger trees:

Where forest plans mandate diameter cap cutting or an age limit to retain large diameter or old trees, forest plan amendments may be required to apply silvicultural practices essential to achieving or maintaining desired conditions or improving ecological integrity, or both.

USDA Forest Service, 2024a, at 10. Though it is not clear if this direction would be retained, it would be consistent with the proposed amendment.

Implementation of such projects will adversely affect old growth values:

...proactive stewardship is likely to be at odds with values that prioritize the naturalness or wildness of old-growth forests as unmanaged, self-determined landscapes.

DEIS at 116.

The intent of the proposed amendment is thus clear: treat existing and future old growth forest areas to save them from threats, even though they may not need treatment, and any treatment could degrade or even eliminate old growth characteristics.

VI. THE PROPOSED EXCEPTIONS IN THE DRAFT AMENDMENT WOULD ALLOW TOO MUCH TREATMENT OF OLD GROWTH

As we detail above, the proposed amendment already appears way too eager to allow and encourage treatment in mature and old growth forests, to the ecological detriment of these areas. But the proposed exceptions would make the prospects for damage even worse.

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Standard 2.b would allow treatment of OG for purposes other than proactive stewardship of OG if the proposed activity is incidental to the proposed activity not otherwise prohibited by the respective forest plan, and

the area - as defined at an ecologically appropriate scale - continues to meet the definition and associated criteria for old-growth forest after the incidental tree cutting or removal.

DEIS at 30. As the DEIS explains, activities for purposes other than proactive stewardship can be done

so long as said incidental tree cutting or removal of trees in old-growth forests does not diminish the ability for said forest to continue to meet the definition and criteria of old-growth, on an ecologically appropriate scale.

DEIS at 104; USDA Forest Service, 2024b at 97-98.

Under this broad exception, projects and activities could be approved in old growth that would considerably degrade the quality of the old growth ecosystem, even if the treated areas still technically met the respective old growth definitions. Indeed, examples cited in the DEIS include development of recreational opportunities and ski runs. *Id.* at 103-104. It is very difficult to imagine an old growth ecosystem maintaining its integrity and function if it has ski runs. Even if it somehow retained the requisite structure, the high level of human use, possibly including some use in the snow-free seasons, would render wildlife habitat ineffective and disrupt ecological processes. In any case, allowing such projects in areas with old growth forests would greatly diminish the quality and functioning of those areas as old growth ecosystems.

The DEIS observes that implementation of these projects may destroy old growth:

It should be acknowledged that some of these infrastructure or multiple use activities may be large enough that they impact whether an area meets the definition and associated criteria of old-growth at the ecologically appropriate scale.

Id. at 104; USDA Forest Service, 2024b at 98. This is a warning sign that the proposed amendment is not strong enough to truly protect old growth ecosystems on national forest land.

Under proposed standard 2.c, activities can be exempted from standards 2.a and 2.b:

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vi. in cases where it is determined - based on best available science, which includes Indigenous Knowledge - that the direction in this standard is not relevant or beneficial to a particular species or forest ecosystem type.

DEIS at 31.

Lodgepole pine forests may be specifically excepted under this standard. DEIS at 105. However, the Threats Report admits that lodgepole pine "can achieve [mature-old growth] conditions over time in the absence of insects and fire". FS-BLM, 2024 at A.110. See also Mehl, 1992, at 111.

As a scientific consensus report noted, these forests are not the same:

Not all lodgepole pine forests are the same.

Some forests are composed of nearly pure lodgepole pine established following large fires decades or centuries ago. Others are mixtures of lodgepole pine with subalpine species such as Engelmann spruce, subalpine fir, and aspen at higher elevations, or with mixed conifer species such as ponderosa pine, Douglas-fir, and aspen at lower elevations. Each type of forest has unique features of ecology and fire behavior.

Kaufmann et al, 2008, at 4.

Some pure lodgepole pine stands may not develop old growth characteristics, particularly large diameter trees. However, lodgepole can grow to sizable diameters on productive sites. And as Kaufmann et al, 2008 noted:

If not renewed by fire every few centuries, pure lodgepole pine stands often but not always experience ingrowth by other tree species, especially those tolerant of moderate shade.

Id. at 6. This may lead to development of old growth characteristics, such as variation in tree diameter, more than one age class, down dead logs in various stages of decay, and standing dead trees (snags). Lodgepole grows in subalpine forests at higher elevations, mixed with Engelmann spruce and subalpine fir (id. at 7), where this ingrowth often occurs. As it does, the lodgepole pine overstory begins to die, and structure found in old growth forests begins to develop. Lodgepole also occurs in mixed conifer forests at lower elevations. Ibid. These forests can also develop old-growth-like structure.

The Draft Ecological Impacts Report of the amendment states:

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Because lodgepole pine often germinates prolifically following wildfire, stands tend to be of uniform age and can achieve MOG conditions over time in the absence of insects and fire.

USDA Forest Service, 2024b, at 51.

The DEIS states that "excluding lodgepole forests from NOGA-FW-STD-2a may detract from ecological integrity." Even though some lodgepole pine forests will likely not develop old growth character, the entire vegetation type must not be excluded from standards 2.a and 2.b or their successors.

The proposed action would allow exemption from standards 2.a and 2.b if:

In cases where this standard would preclude achievement of wildfire risk management objectives within municipal watersheds or the wildland-urban interface (WUI) as defined in Section 101 of the Healthy Forest Restoration Act of 2003.

Standard 2.c (i), DEIS at 31. I. e., such areas could be treated in ways that did not promote proactive stewardship of old growth forest ecosystems.

It is estimated that 6.2 million acres of old growth, about 25 percent of the total nationwide, is in the wildland-urban interface (WUI). DEIS at 104, 99. But the definition of WUI is expansive. The DEIS' Glossary does not have a definition for WUI. The definition most often used is from the Healthy Forest Restoration Act (HFRA). It includes any area within a community wildfire protection plan, and:

(B) in the case of any area for which a community wildfire protection plan is not in effect-

(i) an area extending 1/2-mile from the boundary of an at-risk community;

(ii) an area within 1 1/2 miles of the boundary of an at-risk community, including any land that-

(I) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community;

(II) has a geographic feature that aids in creating an effective fire break, such as a road or

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ridge top; or

(III) is in condition class 3, as documented

by the Secretary in the project-specific environmental analysis

16 U.S.C. 6511 (16).

Modifying fire behavior in the WUI will remain a priority. DEIS at 109. This means significant treatment in these areas to reduce fuels and the concomitant fire risk. Considerable land containing existing and future old growth forests would be adversely affected.

VII. CARBON MANAGEMENT

One of the important functions of older forests is removal of carbon from the atmosphere, long-term storage of that carbon, and production of oxygen. Larger trees store "disproportionally massive amounts of carbon", much more so than smaller ones. See Mildrexler, et al, 2020. It takes at least 200 years for an old growth stand that is cut to be able to remove as much carbon as it did prior to treatment. Harmon et al 1990.

The DEIS misstates the carbon emissions from unmanaged forests:

Moving carbon stored in forests to forest products storage may result in lower net greenhouse gas (GHG) emissions relative to unmanaged forests, if carbon stored in harvested wood products (HWP), substitution effects, and forest regrowth are considered...

DEIS at 75; citations omitted.

This is quite unlikely. See, e. g., Campbell et al, 2011. Much of the wood is trimmed off and discarded during wood product manufacturing process(es); this material subsequently decomposes and returns carbon to the atmosphere. Wood products, e. g., furniture, wear out and wind up in landfills and must then be replaced by new products. This progression is supported by science; e. g., an early study by Harmon et al, 1996, estimated that of all the carbon harvested in Washington and Oregon between 1900 and 1992, only 23 percent remained in storage. In other words, the remainder has been released into the atmosphere, increasing the carbon concentration therein.

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A study by the Forest Service in Alaska (USDA Forest Service, 2020) found that a thinned stand stored less carbon than an uncut stand 100 years after thinning.

It is clear that logging and wood product manufacturing decrease carbon storage. Maintaining our older forests will help in the battle against climate change by maximizing carbon storage. In fact, this is an essential part of any strategy to stem or reverse climate change.

VIII. PLAN MONITORING.

Old growth conditions should indeed be monitored as part of each units required biennial monitoring (36 CFR 219.12(a), (d)) or a broader scale monitoring effort (219.12(b)) to observe how old growth ecosystems change over time. Thus it is good to have proposed Plan Monitoring 1 as part of the amendment. (DEIS at 35.)

However, the wording here needs to be clearer. The component, Plan Monitoring 1, states: Within two years, include the areas identified and prioritized for the retention and promotion of old-growth forests in the Adaptive Strategy for Old-Growth Forest Conservation in the biennial monitoring report or the broader scale monitoring strategy to be updated as conditions change.
DEIS at 35.

It isn't clear what is to be updated, the Strategy or the monitoring report. The "intent" for this component states:

The intent of including plan monitoring in the amendment is to focus monitoring on the areas identified in the Adaptive Strategy to understand how conditions change. This requirement is also intended to ensure that there is a clear and transparent way to track where the plan components in this amendment would apply, recognizing that the system is dynamic and conditions will change over time.

Id. at 35.

DEIS at 102 states that Mon 01 is designed to track the areas identified and prioritized for the retention and promotion of old-growth forests... and provide regular updates on measurable changes in unit-

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level old-growth forest, actions taken pursuant to this amendment, and potential unintended consequences...

The intent appears clearly to monitor old growth conditions and related activities. The wording of the component itself should be adjusted to make clear that old growth conditions will be monitored.

IX. ALLOW UNITS TO DESIGNATE SPECIAL AREAS FOR OLD GROWTH CONSERVATION

The DEIS dismisses an alternative that would establish areas for old growth management because "old-growth forests are dynamic systems and the intent is not to manage all of these areas in the same manner." DEIS at 13-14. However, it may be appropriate on parts of some units to have designated areas for old growth protection. Units can, during land management planning, identify the highest quality old growth stands and/or others that may need special attention, and ensure their protection by designating one or more special areas. Units should at least be encouraged to do this, where appropriate.

X. ALASKA EXCEPTION DELETED

We are pleased to see that the provision which would have exempted the entire Tongass National Forest in Alaska from any plan components addressing old growth has been deleted. See DEIS at 33. There was never any reason for this provision; indeed, the Tongass is already transitioning away from selling old growth timber:

...Alternatives 2 and 3 would effectively halt larger commercial old growth timber

sales on the Tongass NF, leaving commercial harvesting to occur within young or secondary growth areas. The 2016 Tongass Forest Plan, as amended, and the 2021 Southeast Alaska Sustainability Strategy (SASS) already envision reduced commercial timber harvesting of old growth.

DEIS at 106.

We encourage implementation of strong old growth protection for the Tongass, as for everywhere else. It is especially important for the Tongass because it has large areas of intact forest, much of which is likely old growth. For ecological and carbon storage functions, it is best to keep it that way.

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XI. MISCELLANEOUS

It is not clear what the plan components on DEIS pp. 38-52 apply to. They seem to be substantially the same (except for different numbering) as the components described on pp. 20-37.

CONCLUSION

As we noted at the outset, the Forest Service has a golden opportunity to provide some real protection for existing and future old growth ecosystems, which are of inestimably high value for biological diversity and carbon storage. The proposed amendment largely fails to do this.

The agency needs to greatly strengthen the proposed amendment with the following:

- the requirement to identify existing and future old growth stands must be a standard.
- the amendment must emphasize that existing and developing old growth stands should not be manipulated unless there is a strong reason to do so. The NEPA documents for any projects manipulating these forests must clearly state the justifications for, and the potential effects of, implementing the projects.
- fuel reduction in old growth must only be allowed in areas with historically frequent fire where analysis of the best available science gathered in the areas proposed for treatment shows that conditions deviate significantly from historical conditions and proposed treatment will (a) help restore natural conditions, and b) minimize harm to old growth by retaining old growth characteristics to the maximum degree practicable.
- not allowing treatment in existing and future old growth in areas with historically infrequent fire except: a) to protect public safety, such as removing hazard trees in areas of high public use; b) removing non-native plants, animals, or fish; and c) closing and obliterating roads.
- all old growth and most developing old growth stands must be unsuitable for timber production. Units must be required to amend their respective management plans accordingly.
- delete all objectives mandating that a certain number of vegetation manipulation projects be done on each unit every year. Treatment of old growth, if any, should be on a case-by-case basis and only after a demonstration of need and a positive result for old growth.

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- require all treated areas to still meet old growth definitions for the respective ecological types.

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"),
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.

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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 entirety-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 than 10% 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 too 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 MOG1 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 ([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 intent³ 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.

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 ft² per acre. The range is 160 to 270 ft²". Yet the

"minimum" was set at either 80 or 120 ft² 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 ft² (upper end of range) down to 80 ft² ("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 version⁶ of "Living with Fire" includes an additional graphic showing "dense conifer 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 gases 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.

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On behalf of the undersigned, we submit these comments on the Draft Environmental Impact Statement (DEIS) for your proposed Amendments to Land Management Plans to Address Old-Growth Forests Across the National Forest System. We urge you to fully protect all mature and old-growth trees and forests on national forest lands from logging. The DEIS is seriously flawed.

The DEIS as currently written is one-sided and misleading, and omits large bodies of scientific evidence that contradict the claims and assumptions the DEIS uses to promote ongoing and increased logging in mature and old-growth forests, including logging of mature and old-growth trees. No amendment at all would be preferable to one that would increase logging of these highly biodiverse and carbon-rich forests based on a false and skewed presentation of scientific evidence. All mature and old-growth forests must be fully protected from logging, under any name, as over 200 scientists have urged. Immediately below we raise the core substantive flaws with the DEIS, followed by a detailed elaboration on most of these points. We focus in particular on the DEIS's allowance of logging and post-fire logging in mature and old-growth forests, so long as the Forest Service uses one or more of several euphemisms for such logging, including public safety, wildfire management, and forest health.

The DEIS plans to nearly double logging levels-and associated carbon removals-in mature and old-growth forests over the coming decades (DEIS Threats Analysis, Figure 19), making the DEIS more of a logging plan than a forest protection plan.

The DEIS fails to include a reasonable range of alternatives. It excludes mature forests, which leaves out most of the carbon-rich forests in the Western US and nearly all of such forests in the Eastern US, where very little old-growth remains due to historic and ongoing logging. It allows logging, including sale and removal of mature and old-growth trees, in old-growth forests under a series of deceptive euphemisms such as forest health and wildfire management. And the DEIS provides no permanent protection for mature or old-growth forests. A reasonable range of alternatives would include a preferred alternative that would include both mature and old-growth forests, close all logging loopholes and prohibit the sale and removal of trees for lumber or biomass from all mature and old-growth forests, and ensure that the protections from logging under such an alternative are permanent and continue to apply regardless of future natural processes and events like fire, drought and insects, and windthrow. The DEIS fails to recognize the enormous body of science finding that mature and old-growth forests remain carbon-rich following such natural processes, even when most or all trees are killed, and the resulting wildlife habitat is unique and highly biodiverse.

The DEIS fails to faithfully implement President Biden's April 2022 Executive Order on mature and old-growth forest conservation, which promised to "conserve America's mature and old-growth forests on Federal lands". The Executive Order noted that these forests "play an irreplaceable role in reaching net-zero greenhouse gas emissions" and promised to "retain and enhance carbon storage" in mature and old-growth forests on federal lands. Yet the DEIS relies upon hypothetical modeling studies that use flawed and discredited assumptions to promote the false notion that removing carbon from forests through logging will somehow magically increase forest carbon storage (DEIS, pp. 75-76; DEIS Ecological Impacts Analysis, p. 44). Hundreds of climate scientists and ecologists have debunked these false claims. The DEIS omits mention of research finding that thinning emits about 3 times more CO₂ per acre than wildfire alone. The DEIS also conceals the fact that using trees from mature/old-growth forests for energy production, which the DEIS promotes, emits 38% to 65% more CO₂ into the atmosphere than burning coal, for equal energy produced, and it fails to mention research finding that thinning kills significantly more trees than it prevents from being killed.

The DEIS's Threats Analysis is highly misleading and incomplete with regard to climate change effects; nowhere in the DEIS or its associated reports does the Forest Service include an analysis of the impact of its proposed

logging, and increased logging, of mature and old-growth trees and forests on forest carbon storage, or carbon emissions and sequestration. This is a major flaw, especially given that the Forest Service's own research shows that increased logging, as the DEIS proposes, would substantially undermine atmospheric carbon draw down, increase atmospheric carbon, and compromise our ability to achieve net-zero emissions, while moving the other direction and ending all logging on all US national forests would reduce atmospheric carbon by 85 million tons of CO₂ every year. Further, the Threats Analysis omits mention of the fact that field-based research has found that even big fires only consume less than 2% of tree carbon, while thinning projects remove far more carbon-most of which is quickly emitted into the atmosphere and only a small portion of which ends up as lumber in a human structure. Based on the analysis in Ingerson (2007), less than one-fifth of the carbon in trees removed from forests through logging ends up in a wood product like dimensional lumber-the remainder ends up in the atmosphere almost immediately, mostly burned for dirty energy in biomass facilities or as hog fuel at lumber mills (e.g., branches, tree tops, bark, round parts, mill residues).

The Threats Analysis presents a highly misleading and inadequate presentation of supposed threats to mature and old-growth forests. For example, Figure 21 of the Threats Analysis shows that logging, including both thinning and post-fire logging, impacts a comparable amount of mature and old-growth forest as fire up to 1000 feet from roads, and impacts considerably more mature and old-growth forest than fire within 300 feet of roads. Logging can only occur within a relatively short distance from roads, since helicopter logging has been wildly uneconomical for many years now, and rarely ever happens anymore. Moreover, forests that are further than 1000 feet from roads are generally comprised of Wilderness Areas, Roadless Areas, and other areas that are generally off-limits to logging by statute, regulation, forest plan standards, or other administrative restrictions. By including tens of millions of acres of mature and old-growth forest that are generally or entirely off-limits to logging, the DEIS Threats Analysis profoundly dilutes the scale of the effect of logging on mature and old-growth forests relative to fire. A meaningful, and non-misleading, comparison of fire versus logging would have to be limited to areas where both fire and logging can occur, which is mostly within a few hundred feet, or several hundred feet, from roads. In addition, the DEIS's Threats Analysis further dilutes the effect of logging on mature and old-growth forests, relative to fire, by including forest types in which logging rarely occurs, simply because the trees are not merchantable for lumber, including tens of millions of acres of pinyon-juniper forests. This led to an even more misleading presentation of "threats", and comparison of logging versus fire.

The DEIS claims that logging, under the guise of "removing hazardous fuels", will curb wildfires (DEIS Ecological Impacts Analysis, p. 44), but improperly omits mention of the dozens of scientific studies, including by many US Forest Service scientists, finding that denser, mature/old forests tend to burn at lower, not higher, severities in wildfires, while thinning and other logging conducted ostensibly as hazardous fuels reduction often exacerbates wildfires by eroding the cool, shady microclimate provided by denser forests with high canopy cover. As one recent study by US Forest Service scientists found:

"Thinned forests have more open conditions, which are associated with higher temperatures, lower relative humidity, higher wind speeds, and increasing fire intensity. Furthermore, live and dead fuels in young forest or thinned stands with dense saplings or shrub understory will be drier, making ignition and high heat more likely, and the rate of spread higher because of the relative lack of wind breaks provided by closed canopies with large trees."

Nor is the DEIS's repeated claim-that mature and old-growth forests must be logged supposedly to prepare them for fire-scientifically credible. Regardless of forest density or time since the previous fire, many studies by the Forest Service's own scientists show that managed wildfire or prescribed fire can easily be applied, during natural fire season, without any prior tree removal. If lower-intensity fire is desired, such fires simply need to be conducted during mild to moderate fire weather. As published research by US Forest Service scientists has concluded, "managed wildfire...is usually more efficient, cost-effective, and ecologically beneficial than mechanical treatments."

The DEIS ignores or unacceptably downplays the health impacts and cumulative effects of this increase in logging on communities, especially environmental justice communities that are disproportionately impacted by this industry. The DEIS promotes logging mature and old-growth forests for "energy production" (DEIS, p. 75), but conceals the fact that, for equal energy produced, using trees for energy production emits even more pollution than burning fossil fuels: 5.2 times more nitrogen oxides; 30 times more volatile organic compounds; 7 times more ammonia; 3.2 times more sulfur dioxide; and 12.5 times more PM2.5 particulates.

Public Safety

Previous mechanical thinning and post-fire logging is wildly ineffective and counter-productive as a wildfire management and community protection approach.

The images below, from the Washington Post, show the devastation of the town of Greenville, after the Dixie fire swept up from the southwest, moving rapidly northeast through vast areas that had been mechanically thinned and post-fire logged under the guise of fuel reduction and wildfire management, before destroying most of the towns of Greenville and Canyon Dam, along with the smaller town of Indian Falls.

The images below, from Google Earth, show numerous large areas of pre-fire mechanical thinning and earlier post-fire logging (after the 2012 Chips fire around Butt Valley Reservoir) on the Plumas National Forest, southwest, south, and southeast of the Greenville, Canyon Dam, and Indian Falls areas, through which the Dixie fire swept before destroying most of the homes and businesses. For each location a pair of images is shown—one after mechanical thinning but before the Dixie fire, and the other after the Dixie fire. GPS coordinates of the imagery locations are shown at the bottom right margin of each. Most of the mechanically thinned and post-fire logged forests burned at high intensity, as the post-fire images show.

The images below represent all areas of mechanical thinning and/or post-fire logging of any significant size that could be identified as occurring within 15 years or so prior to the 2021 Dixie fire, and which were within the path of the fire as it approached Greenville, Canyon Dam, and Indian Falls. As the images show, the Dixie fire burned mostly or entirely at high intensity through all such areas. For spatial context, each of these images shows an area that is several thousand acres in size.

Dixie fire perimeter map showing the area on August 7, 2021, immediately after the fire, moving from the southwest to the northeast, destroyed Greenville and Canyon Dam. The map is from the inter-agency wildfire site, Inciweb: <https://inciweb.wildfire.gov>

Image Pair #1: Extensive previous post-fire logging on the Plumas National Forest, northeast of Butt Valley Reservoir, and a short distance southwest of Canyon Dam. The first image is from July 2, 2017, after post-fire logging, and the second is from August 7, 2021, just one day after the Dixie fire burned through this area and destroyed Canyon Dam.

Image Pair #2: A large area that was mechanically thinned south of Canyon Dam. The first image is from May 24, 2009, after thinning, and the second image is from July 7, 2022 (note the almost total absence of live, green trees remaining in the thinned areas after the Dixie fire).

Image Pair #3: Mechanical thinning on the Plumas National Forest, south of Indian Falls. The first image is from May 24, 2009, after thinning, and the second is from July 7, 2022, after the Dixie fire. Note that nearly all of the thinned forest burned at high intensity, with 100% tree mortality in most areas.

Image Pair #4: Mechanical thinning south of Greenville on the Plumas National Forest. The first image is from May 24, 2009. The second is from July 7, 2022, showing almost complete high-intensity fire effects in the thinned area.

Image Pair #5: Postfire logging and mechanical thinning west of Greenville and south of Canyon Dam on the Plumas National Forest. The first image is from May 24, 2009, and the second is from July 7, 2022, after the Dixie fire. Once again, note that the thinned area is heavily dominated by high-intensity fire.

Image Pair #6: Mechanical thinning on private timberlands south of Greenville. The first image is from May 24, 2009, and the second is from July 7, 2022, after the Dixie fire, with the thinned areas heavily dominated by high-intensity fire.

USFS fails to address or acknowledge the large body of scientific evidence, including Forest Service studies, finding that thinning plus prescribed fire also increases wildfire rate of spread, intensity, and overall tree mortality. The USFS also fails to address the science finding that post-fire logging exacerbates wildfires. USFS also improperly downplays and dodges science finding that thinning beyond about 100 feet from homes provides no additional protection from wildfire.

The approach of the DEIS, and its logging loopholes, is the same approach that the Forest Service has pursued for many years, except the DEIS promotes this approach on a much bigger scale. In brief, it involves mechanical thinning and post-fire logging of vast forest areas distant from communities based on the claim that this will either directly stop fires from reaching towns or indirectly stop fires by making fires burn much more slowly and so much less intensely that fire suppression crews can easily halt the fire before it reaches a community. This approach is a proven failure, as we have seen in Paradise (Camp fire of 2018), Greenville (Dixie fire of 2021), Grizzly Flats (Caldor fire of 2021), and Berry Creek and Feather Falls (North Complex fire of 2020), among others. Please see the maps below showing large areas of thinning and other so-called fuel-reduction logging around towns that were largely destroyed by the Camp fire, Dixie fire, and Caldor fire, respectively.

The DEIS fails to adequately analyze the potential fire effects to the forest and adjacent communities due to mechanical thinning that includes widespread removal of thousands of mature trees, and the potential for "thinning" and other logging to increase, not decrease, fire severity, based on science submitted here and as recognized by the Ninth Circuit Court of Appeals in the 2020 BARK v. U.S. Forest Service case (https://scholar.google.com/scholar_case?case=816388961271152072&q=BARK+v+forest+service&hl=en&as_sdt=2006). The Ninth Circuit's reasoning is included here:

First, the effects of the Project are highly controversial and uncertain, thus mandating the creation of an EIS. See 40 C.F.R. § 1508.27(b)(4) & (5) (listing relevant factors for whether an EIS is required, including if the project's effects are "highly controversial" and "highly uncertain"). The stated primary purpose of the CCR Project is to reduce the risk of wildfires and promote safe fire-suppression activities, but Appellants identify considerable scientific evidence showing that variable density thinning will not achieve this purpose. Considering both context and intensity, as required by 40 C.F.R. § 1508.27, this evidence raises substantial questions about the Project's environmental impact, and an EIS is required. See, e.g., *Blackwood*, 161 F.3d at 1212; *Native Ecosystems Council*, 428 F.3d at 1238-39.

"A project is 'highly controversial' if there is a 'substantial dispute [about] the size, nature, or effect of the major Federal action rather than the existence of opposition to a use.'" *Native Ecosystems Council*, 428 F.3d at 1240 (alteration in original) (quoting *Blackwood*, 161 F.3d at 1212). "A substantial dispute exists when evidence ... casts serious doubt upon the reasonableness of an agency's conclusions." *In Def. of Animals*, 751 F.3d at 1069 (quoting *Babbitt*, 241 F.3d at 736). "[M]ere opposition alone is insufficient to support a finding of controversy." *WildEarth Guardians v. Provencio*, 923 F.3d 655, 673 (9th Cir. 2019).

The EA explained that the CCR Project will use "variable density thinning" to address wildfire concerns. "In

variable density thinning, selected trees of all sizes ... would be removed." This process would assertedly make the treated areas "more resilient to perturbations such as ... large-scale high-intensity fire occurrence because of the reductions in total stand density." Variable density thinning will occur in the entire Project area.

Substantial expert opinion presented by the Appellants during the administrative process disputes the USFS's conclusion that thinning is helpful for fire suppression and safety. For example, Oregon Wild pointed out in its EA comments that "[f]uel treatments have a modest effect on fire behavior, and could even make fire worse instead of better." It averred that removing mature trees is especially likely to have a net negative effect on fire suppression. Importantly, the organization pointed to expert studies and research reviews that support this assertion.

Bark also raised this issue: "It is becoming more and more commonly accepted that reducing fuels does not consistently prevent large forest fires, and seldom significantly 871*871 reduces the outcome of these large fires," citing an article from *Forest Ecology and Management*. Bark also directed the USFS to a recent study published in *The Open Forest Science Journal*, which concluded that fuel treatments are unlikely to reduce fire severity and consequent impacts, because often the treated area is not affected by fire before the fuels return to normal levels. Bark further noted that, while "Bark discussed [during the scoping process] the studies that have found that fuel reduction may actually exacerbate fire severity in some cases as such projects leave behind combustible slash, open the forest canopy to create more ground-level biomass, and increase solar radiation which dries out the understory[,] [t]he EA did not discuss this information."

Oregon Wild also pointed out in its EA comments that fuel reduction does not necessarily suppress fire. Indeed, it asserted that "[s]ome fuel can actually help reduce fire, such as deciduous hardwoods that act as heat sinks (under some conditions), and dense canopy fuels that keep the forest cool and moist and help suppress the growth of surface and ladder fuels...." Oregon Wild cited more than ten expert sources supporting this view. Importantly, even the Fuels Specialist Report produced by the USFS itself noted that "reducing canopy cover can also have the effect of increasing [a fire's rate of spread] by allowing solar radiation to dry surface fuels, allowing finer fuels to grow on ... the forest floor, and reducing the impact of sheltering from wind the canopy provides."

The effects analysis in the EA did not engage with the considerable contrary scientific and expert opinion; it instead drew general conclusions such as that "[t]here are no negative effects to fuels from the Proposed Action treatments." Appellants thus have shown a substantial dispute about the effect of variable density thinning on fire suppression. Although it is not our role to assess the merits of whether variable density thinning is indeed effective in the project area to prevent fires, or to take sides in a battle of the experts, see *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1333 (9th Cir. 1992), NEPA requires agencies to consider all important aspects of a problem. See *WildEarth Guardians*, 759 F.3d at 1069-70. Throughout the USFS's investigative process, Appellants pointed to numerous expert sources concluding that thinning activities do not improve fire outcomes. In its responses to these comments and in its finding of no significant impact, the USFS reiterated its conclusions about vegetation management but did not engage with the substantial body of research cited by Appellants. This dispute is of substantial consequence because variable density thinning is planned in the entire Project area, and fire management is a crucial issue that has wide-ranging ecological impacts and affects human life. When one factor alone raises "substantial questions" about whether an agency action will have a significant environmental effect, an EIS is warranted. See *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 865 (9th Cir. 2005) ("We have held that one of [the NEPA intensity] factors may be sufficient to require preparation of an EIS in appropriate circumstances."). Thus, the USFS's decision not to prepare an EIS was arbitrary and capricious. See *Blackwood*, 161 F.3d at 1213 (holding that conflicting evidence on the effects of ecological intervention in post-fire landscapes made a proposed project highly uncertain, thus requiring an EIS).

We note that describing mixed-conifer and ponderosa pine forest as having frequent-fire low-severity regimes is outdated and misleading, as it is based on the now-discredited notion that fire return intervals from fire-scar studies are an accurate method to assess historical fire frequencies. Far more detailed and comprehensive analyses have determined that historical fire frequencies in dry forests of the western U.S., such as ponderosa pine and dry mixed-conifer forests, were about 39 years on average (e.g., Baker 2017), and actual fire frequencies (fire rotation) were about 4 times longer than the misleading fire return interval concept suggested (Crompton et al. 2022 Table 1).

What about the effect of mechanical thinning on wildfire severity in mixed-conifer and ponderosa pine forests? The Forest Service's own scientists (Lesmeister et al. 2021) recently conducted a massive, landmark 30-year study-a substantial portion of which was conducted in such forests-and found that, in these forest types (most frequent fire regime), the densest forests with the highest biomass, highest canopy cover, and highest tree densities, on average had lower wildfire severities when fires occurred when compared to more open, lower-density forests resulting from mechanical thinning and other logging operations (see Figure 4b from Lesmeister et al. 2021 below). The Forest Service scientists concluded that more open forests with lower biomass had higher fire severity, because the type of open, lower-biomass forests resulting from thinning and other logging activities have "hotter, drier, and windier microclimates, and those conditions decrease dramatically over relatively short distances into the interior of older forests with multi-layer canopies and high tree density..."

(Figure 4 from Lesmeister et al. 2021-values above 1.0 are relatively more likely, and values below 1.0 are relatively less likely)

Notably, Lesmeister et al. (2021) made the same finding in their analysis of more mesic forests, including mesic mixed-conifer forests.

Other Forest Service scientists, in Lydersen et al. (2014), reported the following finding in the 257,000-acre Rim fire of 2013:

"Density of small to intermediate size trees (20-40 cm dbh in the analysis with all plots and both 40-60 cm and 60-80 cm dbh in the analysis excluding plots burned on a plume-dominated day) were also related to Rim Fire severity, with plots with a greater small tree density tending to burn with lower severity."

The very largest scientific analysis ever conducted in dry forests on the subject of tree removal and wildfire severity, Bradley et al. (2016), found that forests completely protected from tree removal had the lowest fire severity, while forests with some limited tree removal allowed had higher levels of fire severity, and forests with the fewest environmental protections and the most tree removal had the highest fire severity. The authors concluded the following:

"We found forests with higher levels of protection [from tree removal] had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading. Our results suggest a need to reconsider current overly simplistic assumptions about the relationship between forest protection and fire severity in fire management and policy."

Hanson (2021) made similar findings in dry forests in the approximately 380,000-acre Creek fire of 2020 in the southern Sierra Nevada, reporting that, based on the Forest Service's own data, forests with previous logging under the rubric of "fuel reduction"-specifically, mechanical thinning and post-fire logging-had overall higher fire severity than unmanaged forests.

More recently, scientists have begun looking at another key question regarding mechanical thinning and wildfire severity in dry forests, related to overall combined tree mortality from thinning itself and subsequent wildfire.

These studies have found that mechanical thinning kills more trees than it prevents from being killed in mature and old dry forests, including Baker and Hanson (2022) (pertaining to the Caldor fire of 2021 in the northern Sierra Nevada), and DellaSala et al. (2022) (pertaining to the Wallow fire of 2011 in Arizona). Baker and Hanson (2022) explained why some studies have erroneously reported that mechanical thinning is effective as a wildfire management approach:

"Despite controversy regarding thinning, there is a body of scientific literature that suggests commercial thinning should be scaled up across western US forest landscapes as a wildfire management strategy. This raises an important question: what accounts for the discrepancy on this issue in the scientific literature? We believe several factors are likely to largely explain this discrepancy. First and foremost, because most previous research has not accounted for tree mortality from thinning itself, prior to the wildfire-related mortality, such research has

underreported tree mortality in commercial thinning areas relative to unthinned forests. Second, some prior studies have not controlled for vegetation type, which can lead to a mismatch when comparing severity in thinned areas to the rest of the fire area given that thinning necessarily occurs in conifer forests but unthinned areas can include large expanses of non-conifer vegetation types that burn almost exclusively at high severity, such as grasslands and chaparral. Third, some research reporting effectiveness of commercial thinning in terms of reducing fire severity has been based on the subjective location of comparison sample points between thinned and adjacent unthinned forests. Fourth, reported results have often been based on theoretical models, which subsequent research has found to overestimate the effectiveness of thinning. Last, several case studies draw conclusions about the effectiveness of thinning as a wildfire management strategy when the results of those studies do not support such a conclusion, as reviewed in DellaSala et al. (2022)." (internal citations omitted) Finally, with regard to the common misconception that mature and old-growth stands are "overgrown", and have too many smaller trees relative to historical forests, Baker et al. (2023) meticulously documented the fact that this notion stems from a pattern of scientific omissions in studies funded by the Forest Service. This pattern of omissions of peer-reviewed, published reply articles, which refuted and discredited U.S. Forest Service response articles, created a "falsification" of the scientific record regarding historical forest density and fire regimes. The corrected record shows that historical forests were much denser on average than assumed by the Forest Service and were shaped by mixed-severity fire, not merely low-severity fire.

Below is a summary of numerous scientific sources in key subject areas that implicate both the impacted environment as well as public safety. Key findings are quoted and/or summarized, and sources authored or co-authored by U.S. Forest Service scientists are indicated in bold.

The only effective way to protect homes from fire is home-hardening and defensible space pruning within 100 to 200 feet of homes or less.

Cohen, J.D. (U.S. Forest Service). 2000. Preventing disaster: home ignitability in the wildland-urban interface. *Journal of Forestry* 98: 15-21.

The only relevant zone to protect homes from wildland fire is within approximately 135 feet or less from each home-not out in wildland forests.

Gibbons P, van Bommel L, Gill MA, Cary GJ, Driscoll DA, Bradstock RA, Knight E, Moritz MA, Stephens SL, Lindenmayer DB (2012) Land management practices associated with house loss in wildfires. *PLoS ONE* 7: Article e29212.

Defensible space pruning within less than 130 feet from homes was effective at protecting homes from wildfires, while vegetation management in remote wildlands was not. A modest additional benefit for home safety was provided by prescribed burning less than 500 meters (less than 1641 feet) from homes.

Syphard, A.D., T.J. Brennan, and J.E. Keeley. 2014. The role of defensible space for residential structure protection during wildfires. *Intl. J. Wildland Fire* 23: 1165-1175.

Vegetation management and removal beyond approximately 100 feet from homes provides no additional benefit in terms of protecting homes from wildfires.

Tree removal is not necessary prior to conducting prescribed fire in forest wildlands or as an additional community buffer.

Decades of scientific studies have proven that, even in the densest forests that have not experienced fire in many decades, prescribed fire can be applied without prior tree removal, as demonstrated in the following studies:

Knapp EE, Keeley JE, Ballenger EA, Brennan TJ. 2005. Fuel reduction and coarse woody debris dynamics with early season and late season prescribed fire in a Sierra Nevada mixed conifer forest. *Forest Ecology and Management* 208: 383-397.

Knapp, E.E., and Keeley, J.E. 2006. Heterogeneity in fire severity within early season and late season prescribed burns in a mixed-conifer forest. *Int. J. Wildland Fire* 15: 37-45.

Knapp, E.E., Schwilk, D.W., Kane, J.M., Keeley, J.E., 2007. Role of burning on initial understory vegetation response to prescribed fire in a mixed conifer forest. *Canadian Journal of Forest Research* 37: 11-22.

van Mantgem, P.J., A.C. Caprio, N.L. Stephenson, and A.J. Das. 2016. Does prescribed fire promote resistance to drought in low elevation forests of the Sierra Nevada, California, USA? *Fire Ecology* 12: 13-25.

van Mantgem, P.J., N.L. Stephenson, J.J. Battles, E.K. Knapp, and J.E. Keeley. 2011. Long-term effects of prescribed fire on mixed conifer forest structure in the Sierra Nevada, California. *Forest Ecology and Management* 261: 989-994.

A large and growing body of scientific evidence and opinion concludes that commercial thinning and post-fire logging conducted under the guise of fuel reduction makes wildfires spread faster and/or burn more severely, and this puts nearby communities at greater risk.

Calkin, D.E., Barrett, K., Cohen, J.D., Finney, M.A., Pyne, S.J., and Quarles, S.L. (co-authored by U.S. Forest Service). 2023. Wildland-urban fire disasters aren't actually a wildfire problem. *Proceedings of the National Academy of Sciences of the United States of America*. 120: e2315797120.

The authors noted that wildfires are driven by climate and climate change, and criticized the current federal management approach embodied in the 2022 Wildfire Crisis Strategy, and in the 2021 Infrastructure Act and 2022 Inflation Reduction Act, that is focused on thinning tens of millions of acres of public, private, and Tribal forests in the western U.S. The authors concluded that we must recognize that wildfire in forests and other wildlands is not only inevitable, but also there is an "ecological necessity" that wildfires occur for native biodiversity benefits. The scientists concluded that the "best way" to protect homes and lives is to focus attention and resources directly on communities, using proven methods to make them fire safe, noting that the current approach is leading to more, not fewer, losses of homes and lives. They promoted "direct funding and technical assistance to communities", instead of spending many billions of dollars managing forests distant from homes. USFS (U.S. Forest Service) (2022). Gallinas-Las Dispensas Prescribed Fire Declared Wildfire Review. U.S. Forest Service, Office of the Chief, Washington, D.C.

Thinning followed by burning caused a massive fire that destroyed communities.

Thinning reduced canopy cover, increasing growth of combustible grasses; associated pile burning caused a huge wildfire, spreading rapidly through thinned areas, burning many homes.

Lesmeister, D.B., et al. (co-authored by U.S. Forest Service). 2019. Mixed-severity wildfire and habitat of an old-forest obligate. *Ecosphere*10: Article e02696.

Denser, older forests with high canopy cover had lower fire severity and "buffer the negative effects of climate change" regarding wildfires.

"Thinned forests have more open conditions, which are associated with higher temperatures, lower relative humidity, higher wind speeds, and increasing fire intensity. Furthermore, live and dead fuels in young forest or thinned stands with dense saplings or shrub understory will be drier, making ignition and high heat more likely, and the rate of spread higher because of the relative lack of wind breaks provided by closed canopies with large trees."

Lesmeister, D.B., et al. (co-authored by U.S. Forest Service). 2021. Northern spotted owl nesting forests as fire refugia: a 30-year synthesis of large wildfires. *Fire Ecology* 17: Article 32.

More open forests with lower biomass had higher fire severity, because the type of open, lower-biomass forests resulting from thinning and other logging activities have "hotter, drier, and windier microclimates, and those conditions decrease dramatically over relatively short distances into the interior of older forests with multi-layer canopies and high tree density..."

Reilly, M.J., et al. (co-authored by U.S. Forest Service). 2022. Cascadia Burning: The historic, but not historically unprecedented, 2020 wildfires in the Pacific Northwest, USA. *Ecosphere* 13: e4070.

Weather conditions primarily determined fire severity, and forest density was not a factor.

"We found minimal difference in burn severity among stand structural types related to previous management in the 2020 fires. Adaptation strategies for similar fires in the future could benefit by focusing on ignition prevention, fire suppression, and community preparedness, as opposed to fuel treatments that are unlikely to mitigate fire severity during extreme weather."

North, M.P., S.L. Stephens, B.M. Collins, J.K. Agee, G. Aplet, J.F. Franklin, and P.Z. Fule (co-authored by U.S. Forest Service). 2015. Reform forest fire management. *Science* 349: 1280-1281.

"...fire is usually more efficient, cost-effective, and ecologically beneficial than mechanical treatments."

Lydersen, J. M., M. P. North, and B. M. Collins (co-authored by U.S. Forest Service). 2014. Severity of an uncharacteristically large wildfire, the Rim Fire, in forests with relatively restored frequent fire regimes. *Forest Ecology and Management* 328:326-334.

In the Rim fire of 2013, the authors found that mature mixed-conifer and ponderosa pine forests with "a greater small tree density tend[ed] to burn with lower severity."

Meigs, G.W., et al. (co-authored by U.S. Forest Service). 2020. Influence of topography and fuels on fire refugia probability under varying fire weather in forests of the US Pacific Northwest. *Canadian Journal of Forest Research* 50: 636-647.

Forests with higher pre-fire biomass are more likely to experience low-severity fire.

Thompson, J.R., Spies, T.A., Ganio, L.M. (co-authored by U.S. Forest Service). 2007. Reburn severity in managed and unmanaged vegetation in a large wildfire. *Proceedings of the National Academy of Sciences of the United States of America* 104: 10743-10748.

"Areas that were salvage-logged and planted after the initial fire burned more severely than comparable unmanaged areas."

Thompson, J.R., Spies, T.A. (co-authored by U.S. Forest Service). 2009. Vegetation and weather explain variation in crown damage within a large mixed-severity wildfire. *Forest Ecology and Management* 258: 1684-1694.

Mature forests with higher canopy cover had lower fire severity.

Thompson, J., and T.A. Spies (co-authored by U.S. Forest Service). 2010. Exploring Patterns of Burn Severity in the Biscuit Fire in Southwestern Oregon. *Fire Science Brief* 88: 1-6.

"Areas that burned with high severity...in a previous wildfire (in 1987, 15 years prior) were more likely to burn with high severity again in the 2002 Biscuit Fire. Areas that were salvage-logged and planted following the 1987 fire burned with somewhat higher fire severity than equivalent areas that had not been logged and planted."

Graham, R., et al. (U.S. Forest Service). 2012. Fourmile Canyon Fire Findings. Gen. Tech. Rep. RMRS-GTR-289. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 110 p.

Thinned forests "were burned more severely than neighboring areas where the fuels were not treated", and 162 homes were destroyed by the Fourmile Canyon Fire (see Figs. 45 and 46).

Morris, W.G. (U.S. Forest Service). 1940. Fire weather on clearcut, partly cut, and virgin timber areas at Westfir, Oregon. *Timberman* 42: 20-28.

"This study is concerned with one of these factors - the fire-weather conditions near ground level - on a single operation during the first summer following logging. These conditions were found to be more severe in the clear-cut area than in either the heavy or light partial cutting areas and more severe in the latter areas than in virgin timber."

Countryman, C.M. (U.S. Forest Service). 1956. Old-growth conversion also converts fire climate. *Fire Control Notes* 17: 15-19.

Partial cutting (thinning) increases wildfire severity, due to microclimate impacts, regardless of whether or how the slash debris is treated.

"Although the general relations between weather factors, fuel moisture, and fire behavior are fairly well known, the importance of these changes following conversion and their combined effect on fire behavior and control is not generally recognized. The term 'fireclimate,' as used here, designates the environmental conditions of weather and fuel moisture that affect fire behavior. It does not consider fuel created by slash because regardless of what forest managers do with slash, they still have to deal with the new fireclimate. In fact, the changes in wind, temperature, humidity, air structure, and fuel moisture may result in greater changes in fire behavior and size of control job than does the addition of more fuel in the form of slash."

"Conversion which opens up the canopy by removal of trees permits freer air movement and more sunlight to reach the ground. The increased solar radiation in turn results in higher temperatures, lower humidity, and lower fuel moisture. The magnitude of these changes can be illustrated by comparing the fireclimate in the open with that in a dense stand."

"A mature, closed stand has a fireclimate strikingly different from that in the open. Here nearly all of the solar radiation is intercepted by the crowns. Some is reflected back to space and the rest is converted to heat and distributed in depth through the crowns. Air within the stand is warmed by contact with the crowns, and the ground fuels are in turn warmed only by contact with the air. The temperature of fuels on the ground thus usually approximates air temperature within the stand."

"Temperature profiles in a dense, mixed conifer stand illustrate this process (fig. 2). By 8 o'clock in the morning, air within the crowns had warmed to 68° F. Air temperature near the ground was only 50°. By 10 o'clock temperatures within the crowns had reached 82° and, although the heat had penetrated to lower levels, air near the surface at 77° was still cooler than at any other level. At 2:00 p.m., air temperature within the stand had become virtually uniform at 87°. In the open less than one-half mile away, however, the temperature at the surface of pine litter reached 153° at 2:00 p.m."

"Because of the lower temperature and higher humidity, fuels within the closed stand are more moist than those in the open under ordinary weather conditions. Typically, when moisture content is 3 percent in the open, 8 percent can be expected in the stand."

"Moisture and temperature differences between open and closed stands have a great effect on both the inception and the behavior of fire. For example, fine fuel at 8-percent moisture content will require nearly one-third more heat for ignition than will the same fuel at 3-percent moisture content. Thus, firebrands that do not contain enough heat to start a fire in a closed stand may readily start one in the open."

"When a standard fire weather station in the open indicates a temperature of 85° F., fuel moisture of 4 percent, and a wind velocity of 15 m.p.h.--not unusual burning conditions in the West--a fire starting on a moderate slope will spread 4.5 times as fast in the open as in a closed stand. The size of the suppression job, however, increases even more drastically."

"Greater rate of spread and intensity of burning require control lines farther from the actual fire, increasing the length of fireline. Line width also must be increased to contain the hotter fire. Less production per man and

delays in getting additional crews complicate the control problem on a fast-moving fire. It has been estimated that the size of the suppression job increases nearly as the square of the rate of forward spread. Thus, fire in the open will require 20 times more suppression effort. In other words, for each man required to control a surface fire in a mature stand burning under these conditions, 20 men will be required if the area is clear cut."

"Methods other than clear cutting, of course, may bring a less drastic change in fireclimate. Nevertheless, the change resulting from partial cutting can have important effects on fire. The moderating effect that a dense stand has on the fireclimate usually results in slow-burning fires. Ordinarily, in dense timber only a few days a year have the extreme burning conditions under which surface fires produce heat rapidly enough to carry the fire into the crowns. Partial cutting can increase the severity of the fireclimate enough to materially increase the number of days when disastrous crown fires can occur."

SNEP (co-authored by U.S. Forest Service). 1996. Sierra Nevada Ecosystem Project, Final Report to Congress: Status of the Sierra Nevada. Vol. I: Assessment summaries and management strategies. Davis, CA: University of California, Davis, Center for Water and Wildland Resources.

"Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has increased fire severity more than any other recent human activity."

Chen, J., et al. (co-authored by U.S. Forest Service). 1999. Microclimate in forest ecosystem and landscape ecology: Variations in local climate can be used to monitor and compare the effects of different management regimes. *BioScience* 49: 288-297.

When moving from open forest areas, resulting from logging, and into dense forests with high canopy cover, "there is generally a decrease in daytime summer temperatures but an increase in humidity..."

The authors reported a 5° C difference in ambient air temperature between a closed-canopy mature forest and a forest with partial cutting, like a commercial thinning unit (Fig. 4b), and noted that such differences are even greater than the increases in temperature predicted due to anthropogenic climate change.

Dombeck, M. (U.S. Forest Service Chief). 2001. How Can We Reduce the Fire Danger in the Interior West. *Fire Management Today* 61: 5-13.

"Some argue that more commercial timber harvest is needed to remove small-diameter trees and brush that are fueling our worst wildlands fires in the interior West. However, small-diameter trees and brush typically have little or no commercial value. To offset losses from their removal, a commercial operator would have to remove large, merchantable trees in the overstory. Overstory removal lets more light reach the forest floor, promoting vigorous forest regeneration. Where the overstory has been entirely removed, regeneration produces thickets of 2,000 to 10,000 small trees per acre, precisely the small-diameter materials that are causing our worst fire problems. In fact, many large fires in 2000 burned in previously logged areas laced with roads. It seems unlikely that commercial timber harvest can solve our forest health problems."

Hanson, C.T. 2021. Is "Fuel Reduction" Justified as Fire Management in Spotted Owl Habitat? *Birds* 2: 395-403.

Thinning followed by burning and post-fire logged areas had higher overall fire severity.

"Within the forest types inhabited by California Spotted Owls, high-severity fire occurrence was not higher overall in unmanaged forests and was not associated with the density of pre-fire snags from recent drought in the Creek Fire, contrary to expectations under the fuel reduction hypothesis. Moreover, fuel-reduction logging in California Spotted Owl habitats was associated with higher fire severity in most cases. The highest levels of high-severity fire were in the categories with commercial logging (post-fire logging, private commercial timberlands, and commercial thinning), while the three categories with lower levels of high-severity fire were in forests with no recent forest management or wildfire, less intensive noncommercial management, and unmanaged forests with re-burning of mixed-severity wildfire, respectively."

Baker, B.C., and C.T. Hanson. 2022. Cumulative tree mortality from commercial thinning and a large wildfire in the Sierra Nevada, California. *Land* 11: Article 995.

Thinning followed by burning increases overall fire severity.

"Similar to the findings of Hanson (2022) in the Antelope Fire of 2021 in northern California, in our investigation of the Caldor Fire of 2021 we found significantly higher cumulative severity in forests with commercial thinning than in unthinned forests, indicating that commercial thinning killed significantly more trees than it prevented from being killed in the Caldor Fire...Despite controversy regarding thinning, there is a body of scientific literature that suggests commercial thinning should be scaled up across western US forest landscapes as a wildfire management strategy. This raises an important question: what accounts for the discrepancy on this issue in the scientific literature? We believe several factors are likely to largely explain this discrepancy. First and foremost, because most previous research has not accounted for tree mortality from thinning itself, prior to the wildfire-related mortality, such research has underreported tree mortality in commercial thinning areas relative to unthinned forests. Second, some prior studies have not controlled for vegetation type, which can lead to a mismatch when comparing severity in thinned areas to the rest of the fire area given that thinning necessarily occurs in conifer forests but unthinned areas can include large expanses of non-conifer vegetation types that burn almost exclusively at high severity, such as grasslands and chaparral. Third, some research reporting effectiveness of commercial thinning in terms of reducing fire severity has been based on the subjective location of comparison sample points between thinned and adjacent unthinned forests. Fourth, reported results have often been based on theoretical models, which subsequent research has found to overestimate the effectiveness of thinning. Last, several case studies draw conclusions about the effectiveness of thinning as a wildfire management strategy when the results of those studies do not support such a conclusion, as reviewed in DellaSala et al. (2022)." (internal citations omitted)

DellaSala, D.A., B.C. Baker, C.T. Hanson, L. Ruediger, and W.L. Baker. 2022. Have western USA fire suppression and megafire active management approaches become a contemporary Sisyphus? *Biological Conservation* 268: Article 109499.

Thinning followed by burning increases overall fire severity.

With regard to a previous U.S. Forest Service study claiming that commercial thinning effectively reduced fire severity in the large Wallow fire of 2011 in Arizona, DellaSala et al. (2022, Section 5.1) conducted a detailed accuracy check and found that the previous analysis had dramatically underreported high-severity fire in commercial thinning units, and forests with commercial thinning in fact had higher fire severity, overall.

DellaSala et al. (2022, Section 5.2) also reviewed several U.S. Forest Service studies relied upon by Prichard et al. (2021) for the claim that commercial thinning is an effective fire management approach and found that the actual results of these cited studies did not support that conclusion.

Beschta, R.L.; Frissell, C.A.; Gresswell, R.; Hauer, R.; Karr, J.R.; Minshall, G.W.; Perry, D.A.; Rhodes, J.J. 1995. *Wildfire and salvage logging*. Eugene, OR: Pacific Rivers Council.

"We also need to accept that in many drier forest types throughout the region, forest management may have set the stage for fires larger and more intense than have occurred in at least the last few hundred years."

"With respect to the need for management treatments after fires, there is generally no need for urgency, nor is there a universal, ecologically-based need to act at all. By acting quickly, we run the risk of creating new problems before we solve the old ones."

"[S]ome argue that salvage logging is needed because of the perceived increased likelihood that an area may reburn. It is the fine fuels that carry fire, not the large dead woody material. We are aware of no evidence supporting the contention that leaving large dead woody material significantly increases the probability of reburn."

Morrison, P.H. and K.J. Harma. 2002. Analysis of Land Ownership and Prior Land Management Activities Within the Rodeo & Chediski Fires, Arizona. Pacific Biodiversity Institute, Winthrop, WA. 13 pp.

Previous logging was associated with higher fire severity.

Donato DC, Fontaine JB, Campbell JL, Robinson WD, Kauffman JB, Law BE. 2006. Science 311: 352.

"In terms of short-term fire risk, a reburn in [postfire] logged stands would likely exhibit elevated rates of fire spread, fireline intensity, and soil heating impacts....Postfire logging alone was notably incongruent with fuel reduction goals."

Hanson, C.T., Odion, D.C. 2006. Fire Severity in mechanically thinned versus unthinned forests of the Sierra Nevada, California. In: Proceedings of the 3rd International Fire Ecology and Management Congress, November 13-17, 2006, San Diego, CA.

"In all seven sites, combined mortality [thinning and fire] was higher in thinned than in unthinned units. In six of seven sites, fire-induced mortality was higher in thinned than in unthinned units...Mechanical thinning increased fire severity on the sites currently available for study on national forests of the Sierra Nevada."

Platt, R.V., et al. 2006. Are wildfire mitigation and restoration of historic forest structure compatible? A spatial modeling assessment. Annals of the Assoc. Amer. Geographers 96: 455-470.

"Compared with the original conditions, a closed canopy would result in a 10 percent reduction in the area of high or extreme fireline intensity. In contrast, an open canopy [from thinning] has the opposite effect, increasing the area exposed to high or extreme fireline intensity by 36 percent. Though it may appear counterintuitive, when all else is equal open canopies lead to reduced fuel moisture and increased midflame windspeed, which increase potential fireline intensity."

Cruz, M.G, and M.E. Alexander. 2010. Assessing crown fire potential in coniferous forests of western North America: A critique of current approaches and recent simulation studies. Int. J. Wildl. Fire. 19: 377-398.

The fire models used by the U.S. Forest Service falsely predict effective reduction in crown fire potential from thinning:

"Simulation studies that use certain fire modelling systems (i.e. NEXUS, FlamMap, FARSITE, FFE-FVS (Fire and Fuels Extension to the Forest Vegetation Simulator), Fuel Management Analyst (FMAPlus), BehavePlus) based on separate implementations or direct integration of Rothermel's surface and crown rate of fire spread models with Van Wagner's crown fire transition and propagation models are shown to have a significant underprediction bias when used in assessing potential crown fire behaviour in conifer forests of western North America. The principal sources of this underprediction bias are shown to include: (i) incompatible model linkages; (ii) use of surface and crown fire rate of spread models that have an inherent underprediction bias; and (iii) reduction in crown fire rate of spread based on the use of unsubstantiated crown fraction burned functions. The use of uncalibrated custom fuel models to represent surface fuelbeds is a fourth potential source of bias."

DellaSala et al. (2013) (letter from over 200 scientists):

"Numerous studies also document the cumulative impacts of post-fire logging on natural ecosystems, including...accumulation of logging slash that can add to future fire risks..."

DellaSala et al. (2015) (letter from over 200 scientists):

"Post-fire logging has been shown to eliminate habitat for many bird species that depend on snags, compact soils, remove biological legacies (snags and downed logs) that are essential in supporting new forest growth, and spread invasive species that outcompete native vegetation and, in some cases, increase the flammability of the new forest. While it is often claimed that such logging is needed to restore conifer growth and lower fuel hazards after a fire, many studies have shown that logging tractors often kill most conifer seedlings and other important re-establishing vegetation and actually increases flammable logging slash left on site. Increased chronic sedimentation to streams due to the extensive road network and runoff from logging on steep slopes degrades

aquatic organisms and water quality."

Bradley, C.M. C.T. Hanson, and D.A. DellaSala. 2016. Does increased forest protection correspond to higher fire severity in frequent-fire forests of the western USA? *Ecosphere* 7: article e01492.

In the largest study on this subject ever conducted in western North American, the authors found that the more trees that are removed from forests through logging, the higher the fire severity overall:

"We investigated the relationship between protected status and fire severity using the Random Forests algorithm applied to 1500 fires affecting 9.5 million hectares between 1984 and 2014 in pine (*Pinus ponderosa*, *Pinus jeffreyi*) and mixed-conifer forests of western United States, accounting for key topographic and climate variables. We found forests with higher levels of protection [from logging] had lower severity values even though they are generally identified as having the highest overall levels of biomass and fuel loading."

Dunn, C.J., et al. 2020. How does tree regeneration respond to mixed-severity fire in the western Oregon Cascades, USA? *Ecosphere* 11: Article e03003.

Forests that burned at high-severity had lower, not higher, overall pre-fire tree densities.

Moomaw et al. (2020) (letter from over 200 scientists: <https://johnmuirproject.org/2020/05/breaking-news-over-200-top-u-s-climate-and-forest-scientists-urge-congress-protect-forests-to-mitigate-climate-crisis/>):

"Troublingly, to make thinning operations economically attractive to logging companies, commercial logging of larger, more fire-resistant trees often occurs across large areas. Importantly, mechanical thinning results in a substantial net loss of forest carbon storage, and a net increase in carbon emissions that can substantially exceed those of wildfire emissions (Hudiburg et al. 2013, Campbell et al. 2012). Reduced forest protections and increased logging tend to make wildland fires burn more intensely (Bradley et al. 2016). This can also occur with commercial thinning, where mature trees are removed (Cruz et al. 2008, Cruz et al. 2014). As an example, logging in U.S. forests emits 10 times more carbon than fire and native insects combined (Harris et al. 2016). And, unlike logging, fire cycles nutrients and helps increase new forest growth."

Moomaw et al. (2021) (letter from over 200 scientists: <https://bit.ly/3BFtlAg>):

"[C]ommercial logging conducted under the guise of "thinning" and "fuel reduction" typically removes mature, fire-resistant trees that are needed for forest resilience. We have watched as one large wildfire after another has swept through tens of thousands of acres where commercial thinning had previously occurred due to extreme fire weather driven by climate change. Removing trees can alter a forest's microclimate, and can often increase fire intensity. In contrast, forests protected from logging, and those with high carbon biomass and carbon storage, more often burn at equal or lower intensities when fires do occur."

Bartowitz, K.J., et al. 2022. Forest Carbon Emission Sources Are Not Equal: Putting Fire, Harvest, and Fossil Fuel Emissions in Context. *Front. For. Glob. Change* 5: Article 867112.

The authors found that logging conducted as commercial thinning, which involves removal of some mature trees, substantially increases carbon emissions relative to wildfire alone, and commercial thinning "causes a higher rate of tree mortality than wildfire."

Evers, C., et al. 2022. Extreme Winds Alter Influence of Fuels and Topography on Megafire Burn Severity in Seasonal Temperate Rainforests under Record Fuel Aridity. *Fire* 5: Article 41.

The authors found that dense, mature/old forests with high biomass and canopy cover tended to have lower fire severity, while more open forests with lower canopy cover and less biomass burned more severely.

Baker, W.L., C.T. Hanson, M.A. Williams, and D.A. DellaSala. 2023. Countering Omitted Evidence of Variable Historical Forests and Fire Regime in Western USA Dry Forests: The Low-Severity-Fire Model Rejected. *Fire* 6: Article 146.

A pattern of omissions of peer-reviewed, published reply articles, which refuted and discredited U.S. Forest Service response articles, created a "falsification" of the scientific record regarding historical forest density and fire regimes. The corrected record shows that historical forests were much denser on average than assumed by the Forest Service and were shaped by mixed-severity fire, not merely low-severity fire.

Inadequate Analysis of Impacts to Spotted Owls

There is no more iconic indicator species for old-growth forests, and the ecological health of these forests, than the spotted owl.

Current research confirms severe adverse impacts to spotted owls from post-fire logging, and neutral or positive effects from big wildfires in the absence of post-fire logging (Hanson et al. 2018, Lee 2020, Hanson et al. 2021). Two subspecies of the spotted owl are already listed under the ESA (northern and Mexican), and the U.S. Fish and Wildlife Service recently proposed (see attached 60-day comments on the proposed listing, which we incorporate herein by reference) to list the California spotted owl as threatened in the Sierra Nevada, and noted that mechanical thinning has an adverse impact on the owls. An EIS must be prepared to analyze these impacts.

If the DEIS's logging loopholes remain, it would convert vast areas of suitable spotted owl habitat to unsuitable. USFS attempts to justify this by assuming that a wildfire would convert some areas of suitable habitat to unsuitable. However, high-intensity fire patches are highly suitable foraging habitat for spotted owls, so long as they are not subjected to post-fire logging (e.g., Lee 2020, Hanson et al. 2021, USFS 2023).

Bond et al. (2009) accounted for distance from nest sites and they found that spotted owls preferentially select high-intensity fire areas up to 1500 meters away from nest sites, including in areas much more than 100 meters into the interiors of high-intensity fire patches. Bond et al. (2009), Hanson et al. (2018), and Hanson et al. (2021) find that mature/old forest that experienced high-intensity fire, and becomes complex early seral forest habitat ("snag forest habitat") is suitable spotted owl habitat, specifically suitable foraging habitat. The DEIS misrepresents the science, and improperly minimizes disclosure of impacts, by only considering lower-intensity fire areas in dense mature/old forest as suitable spotted owl habitat.

The US Fish and Wildlife Service's proposal to list the California spotted owl under the Endangered Species Act acknowledges serious harm to spotted owls from mechanical thinning and post-fire logging, yet the DEIS does not adequately address this. For example:

On p. 62 of the USFWS listing proposal, USFWS admits that "mechanical thinning can decrease California spotted owl occupancy and is negatively correlated with reproduction (Tempel et al. 2014a, p. 2089; Stephens et al. 2014, p. 903; Tempel et al. 2022, p. 19)", and further concludes on p. 62 that "there is evidence of reduced foraging in fuel treatment areas" and "Thinning may have negative short-term effects on prey species by increasing the risk of predation by removing above-ground cover and reducing canopy connectivity, and thinning may remove suitable nesting substrates..."

On p. 63, USFWS admits that "California spotted owls inhabit areas of low-medium severity fire, patchy high-severity fire, and areas with dead trees; therefore, salvage logging likely reduces the amount of habitat available for California spotted owls (Gutiérrez et al. 2017, p. 276)." USFWS further admits, on p. 63, that there is evidence that "California spotted owl occupancy decreases with salvage logging (Lee et al. 2013, p. 1327; Lee and Bond 2015, p. 228; Hanson and Chi 2021, p. 5)", and that "Salvage logging can be a threat to California spotted owls when their habitat components of large trees, coarse woody debris, and habitat heterogeneity are removed from the landscape, resulting in a decrease in occupancy at the population level." USFWS also admits, at the top of p. 64, that the Sierra Nevada Forest Plan Amendment even allows salvage logging in CSO PACs that are occupied by CSOs after fires, so long as the Forest Service merely claims that the territory is no longer suitable for CSOs postfire, which the agency can do under the forest plan amendment even if CSOs are nesting and reproducing (Lee and Bond 2015, Hanson et al. 2018).

The DEIS fails to adequately disclose and address the adverse impacts to spotted owls and their habitat that would result from the logging loopholes and the failure of all alternatives to actually protect mature and old-growth forests from logging, both mechanical thinning and post-fire logging.

The DEIS Does Not Adequately Analyze Increased Tree Mortality Caused by Thinning

In Sierra Nevada forests, the Forest Service has recently improperly relied on a Forest Service study, North et al. (2022), that has been thoroughly discredited and has been found to represent a "falsification of the scientific record" (Baker et al. 2023).

First, North et al. (2022) relies on previous studies by Collins and Stephens, which reported that there were only 20 to 30 trees per acre in historical Sierra Nevada forests, based on circa 1911 Forest Service field surveys. However, as we found in Baker et al. (2018), the Collins and Stephens work omitted the small-tree data in those historical datasets and failed to use correction factors that the Forest Service itself, a century ago, repeatedly stated were needed to avoid severe underestimations of forest density. The surveys were based on visually estimated distance from the transect line, but surveyors consistently overestimated distance (e.g., they would see 30 or 40 feet to their left and right but would assume they were seeing 66 feet left and right), causing a huge underestimation of forest density. Our findings in Baker et al. (2018) are uncontested by the Forest Service.

Second, North et al. (2022) misleadingly claimed that "current" forests have 150 to 200 trees per acre, but inexplicably used data from 2011 to represent supposed "current" conditions, and failed to mention that over 90% of their study areas have burned in mixed-intensity wildfires since 2011, and that a large portion of the live trees that existed a decade ago are now snags and downed logs.

The bottom line is that North et al. (2022) severely underreported historical forest density by using previous historical density estimates that have been discredited and superseded, and overreported current live tree forest density by using 2011 as their "current" condition, despite the fact that fire and drought since 2011 have dramatically reduced live tree density in their study areas.

Further, studies that have claimed success of such projects on reducing bark beetle mortality generally do not consider the treatment-caused mortality when considering the concept of a successful treatment. For instance, Fettig et al (2012) examined the effect on bark beetle-induced tree mortality of various levels of thinning in comparison to unthinned areas in mixed-conifer forests in the Sierra Nevada. While they stated that "[i]n the present study, bark beetle-caused tree mortality was relatively low the decade after thinning, never reaching a level that would be considered epidemic for either *P. jeffreyi* or *P. ponderosa*..." the authors did not consider the initial mortality event caused by the thinning treatment itself. Their measure of success was whether the level of tree mortality in thinned stands was less than that in the unthinned stands, but apparently mortality was only significant to success if caused by bark beetles. When analyzing the data they present, it is actually quite simple to glean that the overall mortality (i.e. mortality from thinning plus mortality from subsequent bark beetles) in the three thinning treatments was substantial (109 - 289 trees killed per hectare on average) compared to the overall mortality in the unthinned stands (approximately 13 trees killed per hectare on average). Granted, the number of trees killed by bark beetles was slightly lower in the thinning units (3 - 11 trees killed per hectare on average) compared to the unthinned stand (13 trees killed per hectare on average), but this pales in comparison to overall number of trees killed due to the thinning itself (see Figure 1). Another way to view this is, approximately 289 trees per hectare were killed in the most intensive treatment by the thinning itself in order to prevent 10 trees from being killed in the future by bark beetles.

Six et al. (2014) notes a similar pattern:

"Although more trees were killed overall in control units during the outbreak, all controls still retained a greater number of residual mature trees than did thinned stands as they entered the post-outbreak phase."

And a separate study in ponderosa pine forests in the Black Hills similarly demonstrated that far more trees were killed through the actual thinning process than through a subsequent bark beetle outbreak that was more severe than that experienced in the study by Fettig et al. (2012). Negron et al (2017) examined stands in which the overall mortality (again, mortality caused by thinning plus mortality caused by bark beetles) was 242.6 trees killed per acre on average in thinned stands compared to 87.7 trees killed per acre in unthinned stands. As with other similar studies, the treatment was the primary source of mortality in the stand rather than bark beetles. By the end of the outbreak, not only were there more trees in the unthinned stands (203.2 trees per acre on average)

compared to the thinned stands (55 trees per acre on average) as well as more basal area (which could be considered a proxy for both biomass and carbon storage; 67.8 square feet per acre compared to 32.3 square feet per acre).

In Sierra Nevada mixed-conifer and ponderosa pine forests after the major drought occurring approximately 2012-2017, Restaino et al. (2019) reported, in Figures 3 and 4, mixed effects of increasing forest basal area on tree mortality from drought and native bark beetles, with no clear relationship. Restaino et al. (2019), in Figure 5, reported that thinned forests had approximately the same or higher tree mortality from drought/beetles compared to unthinned forests for three of the four conifer species studied. Only one of the four conifer species studied, ponderosa pine, had slightly lower probability of mortality in thinned forests than in unthinned forests, but the difference was only 15% on average, while Figure 2a of the study showed that thinning itself killed about 35% of the forest basal area before the drought occurred; thus thinning once again killed more trees than it prevented from being killed, even for the one conifer species out of four for which the thinned areas had somewhat lower probability of tree mortality.

North et al. (2022) fails to divulge or disclose the fact that mechanical thinning, conducted ostensibly to reduce stand densities and reduce competition-related tree mortality, kills far more trees than it prevents from being killed.

Moreover, Baker and Hanson (2022) establish that mechanical thinning kills significantly more trees than it prevents from being killed, when tree mortality from thinning and tree mortality from subsequent wildfire are both taken into account.

Sincerely,

Andy Mahler
Protect Our Woods