



Submitted [via portal on the USFS planning site](#)

January 31, 2024

**RE: Scoping comments on proposed amendment to Northwest Forest Plan**

Dear Regional Forester for the Pacific Northwest Region Jacqueline Buchanan,

Great Old Broads for Wilderness is a women-led national grassroots organization that engages and inspires activism to preserve and protect wilderness and wild lands. Please accept these scoping comments for the proposed Northwest Forest Plan amendment on behalf of 7 Pacific Northwest chapters (called “Broadbands”): Redwood (northern California), Rogue Valley (southern Oregon), Willamette Valley (Salem to Eugene), Bitterbrush (Central and Eastern Oregon), Cascade-Volcanoes (Portland area and Southwestern Washington), South Sound (Olympia, WA), and Polly Dyer (Seattle). Our roughly 500 members and supporters in the region include a diverse range of experience and expertise, and many have raised families and enjoyed careers in this region. We enjoy the National Forests included in the proposed amendment for many purposes - from boating and hiking, to bird watching and foraging. We also know how important ecosystem services these forested public lands provide are - from storing carbon to battle climate change, to filtering our drinking water. And while we value these forests for ourselves, we also value them for the benefits they provide for our children and grandchildren, and the countless species of plants, animals, and fungi that live in the Pacific Northwest.

The preliminary need to change, as stated in the Notice of Intent, focuses on five interrelated topic areas, including:

- Improving fire resistance and resilience across the NWFP planning area,
- Strengthening the capacity of NWFP ecosystems to adapt to the ongoing effects of climate change,
- Improving conservation and recruitment of mature and old-growth forest conditions, ensuring adequate habitat for species dependent upon mature and old growth ecosystems and supporting regional biodiversity,
- Incorporating Indigenous Knowledge into planning, project design, and implementation to achieve forest management goals and meet the agency's general trust responsibilities, and

- Providing a predictable supply of timber and non-timber products, and other economic opportunities to support the long-term sustainability of communities located proximate to National Forest System lands and economically connected to forest resources.

We care about all of these topics, and the comments expressed below are reflective of where our chapters' biggest concerns and expertise lie. We hope that the Forest Service will consider these comments carefully and fully incorporate these and other public comments and the best available science as the amendment process moves forward. Pacific Northwest forests are too important to the future of our communities, climate, and biodiversity to push hastily forward with plan amendments for the sake of political convenience.

### ***Differences in moist and dry forests:***

The amended plan proposes to expand the reach of the Northwest Forest Plan to cover national forests east and south of the original boundaries of "the range of the northern spotted owl." There may be good reasons to consider this expansion, including connectivity across ecosystems for human and biological communities. Expanding the intent of the NWFP to other parts of the western United States could encourage development of late successional reserves to protect mature and old-growth stands and ample stream buffers to protect water quality, quantity, and aquatic habitat. However, the proposed amended Plan does not export concepts of biodiversity to dry forests as much as it imports techniques of fire-fighting to wet forests. This is problematic. *How will an amended Plan avoid one-size-fits-all planning that ignores stark differences between many forest types in both eastside and westside forests?*

- *The problem isn't fire as much as overharvest. How will the amended Plan address this?*  
The temperate rainforests (the focus of the original Northwest Forest Plan) suffer from decades of over-harvest. The dry forests east and south of the Cascade Mountains suffer from decades of fire suppression *and* over-harvest. (see Figure 1, below.) While wildfire, insects, and disease are exacerbated by climate change, it is the threat of *logging* that forest management can most easily address. The proposed amendment seems to use the fear of wildfire to apply blanket prescriptions of aggressive fire-fighting on both sides of the Cascade Mountains, and to open more public forestland to logging in the name of fire prevention. A regionwide application of thinning and fire suppression is not scientifically supported.

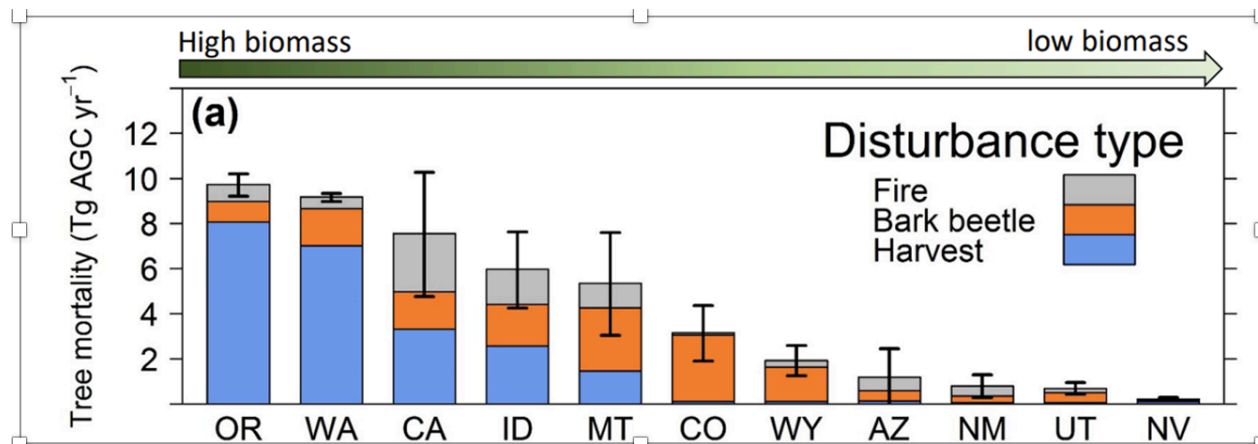


Figure 1. Mean annual tree mortality from fires, bark beetles, and timber harvest on forestland from 2003–2012 for each state in the western US. Tree mortality was quantified as the amount of aboveground carbon (AGC) stored in tree biomass killed by disturbance (Berner et al. 2017)<sup>1</sup>.

- *What exactly is proposed as “management” for the MOIST forests to allow them to recover as naturally functioning ecosystems?*

A century ago, the rain-drenched westside forests supported some of the oldest, largest trees in the world (coast Douglas-fir remains the second-tallest tree species in the world.) Since the mid-twentieth century, industrial-scale logging on federal land has whittled down these giant forests to remnant stands. The Northwest Forest Plan halted most old-growth logging in the region and managed to save most old forest remnants. However, logging continues in unprotected stands of mature forests, often in the name of thinning or fuel reduction.

The high productivity of these westside forests creates a continuously layered canopy with a variety of tree species, sizes, and ages, all growing in a moisture-holding environment of downed logs, thick moss, profuse epiphytes, and rich organic soils. They are naturally fire-resistant. Thinning forests compresses the soil, destroys the understory layers, increases susceptibility to erosion and windthrow, accumulates broken branches as fuel, and opens the canopy for more rapid drying. All of this increases fire susceptibility and releases carbon into the atmosphere.

In moist forests of western Oregon and western Washington, thinning doesn't deter wildfire. Because of the abundant rainfall in this ecosystem, a thinned understory will grow back quickly, too quickly to make any difference to the relative infrequency of fire in this region. Dr. Beverly Law (2021) states that west of the Oregon Cascades there is no scientific basis to attempt to reduce fuels because they grow back rapidly; it is not possible to reduce their flammability.

<sup>1</sup> Berner, Logan T, Beverly E Law, Arjan J H Meddens, and Jeffrey A Hicke. 2017. “Tree Mortality from Fires, Bark Beetles, and Timber Harvest during a Hot and Dry Decade in the Western United States (2003–2012).” *Environmental Research Letters* 12 (6): 065005. <https://doi.org/10.1088/1748-9326/aa6f94>.

In addition, thinned, open understories provide little shelter for moist-forest species (marbled murrelets; northern spotted owls; red tree voles) and invite an influx of predators (ravens, barred owls, great horned owls) that further threaten these already threatened species.

- *What exactly is proposed as “management” for the DRY forests to allow them to recover as naturally functioning ecosystems?*

In January 2022, Department of Agriculture Secretary Vilsack and Randy Moore, head of the Forest Service, unveiled a 10-year strategy for “confronting America’s wildfire crisis through increased logging, thinning and prescribed fires to reduce high fuel loads”. Nationwide, the plan calls for “forest health treatments” on an additional 50 million acres of forest land over the next 10 years; that is *twice* the current levels of timber harvest.

Forest management in dry forests should consider the need to reverse decades of fire exclusion by prioritizing non-commercial fuel treatments and managed use of fire, and protecting fire resistant mature and old-growth trees. This will ensure carbon storage is not lost, and that ecological processes like fire are restored to these forests.

- *How will this amended NWFP ensure the long-term protection of mature and old-growth forests?*

Mature and old-growth stands in these lush, moist westside are carbon dense and highly valuable for climate mitigation. Researchers throughout the region have documented the value of these forests as carbon reserves because of their massive carbon storage, their fire resistance, and their likelihood to survive for decades or centuries because of their *potential* protection as public forests. In addition, mature and old forests provide the highest proportional area of terrestrial vertebrate habitat for supporting threatened or endangered species. Clearly, these forests are far more valuable standing, holding carbon, cleansing air and water, providing habitat, than being cut for a one-time profit and emitting tons of carbon into the atmosphere.

Mature and old-growth trees and forests offer similar value in eastside ecosystems. Many dry forest species have evolved with frequent fire and are fire-resistant, cutting them down removes the most fire resilient components in the eastside forests.

- *How will you assure that the most relevant, best available science is used throughout this amended plan?*

The NWFP was developed by scientists who knew the ecology of these westside forests in great detail. Such science-led bioregional plans are difficult to accomplish, but they are durable because they are locally specific and relevant.

Because most fire-related research is NOT from this unique corner of the wet Pacific Northwest, it is imperative that the amended plan is NOT built on research ideas imported from dry, fire-prone ecosystems. The same is true for developing a credible, science-based plan for the region’s dry forests

Ecosystem-based management for each forest type must be based on credible, relevant research from each ecosystem. This amended Plan must include westside and eastside ecosystem scientists in its development and review.

There are often-cited studies that claim thinning forests is good for spotted owls. These studies were conducted in the dry forests of Sierra Nevada on a subspecies different from the *northern* spotted owl. The original NWFP limited its reach to western Washington, western Oregon, and a fog-drenched strip of northern California, the range of the *northern* spotted owl. This area has an average annual precipitation between 80 and 200 inches. That is five to ten *times* more precipitation than falls in the national forests to the south and east that have recently been added to this amended Plan. Fire is a different beast in these dry forests.

### **Focus on effective fire risk reduction and prevention:**

- *How does the amended plan refocus fire policy on effective risk reduction?*

Older, moss-draped forests of the Cascade Mountains and Coast Range are fire resistant. Most fuel reduction projects in the highly productive, moist west forests of Oregon and Washington are ineffective. Instead, these projects reduce carbon storage in these carbon-rich forests, thus reducing one of our most effective climate mitigation strategies. Promoting natural fire processes and protecting mature and old-growth trees (the most fire-resistant and carbon rich trees) are essential in dry forests as well. We are concerned that focusing on commercial thinning projects direct limited funds away from more effective strategies.

Fuel reduction should be located near communities and focus on non-commercially treating small fuels. Logging commercially viable trees as fuel reduction tends to decrease a forests' resilience to fire by removing fire resistant trees, generating hazardous slash, making the stand hotter-drier-windier, and stimulating the growth of surface and ladder fuels. Fuel and fire risk reduction "treatments" can also have negative impacts on wildlife habitat and seldom result in actual risk reduction because fires don't often intersect with fuel reduction areas during conditions when such treatments are effective.

Thinning and fuel treatment should be prioritized to high-risk locations such as the wildland-urban interface to protect structures. Forest management for wildfire protection is most effective in the 60-100 feet zone from structures, "defensible space": the home outward strategy (Bevington, 2021).

- *How does the amended plan reduce human ignitions?*

Reducing sources of ignition should also be addressed. A variety of research shows that human-caused ignitions of wildfire is very high. Across National Forests in the west, 65% of wildfires are ignited by natural causes, almost exclusively by lightning strikes<sup>2</sup>. When all wildfires

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<sup>2</sup> Jeffrey P. Prestemon, Todd J. Hawbaker, Michael Bowden, John Carpenter, Maureen T. Brooks, Karen L. Abt, Ronda Sutphen, and Samuel Scranton. Wildfire Ignitions: A Review of the Science and Recommendations for Empirical Modeling. USFA General Technical Report SRS-171. 2013  
[https://www.srs.fs.usda.gov/pubs/gtr/gtr\\_srs171.pdf](https://www.srs.fs.usda.gov/pubs/gtr/gtr_srs171.pdf)

are included in the equation, human caused ignitions account for as much as 85%<sup>3</sup>. Human-caused ignitions can be direct or indirect, mostly unintentional. Spreading depends on fuels, low-moisture conditions, wind. Many of these are started by escaped campfires, often along roads.

Calef and others (2008) found proximity to roads and human settlement are high predictors of ignition of wildfires in Alaska.<sup>4</sup> Existing communities are fixed, but we can limit future development in high fire hazard areas in and near forests. Road density can be reduced by decommissioning unneeded roads, which can have additional benefits, and roads can be closed seasonally during high fire risk periods.

Preventive measures for human-caused ignitions, processes that can be altered, come under three categories: Education, Engineering, and Enforcement. Education can be for communities adjacent to the forest and for forest-users. Engineering can include utility inspections and procedures to cut off power during a wildfire or in anticipation under dry, high-wind conditions. This also includes establishment of building codes for fire resistant building materials, and hazardous fuel reduction especially around structures. Enforcement can include spark arrestor compliance, fire use restrictions, and burn permitting. The Forest Service should work with appropriate local governments and agencies to ensure these measures are prioritized.

### ***Climate Change and Mature and Old-Growth Ecosystems:***

In order to meet the intent of Executive Order 14072<sup>5</sup> on Strengthening the Nation's Forests, Communities, and Local Economies, and rise to the urgent need to address climate change, the NWFP amendment must protect all mature and old growth (MOG) trees and forests. The Broads are supportive of additional protections for mature and old-growth trees and forests across the country. In fact, we feel that the proposed national forest plan amendment is an important and necessary backstop to the NWFP amendment.

Here in the Pacific Northwest, protecting trees that are 80 years or older is important for ecosystem function and has many co-benefits alongside increased carbon storage. An 80-year-old conifer can live for hundreds of more years, absorbing more and more carbon from the atmosphere and storing it in its wood, roots, soil, and supporting diverse wildlife. These are among the most carbon-rich forests in the world, holding more carbon per acre than tropical

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<sup>3</sup> Syphard, Alexandra D., and Jon E. Keeley. 2015. "Location, Timing and Extent of Wildfire Vary by Cause of Ignition." *International Journal of Wildland Fire* 24 (1): 37. <https://doi.org/10.1071/WF14024>.

<https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm>

<sup>4</sup> Calef, M.P.; McGuire, A.D.; Chapin, F.S., III. 2008. Human influences on wildfire in Alaska from 1988 through 2005: An analysis of the spatial patterns of human impacts. *Earth Interactions*. 12(1): 1-17.

<sup>5</sup> USFS. Mature and Old-Growth Forests: Definition, Identification, and Initial Inventory on Lands Managed by the Forest Service and Bureau of Land Management Fulfillment of Executive Order 14072, Section 2(b). April 2023.

rainforests. Nowhere else in the *world* are there so many different species of big, long-lived conifers together in one place as in the Pacific Northwest. The NWFP governs the largest natural carbon reserves found in North America and the amendment must prioritize increasing carbon storage.

Law and Moomaw (2024)<sup>6</sup> report that “In the U.S., forests remove 12% of the nation’s greenhouse gas emissions annually and store the carbon long term in trees and soils. Mature and old-growth forests, with larger trees than younger forests, play an outsized role in accumulating carbon and keeping it out of the atmosphere. These forests are especially resistant to wildfires and other natural disturbances as the climate warms.”

Protecting these older forests can also help contribute to the goal of conserving 30% of land and water by 2030 (30x30). There are nearly 11 million acres of MOG in federal forests in Oregon and Washington (about 19% of the lower 48 states). Despite the important role they play in carbon storage and climate mitigation, only about 24% of MOG on federal land in our two states are fully protected from logging (GAP 1 & 2 designation). The remainder have varied levels of protection, some under the Northwest Forest Plan, in Late Successional Reserves, or in Inventoried roadless areas (which may be subject to post-fire logging.) This analysis was released in a mapping study by DellaSala et al. in 2022.<sup>7</sup>

Law et al (2022) proposes strategic reserves in Oregon forests for biodiversity, water and carbon to mitigate and adapt to climate change<sup>8</sup>. The researchers look at ways of achieving the Executive Order 14008 goal of “conserving 30% of our land and waters by 2030.” They also look at preservation targets of 50 x 50 proposed by the Intergovernmental Panel on Climate Change. They state that “*protecting mature and old growth forests on federal lands fulfills an urgent need for protection and provides a low-cost way to simultaneously meet national and international goals.*” (*Emphasis added.*) The Pacific Northwest forests, especially on the moist western part, are carbon dense, with a high potential for climate mitigation, and also lower vulnerability to wildfire. Selection of areas for the highest priority for preservation were ranked by aboveground carbon stocks, biodiversity, and climate resilience. They defined landscape resilience as the capacity of a landscape or ecoregion to maintain biological diversity and ecological function despite climate change. They identified areas not currently protected that

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<sup>6</sup> Law, B.E. and W. Moomaw. 2024. Old forests are critically important for slowing climate change and merit immediate protection from logging. *The Conversation*. <https://theconversation.com/old-forests-are-critically-important-for-slowing-climate-change-and-merit-immediate-protection-from-logging-220771>

<sup>7</sup> DellaSala, Dominick A., Brendan Mackey, Patrick Norman, Carly Campbell, Patrick J. Comer, Cyril F. Kormos, Heather Keith, and Brendan Rogers. Mature and old-growth forests contribute to large-scale conservation targets in the conterminous United States. *Frontiers in Forests and Global Change*, September 28, 2022. <https://www.frontiersin.org/articles/10.3389/ffgc.2022.979528/full>

<sup>8</sup> Law BE, Berner LT, Mildrexler DJ, Bloemers RO and Ripple WJ (2022). Strategic reserves in Oregon’s forests for biodiversity, water, and carbon to mitigate and adapt to climate change. *Front. For. Glob. Change* 5:1028401. <https://doi.org/10.3389/ffgc.2022.1028401>

could be strategically protected at GAP 1 or 2 (USGS ratings). About 10% of Oregon's forests currently are fully protected.

- *How will the amended plan acknowledge and protect the co-benefits of protecting MOG forests?*

Biodiversity is strongly associated with mature and old growth forests. The Northwest Forest Plan was devised to protect old-growth-dependent threatened and endangered species. Prohibiting logging in MOG forests would better protect Threatened & Endangered species, and benefit a wide range of wildlife and plant species.

Harvest prohibition of MOG preserves streamflow and summer flows. Downstream drinking water has better water quality and quantity. One study evaluated the long-term impact of forest harvest on summer low flow deficits in the Oregon Coast Range<sup>9</sup>. The study found streamflow was 50% lower in a 40–43-year-old plantation relative to 110-year-old forest. Summer low flow deficits persisted over six months or more each year. Thus, logging prohibition of MOG will also provide better habitat for aquatic species.

Retention of water in the stream and riparian zone can also provide a natural fuelbreak, with higher water content of riparian vegetation. The wider riparian zones also serve as wildlife refugia during wildfires.

### ***Beaver protection:***

The Broads urge the Forest Service to prohibit hunting and trapping of beaver on federal lands. This would allow beavers to expand within their historic range, expanding wetlands and associated riparian vegetation. The pools created are rearing habitat for coastal coho salmon in Oregon. Streams and riparian zones have high biodiversity, and the ponds and wet meadows created by beaver dams expand riparian habitats.

California closed its entire state to all beaver trapping in 2019. In the California National Forests proposed to be added in the Amendment, what has been the effect on beaver populations? Have beaver dams and expanded wetlands been monitored? Have there been lower stream temperatures, which benefit salmonids? Have there been documented later summer stream flows where beavers have expanded? Have any of these areas experienced wildfires since the closure? If so, did the expanded wet riparian zones provide natural firebreaks? Observed benefits could be expanded throughout the Plan area by this NWFP Amendment.

A review of studies of beaver closures and outcomes was done by Suzanne Fouty, a retired Forest Service hydrologist, which includes closures in Oregon.<sup>10</sup> At least a portion of the Ochoco

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<sup>9</sup> Segura, Catalina, Kevin Bladon, Jeff Hatten, Julia Jones, Cody Hale, George Ice. Long-term effects of forest harvesting on summer low flow deficits in the Coast Range of Oregon. *Journal Of Hydrology*, Volume 585, June 2020, 124749. <https://doi.org/10.1016/j.jhydrol.2020.124749>

<sup>10</sup> Fouty, Suzanne. Beaver Trapping Closures Published Studies and Study Results. 10/3/2021



National Forest in Oregon has been closed to beaver trapping since 1986 (not in the Plan area). Forest Supervisor A. Shane Jeffries wrote in a 2020 letter to the Oregon Department of Fish and Wildlife, supporting continued beaver trapping closures with the 1997 objective – “Restore degraded riparian habitat by creating more pool habitat, slowing surface runoff and storing more water for late season release and decreasing sediment transport....Beaver occupancy is important to the health and function of the stream/wetland systems on the Ochoco NF ...as we continue with our restoration efforts, we know that it is also important to continue the trapping closure.”<sup>11</sup>

The expanded wetlands created by beaver increase the size and abundance of natural firebreaks. The expanded riparian zones can provide refugia for wildlife during wildfires. Therefore, this is a wildfire risk reduction strategy.

Expansion of beaver-managed habitat increases carbon capture and storage, which mitigates climate impacts. Climate change reduces snowpack, with more winter precipitation falling as rain, which can cause downstream flooding. Beaver dams store high stream flow, slowly releasing water and extending seasonal streamflow. The newly-created wetlands become net carbon sinks once a minimum of 55% vegetation cover is achieved as above and below ground biomass expands, a change that usually occurs within two to five years.<sup>12</sup>

We urge the NWFP Amendment to include beaver assessments in each forest in the Plan area, monitoring for beaver and vacant habitat. Where suitable, unoccupied habitat is documented, consider beaver enhancements in addition to closure to beaver trapping, such as beaver dam analogs to encourage beaver colonization; utilize non-lethal measures to accommodate beaver if problems arise such as blocked culverts.

Currently beaver hunting and trapping is largely managed by state fish and wildlife agencies. But given the benefits of beaver dams for water retention, vegetation growth, and carbon sequestration, we urge the Forest Service to explore if this can be incorporated into rulemaking for forest management. Western Watersheds Projects submitted a letter to the Biden Administration Feb 27, 2023, signed by 250 scientists and environmental groups, requesting an executive order that would close all federally-managed public lands in the United States to beaver hunting and trapping; a copy was sent to Secretary to Agriculture Tom Vilsack.

### ***Tribal Inclusion:***

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[https://www.dfw.state.or.us/wildlife/working\\_group/docs/beaver\\_management\\_Oct\\_13/Trapping%20Closure%20Study%20Results\\_10032021.pdf](https://www.dfw.state.or.us/wildlife/working_group/docs/beaver_management_Oct_13/Trapping%20Closure%20Study%20Results_10032021.pdf)

<sup>11</sup> Jeffries, A. Shane, Forest Supervisor Ochoco National Forest, letter to ODFW 2020. [https://www.dfw.state.or.us/wildlife/working\\_group/docs/beaver\\_management\\_July\\_22/Beaver%20Trapping%20Closure%20Ochoco%20Response%202020-05-15.pdf](https://www.dfw.state.or.us/wildlife/working_group/docs/beaver_management_July_22/Beaver%20Trapping%20Closure%20Ochoco%20Response%202020-05-15.pdf)

<sup>12</sup> Valach et al (2021). Productive wetlands restored for carbon sequestration quickly become net CO<sub>2</sub> sinks with site-level factors driving uptake variability. PLoS ONE 16(3) <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0248398>

The Forest Service should go beyond “incorporating Indigenous Knowledge into planning, project design, and implementation” and seek true Tribal inclusion in the amendment process. While it’s good to see recognition by the Forest Service that the original Northwest Forest Plan was severely lacking by not meaningfully engaging the Tribes, the truncated process and shortened timeline for completing the Plan amendment may well undermine any current need and desire for meaningful inclusion. Establishing good communication and trust with Indigenous communities takes time, and the agency should ensure this effort is ongoing.

As implementation of the Plan advances, the agency should also consider what co-management could look like with Tribal and Indigenous entities. How can access to and protection of cultural resources and first foods be improved?

### ***Sustainable economic opportunities and communities:***

It has been more than 30 years since the Northwest Forest Plan drafted a roadmap to help timber-dependent communities create more sustainable economic futures. Most of these mill towns have succeeded in diversifying their economies without cutting the last old forests on public land. The remaining communities have had an entire generation to uncouple their dependence on publicly owned forests. [See also: Beverly Law, “Wildfire in a Warming World: Opportunities to Improve Community Collaboration, Climate Resilience, and Workforce Capacity,” Statement to the United States House of Representatives Subcommittee on National Parks, Forests and Public Lands. April 29, 2021.] How will the proposed amendment to the Northwest Forest Plan support the idea that public forests should be managed for non-timber values (carbon; biodiversity; etc)?

Any change to the NWFP should recognize that the socioeconomic benefits of the Northwest Forest Plan include much more than wood products. The economic benefits of clean water, biodiversity, watershed protection, climate stability, fire moderation, recreation, and quality of life need to be recognized as first-order economic benefits of forest conservation. We understand that these benefits can be hard to quantify, but they should not be overlooked and they should be weighed accordingly. For example, outdoor recreation on public lands is a growing industry, employing more than 5 million people across the country in 2022<sup>13</sup>, whereas the timber industry has a declining fraction of the region’s economy.

Ongoing restoration of forests and watersheds is also an important part of the economy in the region. From improving salmon habitat by replacing culverts and removing roads, to non-commercial fuels treatments and prescribed fire in ecologically-appropriate areas, the restoration economy can provide jobs and learning opportunities, and benefit from Indigenous co-management principles.

### ***Biomass extraction is not a sustainable endeavor:***

There has been much recent talk about woody biomass as a sustainable fuel source and economic enterprise. We have deep concerns about this claim and feel it is in error. Biomass

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<https://headwaterseconomics.org/economic-development/trends-performance/outdoor-recreation-economy-by-state/>

extraction should not be considered part of a sustainable economy for local communities because of its adverse ecological and climate impacts.

The natural carbon cycle that has developed over eons allows for biomass accumulation, soil creation, plant succession, and a complex food chain, along with carbon sequestration and healthy biodiversity. The above ground carbon cycle progresses from carbon capture in photosynthesis to storage of carbon in living and dead organic matter, to its final release during decay back into the atmosphere. Fossil carbon is organic matter that has been sequestered underground as, for example, coal and oil. When this carbon is extracted and added back to the above ground carbon cycle, when fossil fuel is burned, it is adding to above ground carbon and contributing to global climate change.<sup>14</sup> The global climate crisis demands that any consideration of extracting woody biomass from a forest have a critical life-cycle analysis done regarding energy inputs required for extraction and processing as well as realistic evaluations of carbon stored and released over time.

The woody biomass materials that are created from thinning and harvesting operations are generally considered waste and are often burned on-site. The growing biomass industry is making extraction of this natural resource seem economically appealing. However, this material is also essential to the health and biodiversity of the forest ecosystems, as well as for long-term storage of carbon. Claims that extracting woody biomass from forests is beneficial to the forest and is carbon neutral are questioned and challenged on many fronts.

Natural ecosystem cycles including both nutrient and carbon cycling utilize deadwood decay and are negatively affected by removing this woody biomass from these cycles. Disturbing these cycles affects insect, bird, reptile, and mammal populations, as well as floral and fungal species. The removal of small trees for biomass removes nutrients from the ecosystem, and increases water depletion of the ecosystem by removing wood, standing and downed, that holds moisture, slows the wind, and blocks the solar radiation that dries the soil.<sup>15</sup> Downed wood contributes organic matter to the soil which improves the soil structure and also helps retain moisture, build more soil, and slow water runoff. Important decay organisms at the bottom of the food chain are also limited by removing wood, and thus limit the numbers and complexity of species higher on the food chain.

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<sup>14</sup> Speare-Cole, Rebecca. 2021. "Biomass Is Promoted as a Carbon Neutral Fuel. But Is Burning Wood a Step in the Wrong Direction?" October 5, 2021. <https://www.theguardian.com/environment/2021/oct/04/biomass-plants-us-south-carbon-neutral>.

Yassa, Sami. 2021. "Forest Biopower Is Far From Carbon Neutral." October 13, 2021. <https://www.nrdc.org/bio/sami-yassa/forest-biopower-far-carbon-neutral>.

Wilkerson, Jordan, figures by Daniel Utter. Biomass over Coal: Burning different Carbon to Mitigate Climate Change. SITNBoston, Harvard University, 16 April 2018. <https://sitn.hms.harvard.edu/flash/2018/biomass-over-coal-burning-different-carbon-to-mitigate-climate-change/>

<sup>15</sup> Maloof, Joan, and Andrew Joslin. 2016. Nature's Temples: The Complex World of Old-Growth Forests. Portland, Oregon: Timber Press. <https://www.goodreads.com/book/show/28009889-nature-s-temples>.

The removal of woody biomass as either small trees or downed wood is a disturbance to the ecosystem that alters the microclimate of an area. The wind has easy access to low vegetation and the soil surface. Solar radiation becomes more intense at the ground level, which with the increased wind may dry the soil and remaining surface vegetation leading to wildfire spread.<sup>16</sup> Moisture falls more rapidly and directly, with the potential to increase soil moisture as well as more runoff and erosion. Insect populations are changed which affect birds and other wildlife, as well as ecosystem services.<sup>17</sup>

One alternative to slash management is the creation of biochar. In-forest biochar creation should be evaluated in the EIS. Biochar can provide a long-term form of soil carbon.

**In summary**, the Great Old Broads for Wilderness chapters of the Pacific Northwest appreciate the opportunity to provide scoping comments on the proposed amendments to the Northwest Forest Plan. We look forward to participating in the ongoing plan amendment process.

Sincerely,

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<sup>16</sup> Hanson, Chad T. 2021. *Smokescreen: Debunking wildfire myths to save our forests and our climate*.

<sup>17</sup> Schowalter, T.D., J.A. Noriega, and T. Tscharrntke. 2018. "Insect Effects on Ecosystem Services—Introduction." *Basic and Applied Ecology* 26 (February): 1–7.  
<https://doi.org/10.1016/j.baae.2017.09.011>.