To: Chair Macdonald and Members of the Oregon Global Warming Commission
Cc: Governor Brown, Kristen Sheeran, Oregon Board of Forestry
Re: Executive Order 20-04 Forest Climate Policy Brief
Date: 5/10/21

Dear Chair Macdonald and members of the Oregon Global Warming Commission,

The Oregon Global Warming Commission was directed by the Governor to propose state goals for carbon sequestration and storage on Oregon's natural and working landscapes by June 30th, 2021. The undersigned organizations are writing to ask that you take a broad and truly ambitious approach to elevating forests within Oregon as a natural climate solution.

Studies estimate that annual logging-related emissions average 33 million metric tons of carbon dioxide equivalent per year (Mmt CO2-e/yr) since 2000.[1] This means that logging is the largest source of emissions in the state (more so than the 23 Mmt CO2-e/yr attributed to transportation). Not only does the OGWC have an obligation to account for and minimize these emissions, it also has an incredibly valuable opportunity to increase carbon storage and sequestration in its forests. With ambitious policies, Oregon can increase net ecosystem carbon balance in its forests by 56% by 2100.[2] State goals must reflect this opportunity to dramatically reduce emissions while simultaneously increasing storage and sequestration.

With the direction given under EO 20-04,[3] Oregon has an opportunity to position itself as a national leader in carbon storage, sequestration, and climate-smart management of its natural and working lands. The state has an incredibly carbon-rich and biodiverse landscape that provides clean drinking water and outdoor recreation opportunities for millions of Oregonians. The state agencies that are responsible for managing these natural resources have struggled to evolve to meet the state's 21st century needs, especially in the face of twin threats from the climate crisis and the biodiversity crisis. Oregon's decision makers must take a step back and reevaluate some of the deeply ingrained policies and practices that have defined how Oregon approaches natural resources management. Now is the time to take bold action, and launch a new approach that prioritizes natural climate solutions as a central strategy in the state's efforts to combat climate change.

A growing scientific consensus has developed around two aspects of Oregon's ecosystems: (1) that they have an incredible potential for sequestering and storing atmospheric carbon; (2) that

[1] Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C., Harmon, M.E. 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences https://www.pnas.org/content/115/14/3663

[2] Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C., Harmon, M.E. 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences https://www.pnas.org/content/115/14/3663

[3] EO 20-04. https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf

this potential is being significantly underutilized due to outdated forest management practices. In its draft biennial report, the Oregon Global Warming Commission cites several of the leading studies in support of these propositions, which we summarize and supplement below:

- Diaz et al. 2018: Expanded riparian protections, increased green tree retention, and the extension of rotation ages can translate into substantially higher carbon storage than contemporary common practice for Douglas-fir management in the Pacific Northwest. The combination of forest practices required for FSC certification always stored more carbon than business-as-usual.
- Fain et al. 2018: On private forest lands west of the Cascades, extending harvest rotations,[4] maximizing utilization of harvested biomass, focusing on production of durable and long-lived wood products, and altering harvest practices to retain more live trees on-site, all could result in significant net carbon gains.
- Law et al. 2018: Reforestation, afforestation, lengthened harvest cycles on private lands, and restricting harvest on public lands in Oregon is projected to increase net ecosystem carbon balance by 56% by 2100, with the latter two actions contributing the most.
- Harmon 2019: Half of harvested carbon is emitted to the atmosphere almost immediately after logging.

This body of scientific research emphasizes the value of natural climate solutions and demonstrates numerous practices that can help the state meet its potential to both adapt to the worsening impacts of climate change and mitigate future emissions. Studies and goals are helpful for framing this approach, but Oregon needs new rules, regulations, and policies to fully realize its potential to store and sequester carbon in its natural and working lands.

Further, new rules, regulations, and policies should be adopted and implemented using an equity framework. Equitable and ecologically-appropriate stewardship of Oregon forests is critical for all Oregonians, but especially for historically disadvantaged populations. The impacts of unsustainable natural resource management decisions disproportionately burden disadvantaged groups, including Black, Indigenous, and People of Color (BIPOC) communities and low-income communities. The impacts of forest management decisions unfold against a backdrop of enduring racial and socioeconomic inequities that have shaped how historically underserved and underrepresented communities can withstand those impacts. We cannot be blind to equity and justice issues when addressing environmental and climate concerns unless we wish to repeat and reinforce the decisions that have created sacrifice zones in low-income and BIPOC communities and left rural communities behind. Decision-makers must engage multiple perspectives, communicate directly with impacted communities, and consider unintended outcomes when developing policies that advance natural climate solutions. Decision-makers must ensure that these communities may continue to reap the recreational, health, social, and cultural benefits of

[4] 80-120 years depending on assumptions about product longevity and substitution.

our forests for generations to come and are not disproportionately burdened by unsustainable forest management practices as the climate crisis worsens.

We respectfully request that you take a broad, ambitious, and equitable approach to elevating forests as a central component of Oregon's strategy to address the climate crisis. The recommendations in the accompanying "Executive Order 20-04 Forest Climate Policy Brief" demonstrate this ambition, and we hope that they will be part of your June proposal to the Governor.

Sincerely,

Lauren Anderson
Forest Climate Policy Coordinator
Oregon Wild

Grace Brahler
Oregon Climate Action Plan & Policy Manager
Beyond Toxics

Alan Journet Ph.D.
Co-facilitator
Southern Oregon Climate Action Now

Bill Bradbury
Former Oregon Secretary of State
Chair, Oregon Coast Energy Alliance Network (OCEAN)

Rand Schenck
Forestry Lead
Metro Climate Action Team

Bill Harris
Member
Metro Climate Action Team

Executive Order 20-04 Forest Climate Policy Brief
Oregon Climate Action Plan Coalition, Forest Policy Table
May 10th, 2021

Table of Contents

Recommendations for Climate-Smart Forestry

The following policy opportunities represent "low-hanging fruit" for the state of Oregon to adopt as its decision-makers work to *"prioritize actions that reduce GHG emissions in a cost-effective manner,"* and *"prioritize actions that will help vulnerable populations and impacted communities adapt to climate change impacts"* as directed in EO 20-04.[5]

1. **Permanent protections for mature and old growth forests on state lands** *(EO 20-04, ss. 3.A, 3.C.(1), 12.A).* Mature and old growth forests store and sequester immense amounts of carbon. Wherever native stands of large trees exist, they should be protected as climate reserves. Further, decision makers should work to identify additional areas of the highest carbon storage potential that should also be protected as part of this carbon

[5] EO 20-04. https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf

reserve. These same stands also provide high quality habitat for salmon and other at-risk wildlife, helping managers achieve two objectives at once.

2. **Lengthen logging rotations** *(EO 20-04, ss. 3.A, 3.C.(1), 12.A).* The best available science[6] has made clear that current standard logging rotations (often as short as 35 years) undermine the ability of forests to optimize carbon stored.[7] By allowing trees to grow for longer time periods, managers can improve carbon stocks while also increasing timber yield and timber quality. Studies suggest that rotations of 80 years in Coastal Douglas fir may provide optimal carbon storage benefit, depending on assumptions about product longevity and substitution.[8]
3. **Increase green tree retention on the land during harvest and promote diversity of species as opposed to monoculture plantations** *(EO 20-04, ss. 3.A, 3.C.(1)-(3), 12.A).* Greater retention of standing trees (especially bigger and older trees) after logging will keep more carbon on site, help to make regrowing forests more resilient to natural disturbance, increase availability of native seed stock for future restoration efforts, and provide for more higher-quality habitat for native species.
4. **Ensure better incentives for non-industrial forest owners to implement climate-smart forestry on their lands** *(EO 20-04 s. 3.C(1)).*
    a. Agencies should prioritize promoting stronger incentives and market development for non-industrial private lands, tribes, land trusts, and local government entities willing to implement climate-smart forest management[9] on their lands (such as protection of larger stream buffers and late successional characteristics), including better state incentives for the production of FSC certified wood products.
    b. Forest owners should be allowed to aggregate small acreage into larger more impactful projects.

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[6] See, e.g. Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C., Harmon, M.E. 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences https://www.pnas.org/content/115/14/3663 https://web.archive.org/web/20180727130028/http://www.pnas.org/content/pnas/115/14/3663.full.pdf

[7] See, e.g. Mark E. Harmon, 2019. Have product substitution carbon benefits been overestimated? A sensitivity analysis of key assumptions. Environmental Research Letters https://doi.org/10.1088/1748-9326/ab1e95

[8] See, e.g. Stephen J. Fain, Brian Kittler, Amira Chowyuk, 2018. Managing Moist Forests of the Pacific Northwest United States for Climate Positive Outcomes. Multidisciplinary Digital Publishing Institute. DOI: 10.3390/f9100618. https://www.researchgate.net/publication/328229114_Managing_Moist_Forests_of_the_Pacific_Northwest_United_States_for_Climate_Positive_Outcomes

[9] Climate-smart forest management integrates the challenges and opportunities of climate change mitigation and adaptation into forest policy, planning and practices, aiming to optimize carbon storage and sequestration in a manner that accounts for the worsening impacts of climate change. See, e.g. Stein, B.A., P. Glick, N. Edelson, and A. Staudt (eds.). 2014. Climate-Smart Conservation: Putting Adaptation Principles into Practice. National Wildlife Federation, Washington, D.C. https://www.nwf.org/~/media/PDFs/Global-Warming/Climate-Smart-Conservation/NWF-Climate-Smart-Conservation_5-08-14.pdf, David D. Diaz, Sara Loreno, Gregory J. Ettl and Brent Davies 2018 Tradeoffs in Timber, Carbon, and Cash Flow under Alternative Management Systems for Douglas-Fir in the Pacific Northwest. Forests 9 (8) 447 https://www.mdpi.com/1999-4907/9/8/447, OGWC 2018 Forest Carbon Accounting Project Report 2018. Keep Oregon Cool, Oregon Global Warming Commission. https://static1.squarespace.com/static/59c554e0f09ca40655ea6eb0/t/5c2e415d0ebbe8aa6284fdef/1546535266189/2018-OGWC-Biennial-Report.pdf

c. Agencies should develop accountability standards to ensure incentives are awarded to forest owners who are currently practicing verifiable climate-smart forestry or will adopt verifiable, high standards of climate-smart forestry.

5. **Establish new partnerships with Tribes, indigenous communities, and tribal climate activists**. *(EO 20-04, ss. 3.C.(2)-(3), 3.E).* Incorporate tribal climate mitigation and adaptation practices that can support increased carbon storage and sequestration in Oregon's forests, and seek to build bridges between Western (conventional) and Indigenous practices, including through use of prescribed fire in Oregon's eastern and southern forests.

Recommendations for Ecologically Appropriate Post-Fire Restoration

In Oregon, logging is a far more significant source of greenhouse gas emissions than wildfire, particularly on the west-side of Cascades. And while wildfire does cause carbon emissions, only 5-10 percent of stored carbon on the landscape is emitted compared to over 50 percent emitted by logging.[10] Further, fire is a natural process that supports a diversity of ecosystems across a landscape. Leaving burned trees on the landscape allows the carbon they contain to remain stored for decades, and released slowly through natural decomposition, often transferring the remaining carbon to the soil.

If partially burned trees are harvested for timber, very little of the stored carbon will be contained in long-lived wood products. Approximately half of harvested carbon is emitted to the atmosphere soon after logging.[11] In Oregon, 65 percent of wood carbon harvested since 1900 has returned to the atmosphere, 16 percent is in landfills, and only 19 percent remains in long-term products.[12] And because much of a forest's carbon is stored in the soil (nearly 50 percent on average in Oregon's forests), soil disturbance from logging operations can release additional carbon that is challenging to re-sequester.[13]

Allowing forests to recover naturally following a wildfire also ensures complex forest structure with diverse vegetation, which in turn supports increased biodiversity. Removing burned trees

[10] Law, B.E., Waring, R. 2015. Carbon implications of current and future effects of drought, fire and management on Pacific Northwest forests, Forest Ecology and Management. https://doi.org/10.1016/j.foreco.2014.11.023

[11] Harmon, M.E. 2019. Have product substitution carbon benefits been overestimated? A sensitivity analysis of key assumptions. Environ. Res. Lett. 14 065008. https://iopscience.iop.org/article/10.1088/1748-9326/ab1e95

[12] Hudiburg, T.W., Law, B.E., Moomaw, W.R., Harmon, M.E. and Stenzel, J.E. 2019. Meeting GHG reduction targets requires accounting for all forest sector emissions. Environ. Res. Lett. 14 095005. https://iopscience.iop.org/article/10.1088/1748-9326/ab28bb

[13] Christensen, G.A., et al. 2019. Oregon Forest Ecosystem Carbon Inventory: 2001-2016. https://www.oregon.gov/ODF/ForestBenefits/Documents/Forest%20Carbon%20Study/OR-Forest-Ecosystem-Carbon-2001-2016-Report-FINAL.pdf

and snags and replanting the forest with monoculture Douglas-fir can prevent development of this complex structure, harming fish and wildlife.[14] Further, if burned forests are allowed to keep their structural complexity, according to the Bureau of Land Management, they can develop old growth forest characteristics twice as fast[15] as dense, replanted forests, and old growth forests store far more carbon than young growth.

Burned landscapes are already at increased risk of sediment runoff, flooding, and landslides, but that risk is dramatically amplified by post-fire logging which disturbs the soil and removes standing trees that would otherwise help anchor soil until new vegetation regenerates. This can lead to even more sediment runoff which in turn can clog waterways, degrade fish habitat, and impact drinking water for local communities. Widespread planting of young, single aged, single species trees after large fires not only creates conditions that are conducive to future large fires,[16] but also leads to a significant increase in evaporative water demand which depletes summer streamflow and degrades fish habitat.[17] Overall, post-wildfire logging can hinder forest regeneration, does not reduce future fuel loads,[18] and can even increase future fire risk.[19]

However, while post-fire logging holds little ecological value, other post-fire restoration practices can help forests recover in an ecologically appropriate manner. Especially in dry forests, climate change is impacting fire regimes and leading to bigger fires and longer fire seasons. Combined with other ecological stressors, such as drought and invasive vegetation, and human caused stressors, such as fire exclusion, past timber harvest practices, livestock grazing, and water diversion, the ecological integrity of some forests can be undermined. Because resources for post-fire, ecologically appropriate restoration are limited, it is essential that managers use the best available science to determine when and where post fire recovery efforts are actually needed. West of the Cascades there is little evidence that climate change is impacting the natural, infrequent fire regimes of our moist temperate rainforests, so small

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[14] Swanson, M.E., Franklin, J.F., Beschta, R.L., et al. 2010. The forgotten stage of forest succession: early-successional ecosystems on forest sites. Front Ecol Environ 2010; doi:10.1890/090157 https://www.fs.fed.us/pnw/pubs/journals/pnw_2010_swanson001.pdf and Donato, D.C., Campbell J.L, and Franklin J.F., 2012. FORUM Multiple successional pathways and precocity in forest development: can some forests be born complex? Journal of Vegetation Science 23 (2012) 576–584 http://people.forestry.oregonstate.edu/john-campbell/sites/people.forestry.oregonstate.edu.john-campbell/files/Donato_2012_JVS.pdf

[15] Bureau of Land Management 2008. Western Oregon Plan Revision Draft Environmental Impact Statement. https://www.blm.gov/or/plans/wopr/files/Science_Team_Review_DEIS.pdf

[16] Zald, H.S.J,. Dunn, C.J., 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. Ecological Applications. Online Version of Record before inclusion in an issue. 26 https://phys.org/news/2018-04-high-wildfire-severity-young-plantation.html and Thompson, J.R, Spies, T.A., and Ganio L.M., 2007. Reburn severity in managed and unmanaged vegetation in a large wildfire. Proceedings of the National Academy of Sciences. PNAS. http://www.fs.fed.us/pnw/pubs/journals/pnw_2007_thompson001.pdf

[17] Perry, T. D., and Jones, J. A. 2016. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. Ecohydrology http://onlinelibrary.wiley.com/doi/10.1002/eco.1790/full

[18] Leverkus, A.B. et al 2020. Salvage logging effects on regulating ecosystem services and fuel loads. Frontiers in Ecology and the Environment. https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.2219

[19] Donato, D. et al. 2006. Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk. Science 311(5759):352

diameter thinning and prescribed fire should be prioritized in other ecosystems. Below are policy recommendations for appropriate practices, and practices that should be avoided in post-fire recovery.

Recommendations for post-fire recovery

1. Encourage fire-affected local communities to rebuild in a responsible, fire-wise manner that improves community safety and resilience to future wildfires.
2. Managers should focus efforts on the restoration or maintenance of essential ecosystem services, such as:
    a. Carbon storage and sequestration (e.g. promoting old growth forest characteristics),
    b. Water quality and quantity (e.g. preventing soil erosion and avoiding tree plantations),
    c. Soil productivity (e.g. ensure burned vegetation remains on the landscape), and
    d. Biodiversity (e.g. preserving habitat for at risk wildlife).
3. Focus on stabilizing watersheds, by mitigating damage caused by past fire suppression (such as fire lines), limiting erosion using native vegetation, and treating invasive species. Other smart adaptations to deal with climate-driven shifts in precipitation and hydrology should include installing bigger culverts and decommissioning roads that increase the risk of erosion, mudslides, and peak stream flows.
4. Focus hazard tree felling on imminent hazards located within 150 feet of high use areas, such as developed sites, parking lots, and paved roads. Do not remove felled danger trees from reserves, including the full extent of riparian reserves. If trees are removed, use them for restoration of streams and old clearcuts that lack large wood. The carbon should remain on the landscape for as long as possible.
5. Retain all large wood to mitigate the shortage of snag habitat and for long-term ecological benefits and carbon storage. Fires create an apparent abundance of snags, but that is misleading because snags are ephemeral; the abundance of snags is short-lived and hides the fact that after those snags fall down, there will be a long-term shortage of snags that lasts until large trees regrow. Salvage logging will exacerbate the expected shortage of snags.

Avoid the following post-fire practices:

1. Avoid post-fire logging. Post-fire logging can have significant negative impacts on water quality, fish and wildlife habitat, and forest successional trajectories. If post-fire logging is deemed necessary, managers should focus on removing trees that pose a threat to infrastructure, such as power lines and roads.
2. Avoid removal of live, green trees. Surviving trees can help to rebuild the ecosystem and can serve as a legacy structure and a recruitment pool for future large trees and snags.

3. Avoid road construction, including temporary roads, as they have long-term impacts on watersheds, soil, and vegetation, can introduce invasive weeds, and fragment habitat. Many watersheds are already damaged by hundreds of miles of hastily constructed firelines.
4. Avoid dense, monoculture replanting. Such practices can create hazardous fuel conditions and truncate development of a desired complex early seral forest. If replanting is deemed necessary, replant diverse species in patches, at low density, far from existing seed sources. In drought impacted areas of the state, selecting more drought-tolerant species to plant may help forests recover.

Recommendations for Protecting Communities From the Threat of Wildfire

Most large fires are driven by extreme weather conditions – high temperatures, low fuel moisture, high winds and drought – and so our rapidly changing climate, coupled with a massive expansion of homes into fire-prone areas, will increasingly influence the extent and impacts of fire in the West. To address these issues, studies suggest focusing on treatments in the home ignition zone is a more effective strategy than logging operations in more distant forested regions.[20] Factors such as the type of materials homes and buildings are made of and the design and maintenance of our infrastructure are huge factors in determining residential losses,[21] and addressing these factors is the best use of limited funding.

While some small-diameter tree thinning can reduce fire intensity when coupled with burning of slash debris under appropriate conditions,[22] recent evidence shows intensive forest management characterized by young trees and homogenized fuels burn at higher severity.[23] Reduced forest protections and increased logging tend to make wildland fires burn *more* intensely.[24] Studies have clearly demonstrated that increased wildland logging is *not* an effective strategy for

[20] Calkin, D.E., et al. 2014. How risk management can prevent future wildfire disasters in the wildland-urban interface. Proc. Nat. Acad. Sci. 111: 746-751. https://www.pnas.org/content/111/2/746

[21] Calkin, D.E., et al. 2014. How risk management can prevent future wildfire disasters in the wildland-urban interface. Proc. Nat. Acad. Sci. 111: 746-751. https://www.pnas.org/content/111/2/746

[22] Perry, D.A., et al. 2004. Forest structure and fire susceptibility in volcanic landscapes of the eastern High Cascades, Oregon. Conservation Biology 18: 913-926. http://www7.nau.edu/mpcer/direnet/publications/publications_p/files/Perry_et_al_2004.pdf and Strom, B.A., and P.Z. Fulé. 2007. Pre-wildfire fuel treatments affect long-term ponderosa pine forest dynamics. International Journal of Wildland Fire 6: 128-138. https://www.fs.fed.us/rm/pubs_other/rmrs_2007_strom_b001.pdf

[23] Zald, H.S.J., and C.J. Dunn. 2018. Severe fire weather and intensive forest management increase fire severity in a multi-ownership landscape. Ecological Applications 28:1068-1080. doi: 10.1002/eap.1710. https://pubmed.ncbi.nlm.nih.gov/29698575/

[24] 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. https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.1492

reducing a community's wildfire risk. The extremely low probability (less than 1 percent)[25] of thinned sites encountering a fire especially limits the effectiveness of such activities to forested areas near homes.

Further, to make thinning operations economically attractive to logging companies, commercial logging of larger, more fire-resistant trees often occurs across large areas. This is an ecologically inappropriate strategy for thinning, as it can severely degrade the resilience of ecosystems already stressed by the impacts of climate change — such as heat waves and more frequent drought. The shade and healthy root system provided by large mature trees helps retain moisture in the soil and keep rivers and streams cool as fish also contend with more severe impacts.

Mechanical thinning also results in a substantial net loss of forest carbon storage and a net increase in carbon emissions that almost always exceed those of wildfire emissions.[26] As an example, logging in U.S. forests emits 10 times more carbon than fire and native insects combined.[27] And, unlike logging, fire cycles nutrients and helps increase new forest growth. Thinning across broad landscapes is costly, by some estimates $2,000 per acre, and also causes collateral damage to the ecosystem from increased road building, creating pathways for the introduction of invasive species and more human entry and more ignitions.[28]

Encourage sound strategies for wildfire risk reduction

1. Increase emergency planning and preparedness for rural communities located in and near forested areas. Well established evacuation routes, designated "safe" areas where people can shelter in place, and established channels of communication where residents can go for trusted information can save lives and property.
    a. Wildfire information should be made available in Spanish and other Indigenous Latin American languages to ensure that our most vulnerable populations, including migrant and Latinx communities living and working in rural areas, are prepared for fire emergencies. ODF could coordinate with and provide financial

[25] Schoennagel, T., et al. 2017. Adapt to more wildfire in western North American forests as climate changes. Proceedings of the National Academy of Sciences of the USA 114: 4582–4590. https://www.pnas.org/content/114/18/4582

[26] Hudiburg, T.W., et al. 2013. Interactive effects of environmental change and management strategies on regional forest carbon emissions. Environmental Science and Technology 47: 13132-13140. https://europepmc.org/article/med/24138534 and Campbell, J.L., M.E. Harmon, and S.R. Mitchell. 2012. Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions? Frontiers in Ecology and Environment 10: 83-90. https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/110057

[27] Harris, N.L., et al. 2016. Attribution of net carbon change by disturbance type across forest lands of the conterminous United States. Carbon Balance Management 11: Article 24. https://cbmjournal.biomedcentral.com/articles/10.1186/s13021-016-0066-5

[28] Balch et al 2017. Human-started wildfires expand the fire niche across the United States. National Academy of Sciences. https://doi.org/10.1073/pnas.1617394114

and technical support to community-based organizations already serving Latinx populations to disseminate information and increase preparedness.[29]

2. Increase fire-wise home hardening and retrofitting (i.e. application of construction design and materials that are fire resistant). Hardening homes to fire can be > 95% effective at preventing structure loss. Wind-driven fire events can ignite homes from flying embers miles ahead of the fire front, and there are examples of home burning even though the actual fire was never in direct contact with the buildings.
3. Reduce fuels in the home ignition zone. Reducing fuels in close proximity to houses (within 200 feet of the home) can help protect property from damage in the event of a fire.
4. Limit new development in high risk areas. It is critical that land use planners account for the increased risk of wildfire. Building homes in fire adapted ecosystems carriers risk, and developers and landowners need to be made aware of this risk.
5. Ensure disadvantaged communities have equal access to resources. It is the most vulnerable populations that carry the highest costs when a fire impacts a community. Investing in air filtration systems for disadvantaged communities is an affordable and effective way to ensure vulnerable people have a safe space to shelter from smoke inhalation and the associated health impacts.
6. Use ecological fire management to restore natural fire regimes in appropriate areas. In the West, the health of some forest ecosystems has declined as a result of past fire suppression. Restoring natural fire regimes, through a place-specific combination of ecologically appropriate thinning and prescribed fire, should be a priority for land managers as they seek to restore ecological health.
7. Avoid or minimize actions that increase fire hazard such as clearcutting and dense monoculture replanting. Encourage more thinning and longer rotations on plantations as these forest management strategies will reduce the proportional area of forest in the most vulnerable dense, young fuel conditions.

Recommendations for Woody Biomass

Within the Oregon Department of Forestry, and as part of other state policies, biomass is treated as a low carbon fuel source that can support the state's climate objectives. This view misrepresents the carbon benefits of using woody biomass for energy production, and fails to account for the numerous environmental and equity challenges associated with biomass. An updated review of the best available science invalidates the case for treating all woody biomass on an equal basis with other renewable energy resources and the need for agency incentivization of biomass.

[29] Alai Reyes Santos. Oct. 22, 2020. Fires shed light on marginalized groups. Available at https://www.registerguard.com/story/opinion/columns/2020/10/22/fires-shed-light-marginalized-groups/5999702002/.

These issues with biomass *must* be addressed in order to ensure that the burning of woody biomass does not exacerbate the climate crisis, endanger vulnerable communities, or degrade ecosystems and biodiversity in Oregon. We recommend that the OGWC promote the following policy recommendations with regards to woody biomass as part of its OCAP policy recommendations for natural and working lands:

1. **<u>Do not define biomass as carbon neutral:</u>** Woody biomass emits significant amounts of carbon when burned to produce energy. A detailed analysis of biomass energy generation commissioned by Massachusetts, the Manomet Study, compared the lifetime greenhouse gas effects of a continuous harvesting and replanting scenario to burning natural gas to generate the same energy. This analysis showed that, considering the first 35 years of operation, the biomass plant would have one and a half times the net CO2 emissions of a natural gas plant generating the same amount of energy.[30] Based on this study and many others,[31] incentivizing biomass energy generation will put Oregon *further behind* on its current 2050 greenhouse gas goals, which aim to reduce greenhouse gas emissions in the state by at least 45 percent below 1990 levels by the year 2035, and by 80 percent by 2050.[32]

   Advocates of the biomass-as-carbon-neutral policy claim that when biomass is removed from the forest and combusted for energy, the emitted carbon is eventually re-sequestered by the forest's regrowth; however, this stance does not account for the long time lag between the immediate short-term of release of carbon emissions from logging and combustion of the wood products, and the long-delayed tree regrowth and recapture of carbon in the ecosystem. The carbon stocks of forests are a result of two factors: carbon

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[30] Manomet Study 2018. https://www.manomet.org/wp-content/uploads/2018/03/Manomet_Biomass_Report_Full_June2010.pdf

[31] McKechnie J, Colombo S, Chen J, Mabee W and MacLean H L 2011 Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels Environ. Sci. Technol. 45 789–95 https://pubs.acs.org/doi/abs/10.1021/es1024004,
Bernier P and Paré D 2013 Using ecosystem CO2 measurements to estimate the timing and magnitude of greenhouse gas mitigation potential of forest bioenergy *GCB Bioenergy* 5 67–72 https://onlinelibrary.wiley.com/doi/full/10.1111/j.1757-1707.2012.01197.x,
Walker T, Cardellichio P, Gunn J S, Saah D S and Hagan J M 2013 Carbon accounting for woody biomass from massachusetts (USA) managed forests: a framework for determining the temporal impacts of wood biomass energy on atmospheric greenhouse gas levels J. Sust. Forest 32 130–58 https://www.tandfonline.com/doi/abs/10.1080/10549811.2011.652019,
Stephenson A L and MacKay D J C 2014 Life Cycle Impacts of Biomass Electricity in 2020 (London: UK Department of Energy and Climate Change)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/349024/BEAC_Report_290814.pdf, and
Laganière J, Paré D, Thiffault E and Bernier P Y 2017 Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests GCB Bioenerg. 9 358–69 https://onlinelibrary.wiley.com/doi/full/10.1111/gcbb.12327.

[32] EO 20-04 https://www.oregon.gov/gov/Pages/carbonpolicy_climatechange.aspx

capture by biomass growth and the duration of carbon in biomass.[33] Therefore, the longevity of trees in the forest matters a great deal in terms of maximizing carbon benefits.

Further, there is no guarantee that replanted trees will eventually reach the same maturity as those that were cut down — drought, fire, insects, climate change, or land use conversion could prevent the same level of sequestration even in the long-term.[34] And because much of a forest's carbon is stored in the soil (nearly 50 percent on average in Oregon's forests), disturbance can release additional carbon that is also challenging to re-sequester.[35] These near term greenhouse gas emissions are a serious problem from a climate change perspective. Even if the forest someday recovers the carbon emitted decades earlier by biomass combustion, there is no way to mitigate the warming that occurred during the lag period due to the excess CO2 released into the atmosphere.

2. **Avoid impacts to vulnerable communities:** EPA data shows that even the best-performing biomass plants produce as much or more air pollution as a similar-sized coal plant.[36] These pollutants include nitrous oxide that generates ozone, small particulate matter that drives lung inflammation, volatile organic compounds, and other harmful compounds. The American Lung Association "does not support biomass combustion for electricity production" and "strongly opposes the combustion of wood and other biomass sources at schools and institutions with vulnerable populations."[37]

   Air pollution is clearly linked to decreased lifespan, causing more than 100,000 early deaths in the United States every year.[38] Power plants are often located in low income and minority neighborhoods, and so the effects of air pollution are unequally distributed in ways that perpetuate historical environmental injustices. Black Americans have the highest mortality rate from exposure to fine particle air pollution.[39]

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[33] Köhl M., Neupane P.R., Lotfiomran N. 2017. The impact of tree age on biomass growth and carbon accumulation capacity: A retrospective analysis using tree ring data of three tropical tree species grown in natural forests of Suriname. PLoS ONE 12(8): e0181187. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0181187

[34] Duffy, Moomaw, Schlesinger et al 2016. Scientists letter to Congress about carbon neutrality of biomass energy. 2-22-2016. http://whrc.org/letter-to-the-senate-on-carbon-neutrality/

[35] Christensen, G.A., et al. 2019. Oregon Forest Ecosystem Carbon Inventory: 2001-2016. https://www.oregon.gov/ODF/ForestBenefits/Documents/Forest%20Carbon%20Study/OR-Forest-Ecosystem-Carbon-2001-2016-Report-FINAL.pdf

[36] Partnership for Policy Integrity (2011). Air pollution from biomass energy. https://www.pfpi.net/air-pollution-2

[37] American Lung Association (2019). Policy Principle on Energy. https://www.lung.org/policy-advocacy/public-policy-positions/public-policy-position-energy#:~:text=The%20American%20Lung%20Association%20does,as%20construction%20and%20demolition%20waste

[38] Fann, N et al. (2012). Estimating the National Public Health Burden Associated with Exposure to Ambient PM2.5 and Ozone. Risk Analysis (32) 81-95. https://doi.org/10.1111/j.1539-6924.2011.01630

[39] Maninder, P.S., et al. (2019). Fine Particulate Air Pollution from Electricity Generation in the US: Health Impacts by Race, Income, and Geography. *Environmental Science and Technology* (53) 14010–14019. https://doi.org/10.1021/acs.est.9b02527

3. **Avoid negative impacts to forest carbon storage and biodiversity:** An expansion of industrial biomass for energy production also would lead to an increased demand for biomass fuel. This demand could be disruptive to existing Oregon industries that currently rely on the same raw materials, as new demand may not be fully met by mill and logging residue alone. Many of these alternative uses of waste are better for the climate — for instance, making particle-board from wood chips can lead to long-term carbon storage in furniture and subfloors. If the demand for clean chips leads to increased harvest through shorter rotations, deforestation, or the conversion of native forests to timber plantations, it will reduce carbon storage on the landscape and degrade the forest habitats that support biodiversity and the survival of some of Oregon's most important species.

   If biomass is associated with large tree removal, road building, commercial logging, or meeting timber targets, this can have far-reaching ecological impacts that can negatively affect the area's biodiversity. Mature and old forest habitats are still quite rare compared to the conditions necessary to sustain healthy populations of Oregon native fish and wildlife. Expanded biomass energy development will make it harder to restore mature and old forests and perpetuate the creation of young forests that are already vastly over-represented on the landscape.

4. **Avoid displacement of zero-emissions energy and ensure better environmental outcomes:** Zero-emission energy resources, such as wind, solar, and geothermal are critical for decarbonizing the power sector. Oregon's decision makers should be focusing the state's resources on supporting the growth of these industries. Continuing to encourage and subsidize biomass energy infrastructure will compete with wind, solar and other carbon free energy sources for scarce resources needed to advance these critical technologies. Using the same amount of land area,[40] solar panels produce up to 80-times as much electricity as wood burning with no point source emissions at all.[41]
5. **Define the scope of "renewable" biomass appropriately:** Given that the U.S. Energy Information Agency estimates that for each 1 percent of forest biomass electricity added to current U.S. electricity production an additional 18 percent increase in U.S. forest harvest is required,[42] strict limits on the role of biomass electricity generation from woody debris are needed to avoid destruction of intact ecosystems and loss of old growth and late successional reserves, which hold far more carbon than the reseeded monoculture that would replace them if harvested. The following examples, while not

[40] All energy infrastructure should be sited in a manner that minimizes impacts to the environment. See, e.g, Defenders of Wildlife 2012. Smart from the Start. https://defenders.org/sites/default/files/publications/smartfromthestartreport12_print.pdf
[41] Duffy, Moomaw, Schlesinger et al 2016. Scientists letter to Congress about carbon neutrality of biomass energy. 2-22-2016. http://whrc.org/letter-to-the-senate-on-carbon-neutrality/
[42] Duffy, Moomaw, Schlesinger et al 2016. Scientists letter to Congress about carbon neutrality of biomass energy. 2-22-2016. http://whrc.org/letter-to-the-senate-on-carbon-neutrality/

comprehensive, highlight renewable (and environmentally appropriate) categories for woody biomass:

- Byproducts of wood or paper mill operations;
- Woody matter removed from within 100-200 yards of man-made structures or campgrounds for the purposes of hazardous fuels thinning;
- Thinned small diameter trees (<12" dbh) that are removed to restore fire adapted ecosystems; and,
- Logged residues such as slash piles that would otherwise increase wildfire risk or hinder ecologically appropriate restoration.

6. **Use woody biomass for biochar production:** Some types of biomass, such as slash for logging operations, is too "dirty"[43] to be used in electricity generation, but can still be used to produce biochar. In addition to retrofitting existing biomass facilities, managers can also utilize biochar kilns[44] in the field to address the challenges of burning slash after logging operations. According to practitioners, "When compared to the pile burning method, this approach produces considerably less smoke, does less damage to the soil, is safer, extends the season possible for fuel reduction efforts, sequesters carbon, and yields biochar, a charcoal-like product made from organic material."
7. **Where appropriate to reduce wildfire risk for communities, use wood waste as a source of biomass:** Oregon's communities that are in high wildfire risk areas should focus resources on community defense and emergency planning. Part of these defensible-space efforts can incorporate vegetation management near vulnerable infrastructure in order to establish a defensible zone for fire prevention. Vegetation waste can be transported to biomass facilities where it can be burned safely, or burned on site via biochar kilns. This vegetation removal should be focused in close proximity to infrastructure (specifically within 100-200 yards of a structure), as this is the most effective way to mitigate future wildfire risk.[45]

As the literature review and best practices above demonstrate, utilizing woody biomass for energy production in an environmentally responsible manner is challenging. In order for Oregon to meet its goals for reduction of near-term carbon emissions, preservation of intact forests for maximal carbon sequestration, water quality and quantity, wildlife conservation, and equity and justice, the state's decision makers must take a nuanced and cautious approach to any expansion of woody biomass energy production.

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[43] Forest residues are often unsuitable for use because of their high ash, dirt and alkali salt content. See: Brack, D. 2017. Research Paper Woody Biomass for Power and Heat Impacts on the Global Climate. Chatham House. https://www.chathamhouse.org/2017/02/woody-biomass-power-and-heat

[44] Utah State University 2019. https://forestry.usu.edu/news/utah-forest-facts/hazardous-fuels-reduction-using-flame-cap-biochar-kiln

[45] Cal Fire 2019. https://www.readyforwildfire.org/prepare-for-wildfire/get-ready/defensible-space/

Recommendations for Climate Adaptation in Forested Watersheds

In addition to carbon storage, climate adaptation strategies are needed to ensure that forest practices are protecting watersheds. Healthy forests protect clean water resources for people and wildlife. Clearcuts and post-fire logging operations increase the risk of mudslides and sediment runoff, negatively impacting Oregon's rivers and streams, and pesticide spraying can pose a risk to local community drinking water sources. Water infrastructure for water service providers is outdated and treatment needs are costly. Further, drinking water violations disproportionately occur in communities of color, especially in rural and tribal areas.[46] As the impacts of climate change worsen (including drought, heat waves, and more extreme precipitation events), Oregon's forests must be managed for clean water quality, water quantity, and flood prevention as an adaptation tool.

Climate change vulnerability assessments are key in synthesizing the best available scientific information to assess climate change vulnerability and develop strategies to mitigate potentially adverse effects of climate change on ecosystem services. Watershed processes including peak flow events are going to change as a result of climate change.

With the support of the U.S. Forest Service Office of Sustainability and Climate and Pacific Northwest Research Station, the Adaptation Partners is a federal group of experts that have assembled researchers and land managers in the U.S. Forest Service and other organizations to provide scientific information on climate change effects and adaptation. They have regionally downscaled climate change projections in Oregon and determined the types of management practices that are needed to mitigate the worst impacts of climate change on stream systems and aquatic species.

The Adaptation Partners have completed several assessments in Oregon, including one for southwest Oregon[47] that is in press as a General Technical Review paper. Adaptation Partners recommended the following forest practices related to aquatic conservation in climate change:

- Where they currently exist, the conservation and maintenance of productive stream habitat conditions will help ensure persistence of native fish populations in a changing climate.

[46] Samayoa, Monica. "Study: Safe Drinking Water Violations Are Higher For Communities Of Color." September 25, 2019. https://www.opb.org/news/article/safe-drinking-water-act-violations-communities-color-study/

[47] See Halofsky, J.E.; Peterson, D.L.; Gravenmier, R.A., eds. 201X. Climate change vulnerability and adaptation in southwest Oregon. Gen. Tech. Rep. PNW-GTR-xxx. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. In press.) http://www.adaptationpartners.org/swoap/

- Decommission roads with relatively low benefits for access to help maintain a sustainable road network under a changing climate.
- Build new or replace existing infrastructure (bridges and culverts) based on climate informed streamflow projections to prevent future degradation.
- Establish safeguards such as drain dips at stream crossing to prevent diversions. Construction of sediment retention structures and out-sloping of road segments would also minimize sediment input to streams.
- Landslide risk will be reduced by stabilizing slopes, mapping areas of highest risk, relocating roads in areas that are less vulnerable to landslides, and decommissioning roads in vulnerable locations.
- In-stream restoration techniques will improve floodplain hydrologic connectivity and increase water storage capacity (e.g., adding downed trees to streams).
- Reintroduction of American beaver may also help to slow water movement and increase water storage.
- Maintain and diversify monitoring programs to provide information about the status and trends of stream conditions and traditional fish habitat metrics.
- Strategically prioritize and restore natural regimes of flow, sediment, wood, and temperature.
- Enhance floodplain connectivity to help ensure the success of migratory life history forms.
- Detection and removal of nonnative species will help to maintain and restore certain fish populations.

Recommendations for Elevating Climate Change in Oregon's Current Forest Practices

Many of the rules and regulations that govern forest management in Oregon were developed nearly 50 years ago. Today, we are facing twin ecological crises, both from the threat of climate change and biodiversity loss. It should be a top priority for Oregon's state legislators to address these challenges, starting with revision of problematic statutes that require modernization. As described in detail above, current language for all statutes governing forest management must be reviewed and rewritten to elevate carbon storage and sequestration as a central climate strategy for the state, and to ensure Oregon's forest and wildlife can continue to thrive in a rapidly changing world. Through revision of these rules and regulations, Oregon can address the climate crisis and become a national leader in climate-smart management of its natural and working lands. The below examples highlight straightforward areas where carbon and climate change can be elevated, though the need for review and revision is far more extensive.

➢ Related to **527.630** Policy; rules:

- Carbon and climate considerations should be prioritized along with the list of sound management priorities — *"(1) Forests make a vital contribution to Oregon by providing jobs, products, tax base and other social and economic benefits, by helping to maintain forest tree species, soil, air and water resources and by providing a habitat for wildlife and aquatic life. Therefore, it is declared to be the public policy of the State of Oregon to encourage economically efficient forest practices that ensure the continuous growing and harvesting of forest tree species and the maintenance of forestland for such purposes as the leading use on privately owned land, consistent with sound management of* **carbon**, *soil, air, water, fish and wildlife resources and scenic resources within visually sensitive corridors as provided in ORS 527.755 and to ensure the continuous benefits of those resources for future generations of Oregonians."*
- The Oregon Board of Forestry should use the following authority to develop climate-smart forestry objectives for the Oregon Department of Forestry — *" (3) To encourage forest practices implementing the policy of ORS 527.610 to 527.770 and 527.990 and 527.992, it is declared to be in the public interest to vest in the* **State Board of Forestry exclusive authority to develop and enforce statewide and regional rules** *pursuant to ORS 527.710 and to coordinate with other state agencies and local governments which are concerned with the forest environment."*

➢ Related to **527.710** Duties and powers of board; rules; inventory for resource protection; consultation with other agencies required.

- Carbon Storage and sequestration should be included as priority resources in Oregon's forests — *" (2) The rules shall ensure the continuous growing and harvesting of forest tree species. Consistent with ORS 527.630, the rules shall provide for the overall maintenance of the following resources:*
  a) **Carbon storage and sequestration**
  b) *Air quality;*
  c) *Water resources, including but not limited to sources of domestic drinking water;*
  d) *Soil productivity; and*
  e) *Fish and wildlife.*

- State forests that exhibit old forest characteristics should be prioritized by the Board for their carbon and biodiversity value — *"(3) In addition to its rulemaking responsibilities under subsection (2) of this section, the board shall collect and analyze the best available information and establish inventories of the following resource sites needing protection:*

a) Carbon-dense mature and old growth forests;
b) Forest with high carbon storage potential;
c) Threatened and endangered fish and wildlife species identified on lists that are adopted, by rule, by the State Fish and Wildlife Commission or are federally listed under the Endangered Species Act of 1973 as amended;
d) Sensitive bird nesting, roosting and watering sites;
e) Biological sites that are ecologically and scientifically significant; and
f) Significant wetlands."

- The Board should use its authority to establish a carbon and biodiversity reserve system across state forest lands, prioritizing forests that exhibit old forests characteristics — *"(3) (b) The board shall determine whether forest practices would conflict with resource sites in the inventories required by paragraph (a) of this subsection.* ***If the board determines that one or more forest practices would conflict with resource sites in the inventory, the board shall consider the consequences of the conflicting uses and determine appropriate levels of protection.****"*

➢ Related to **ORS 477 — Fire Protection of Forests and Vegetation**

- The state should revise rules governing the use of prescribed fire, weighing the risk of low levels of localized smoke pollution against the threat of megafores that cause far more air pollution — *"(Smoke Management) 477.552 Policy. It is the policy of the State of Oregon: (1) To improve the management of prescribed burning as a forest management and protection practice; and (2)* **To minimize emissions from prescribed burning** *consistent with the air quality objectives of the federal Clean Air Act and the State of Oregon Clean Air Act Implementation Plan developed by the Department of Environmental Quality under ORS 468A.035. [1989 c.920 §2]*
- The state should revise its declaration that *all* wildfire is a public nuisance. While human life and property should always be protected, some wildland fires must be allowed to burn over extensive areas in order to restore the state's natural fire regimes — *"**477.064 Uncontrolled fire declared nuisance.** Any fire on any forestland in Oregon burning uncontrolled or without proper action being taken to prevent its spread, notwithstanding its origin, is* **declared a public nuisance** *by reason of its menace to life, forest resources or property. The spread of fire in forestland across an ownership boundary is prima facie evidence of fire burning uncontrolled. [Formerly 477.034; 1997 c.274 §3]*

➢ Related to **530.050** Management of lands acquired; powers of forester; rules.

- The State Forester should be strongly encouraged to identify and establish permanent protections for forests that exhibit old forest characteristics on state lands — *"Under the authority and direction of the State Board of Forestry except as otherwise provided for the sale of forest products, the State Forester shall manage the lands acquired pursuant to ORS 530.010 to 530.040 so as to secure the greatest permanent value of those lands to the state, and to that end may:* **(1) Establish permanent carbon reserves across state forests that exhibit old forest characteristics.***"*

➢ Related to **340-215-0010**, Oregon Greenhouse gas Reporting Program— The authority granted to the Oregon Department of Environmental Quality does not yet include ability to count logging related emissions in the state's annual inventory of greenhouse gases. Studies estimate that annual logging-related emissions average 33 million metric tons of carbon dioxide equivalent per year (Mmt CO2-e/yr) since 2000.[48] This means that logging is the largest source of emissions in the state (more so than the 23 Mmt CO2-e/yr attributed to transportation).

Recommendations for Implementation of Good Neighbor Authority in Oregon

In 2001 Congress authorized Good Neighbor Authority on a limited basis for five years as part of the Interior Appropriations Act. The Authority was expanded nationally and made permanent by the 2014 Farm Bill. Oregon Governor Kate Brown signed a GNA master agreement with the US Forest Service in 2016. Good Neighbor Authority was intended to allow federal land management agencies to work with state agencies to develop and implement forest and watershed projects on national public lands. Projects to date have taken place on seven National Forests and one BLM District and have been almost exclusively associated with timber sale activities. This emphasis on natural resource extraction underscores how this authority can be problematic without adequate policy guardrails. Below we offer several suggestions to ensure the program leads to better outcomes for the public and for Oregon's forests and wildlife.

1. **Projects should be non-controversial, include robust public and environmental review, and be ecologically sound.** The state should not be using GNA on projects that skirt NEPA or other review through the use of Categorical Exclusions, except in very limited circumstances when projects are clearly based on ecological restoration and have broad public support. State resources should be increasing the robustness of analysis and

[48] Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C., Harmon, M.E. 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. Proceedings of the National Academy of Sciences https://www.pnas.org/content/115/14/3663

public input and/or supporting those projects that have undergone sufficient process. The state should *not* use GNA or other resources to support:

- Commercial logging projects that occur in sensitive areas like roadless areas, Wild & Scenic River Corridors, and proposed Wilderness, or that are likely to negatively impact sensitive, endangered, or threatened wildlife or the habitats of extirpated native species;
- Projects that lead to a net addition of roads on our already over-roaded National Forests; and
- Projects that are rightly controversial, including post-fire logging, *de facto* clear-cutting, "fuels reduction" in backcountry areas outside of the infrastructure ignition zone, or overly aggressive hazard/danger tree proposals.

2. **State resources should support good projects that may not otherwise get done.** Good projects are those that have broad public support, are science-based, and are the result of robust public and environmental review. Projects supported by established collaborative groups with meaningful representation from a broad array of stakeholders may provide good opportunities.

   GNA projects should be the right activities in the right places, for the right reasons. For instance, forest thinning projects designed to reduce risk to human life and infrastructure should be near the resources meant to be protected and scientifically-based.

   While timber projects are well-funded by federal agencies, other important work simply doesn't get done - and often doesn't even get proposed due to a lack of resources. State funds should go to projects and activities that are not already commercially viable rather than further subsidize private industry and corporate profits. State resources should allow the implementation of activities the USFS should do, but is generally unable to accomplish. That includes activities such as controlled burns, culvert replacements, road removal, wildlife & other resource surveys, trail creation and maintenance, and instream work. This is the work that the public most wants done. These activities directly benefit the public and provide family-wage jobs.

3. **GNA projects should focus objectives besides natural resource extraction.** Like the USFS and other public agencies, ODF and others at the state level have become enamored of "increasing the pace and scale of restoration". Terms like "restoration", "thinning", "fuel reduction," and "resilience" have unfortunately become so overused and misapplied that they are often euphemisms for continuing a paradigm of commercial logging, road-building, and fire suppression that will only make problems of forest and watershed health worse. The state should be careful not to feed that trend and harm public trust by approving GNA projects that focus on resource extraction.

Even if GNA work is focused on restoration-based activities, including commercial thinning in young plantations, these contracts should be carefully scrutinized to ensure that they are not simply enabling the USFS or BLM to implement forest management projects that are ***not*** restoration, but purely meant to accomplish timber production goals.

In addition, "increasing pace and scale" basically means doing bigger things faster which is not a recipe for good outcomes. It must become no less important to ensure an increase in the *quality* of work. That may include more upfront planning and meaningful monitoring.

To ensure the quality, as well as quantity, of restoration outcomes, they should be measured in a way that's as quantifiable as board feet sent to a mill and could include things such as – miles of road obliterated, miles of trails maintained, culverts replaced, stream miles reconnected, miles of stream fenced from livestock, stream temperature improvement, wildlife surveys conducted, acres protected, etc.

4. **State employees or contractors doing work under GNA on federal lands must be well trained to do work under federal laws and guidelines.** ODF and ODFW employees and contractors are generally unfamiliar with the laws, policies, and guidelines that federal lands are subject to. It is vitally important that state employees and contractors doing work on federal lands under GNA be trained for the specific work they are assigned and the regulations that work is subject to, and that they are supervised by federal employees accountable to these federal regulations and the public.

Recommendations for Implementation of Forest Carbon Offset Program in Oregon

We support the inclusion of alternative compliance mechanisms as part of DEQ's efforts to establish a cap and reduce program in the state of Oregon. These mechanisms can help drive down costs and speed the timeline for achieving decarbonization goals. Forest carbon offsets specifically can offer numerous climate, environmental, and economic co-benefits if designed effectively, but first and foremost, emitters must utilize or commit to utilizing the "Lowest Achievable Emissions Rate" to reduce emissions as quickly as possible. An offset component should only be for emitters where effective reduction technologies do not already exist and it should not be used as a substitute for immediate emissions reductions.

Industrial scale logging operations in Oregon are one of the largest sources of greenhouse gas emissions in the state, and should also be accounted for within an emissions-capping rulemaking. While we recognize that DEQ may not have the statutory authority to directly regulate biogenic greenhouse gas emissions, we do feel that DEQ should make every effort to incorporate this source of emissions into its rulemaking via the employment of alternative compliance options.

Notably, a carbon offsets program within Oregon has the potential to provide financial support for forest protections on private lands. While there are existing policy mechanisms for requiring better management practices on Oregon's corporate timber lands, there are comparatively far fewer opportunities for incentivizing better practices on private lands that have smaller forested areas. Current tax and financial incentives are geared strongly towards short rotation logging as opposed to protecting valuable carbon stocks. Therefore we believe a forest offset program should be tailored to incentivize participation by non-industrial private lands, tribes, land trusts, and local government entities as opposed to large corporate forest owners, as a targeted alternative compliance option mechanism within the broader cap and reduce program.

But while a carbon offset program holds promise as a climate solution, even an alternative compliance mechanism targeted at non-industrial lands could have its effectiveness undermined if not designed properly. As such, DEQ should take these policy priorities under consideration:

1) Any future carbon offset program policies must incorporate strong integrity mechanisms that do not enable the continuation of any toxic air or water pollution as a result of the offset program, with special consideration for communities of color and lower income areas that are already facing higher pollution burdens.
2) DEQ should work closely with non-industrial forest owners to ensure an open and transparent decision making process in regards to a forest offset program, and ensure informational resources are readily available in rural communities.
3) DEQ should permit and create incentives for non-industrial lands forest owners to qualify for offset programs by aggregating small acreages.
4) Any future offsets program should focus on privately owned lands, especially non-industrial lands forest owners, as there are few options for ensuring protections of these forests and they have significant potential in terms of carbon sequestration — data have shown that the carbon stocks on privately owned forests in western Oregon's Coast Range are only a third of their ecological potential. Publicly owned forests are already, by law, held to higher standards for balancing multiple values and should therefore not be included in offset mechanisms.
5) A future forest offset should be designed in a manner that makes it compatible with other existing forest offset programs, though Oregon's program should require outside investments to meet the state's standards. By expanding the market for offsets beyond the

state and linking jurisdictions, Oregon can access additional funding for forest offsets in its carbon rich forests.

6) Forest offset projects must be durable and aim toward long-term storage — that is, they should not only sequester carbon, but also be managed to withstand the stresses of a changing climate in the long-term. Forest projects should be managed for species diversity and climate resilience, with an emphasis on natural forest composition (i.e. high biodiversity and diversity in tree species, size widths, density and spacing).
7) Forest offset projects must be additional — that is, they must incentivize forest practices that are better for the climate than business-as-usual as opposed to rewarding people for current practices. Further, an offset program should incorporate requirements for credit replacement by forest owners for any intentional reversals (they must pay back the credits if they log or develop the offset project).
8) The carbon benefits of any projects must be quantifiable and verifiable, and therefore DEQ must establish a working third-party accountability program with the capacity to ensure this. This program must account for industry-based greenhouse gas emissions assessed in terms of their carbon dioxide equivalent, including emissions from fuel use in industry operations, emissions from road construction, soil and native vegetation disturbance during harvest operations, slash burning and transport of slash offsite, emissions from trucking in and spraying pesticides, and the estimated loss of carbon when a tree is harvested, transported, and processed into wood products. Approved offset transactions must be subject to third-party follow up monitoring to ensure compliance over time, with meaningful penalties should a party violate their commitments.
9) An offset program should incorporate meaningful buffer accounts that are large enough to mitigate for natural processes (natural or human-induced) that impact carbon sequestration, including wildfires. A forest buffer account is a holding account for offset credits issued to forest projects and acts as a general insurance mechanism against unintentional reversals for offset credits issued to forest projects.
10) Any offset program must avoid leakage of greenhouse gas emissions in unregulated sectors.

We believe an alternative compliance option that complies with the above priorities, as part of the design of the overall Climate Protection Program rulemaking, would provide the best balance between maximizing emissions reductions, accounting for equity considerations, and minimizing cost burdens to businesses and consumers.