Southeast Alaska
Conservation Council

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October 14, 2020

Earl Stewart, Forest Supervisor
Attn: Twin Mountain II Timber Sale
Thorne Bay Ranger District
PO Box 19001
1312 Federal Way
Thorne Bay, Alaska 99919

Submitted via web portal: https://cara.ecosystem-management.org/Public//CommentInput?Project=58626
Via email: lucy.g.maldonado@usda.gov

Re: Twin Mountain II Timber Sale – Project Scoping Comments

Dear Mr. Stewart:

Please accept the following scoping comments on the Notice of Intent for the Twin Mountain II Timber Sale on behalf of the Southeast Alaska Conservation Council (SEACC). SEACC is a grassroots organization representing more than 7,000 supporters. For fifty years, SEACC has been bringing together diverse Alaskans from our region's 32 communities to protect the natural resources of Southeast Alaska, ensure sound stewardship of the lands of the region, and protect subsistence resources and traditional ways of life side by side with commercial fishing, tourism and recreation.

I. Summary of the Project

The scoping notice states that the Forest Service proposes to make up to 3,000 acres of old-growth timber (with approximately 42 million board feet (MMBF)) available to offer for harvest, construct approximately 3 miles of new roads, 11 miles of temporary roads, and reconditioning 35 miles of existing roads in the Staney and Red Bay areas within the Thorne Bay Ranger District. In addition, existing log transfer facilities at El Capitan, Exchange Cove, Lab Bay, Naukati, and Winter Harbor would be made available if needed. Clearcuts would generate the bulk of the timber volume on approximately 1,800 acres, with another 1,200 acres slated for uneven-aged management. Project implementation would occur over the course of 5 to 10 years.

II. Comments on process

The scoping notice for the Twin Mountain II Timber Sale was issued on September 14, 2020, the date on which updates to the National Environmental Policy Act regulations issued by the Trump

administration took effect.[1] You have since clarified, however, that this scoping effort is being initiated under the 1978 NEPA rules.[2] Under these rules, the U.S. Forest Service must take a hard look at the direct and indirect effects, and the cumulative effects of the proposed action, including assessment of impacts that are geographically or temporally distant. Furthermore, under these same rules, "**all** [*emphasis added*] reasonable alternatives must be rigorously and objectively evaluated."[3]

Also required under NEPA, a draft EIS must take into full account the comments received as part of this scoping process. However, the 30-day comment period for this scoping effort coincides with the issuance of the final EIS for the Alaska Roadless Rule and the 45-day comment period for the draft EIS for the South Revilla Integrated Resources Project. These environmental documents issued for overlapping public review periods severely burden affected Southeast Alaskans who depend on the Tongass National Forest for an array of uses and livelihoods and limit their capacity to respond and provide meaningful input on these documents, including the scoping effort for the Twin Mountain II timber sale at issue here. We further object to the Forest Service's decision to not hold public meetings and subsistence hearings as part of this scoping process. Given the extensive logging and roadbuilding activity that has occurred and continues to occur on Prince of Wales, the impacts to, and potential conflicts with, local communities, residents, and subsistence, recreation and tourism only increase with each passing year. The USFS should provide the public the opportunity to share their concerns in a public setting and provide input on these potential impacts and how alternatives could reduce those impacts.

III. General Comments

SEACC opposes further industrial scale harvest of old growth on Prince of Wales. Contiguous high-volume old growth forest in northern Prince of Wales, including the project area, has been reduced by 93.8% between 1954 and 2004.[4] Due to historic and ongoing logging and roadbuilding on multiple ownerships on this island, including U.S. Forest Service land, Native corporation land, University Land, and Mental Health Trust land, remaining old-growth forests on Prince of Wales are becoming increasingly depleted and fragmented resulting in a significant loss of habitat that is important for many species. These forests will require centuries to return to their original level of ecologic productivity. Old growth forests provide essential habitat for deer, bears, wolves, martens, flying squirrels and goshawk among other species, as part of a complex ecosystem that also supports thriving watersheds for salmon habitat. The nature of island ecology is that terrestrial species are confined and cannot migrate to new habitat, risking extirpation and irreversible loss of biodiversity.

Of particular concern are the units that fall within the Staney Creek portion of this sale. Staney Creek has been identified by the USFS as a priority watershed.[5] Further timber harvests in the vicinity of this watershed add to the cumulative impacts this important waterbody is already weathering from harvests on non-NFS ownerships. Both the state and Alaska Mental Health Trust plan or have had past harvest activity in the Control Lake area that on their own pose significant degradation to Sitka black-tailed deer habitat and Staney watershed health. From a forest

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[1] 85 Federal Register 43304 (July 16, 2020)
[2] 43 Federal Register 55978 (November 29, 1978, as amended through 2005)
[3] *Ibid.;* 40 C.F.R. §1502.14(a))
[4] J. Schoen and D. Albert, "Use of Historical Logging Patterns to Identify Disproportionately Logged Ecosystems within the Temperate Rainforests of Southeastern Alaska," Conservation Biology (2013)).
[5] U.S. Forest Service. 2018. Tongass National Forest Watershed Restoration Program. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd622074.pdf.

management standpoint, it is not enough for the USFS to simply acknowledge the larger context and cumulative impacts that logging and roadbuilding in multiple adjacent ownerships have on the remaining high volume old grow stands on Prince of Wales. It must act as a responsible forest manager to deliberately curtail those impacts by ending further old growth harvests on Forest Service land.

On Prince of Wales alone, there are already at least 2800 miles of roads.[6] Forest roads contribute to silting, turbidity and erosion and create stormwater runoff that impacts streams. They fragment habitat and routinely contribute to the introduction of invasive species, a problem that will cost the U.S. Forest Service upwards of $3.6 million over the next ten years in the northern Tongass and Wrangell-Petersburg areas.[7] [8] Roads constructed in karst areas have fragile, porous aquifer systems that are highly vulnerable to water quality impacts from logging-related road construction, traffic, and fuel spills that can cause irreversible damage. Karst features are documented in both the Staney and Red Bay areas of the project. For all of these reasons SEACC opposes the construction of an additional 14 miles of roads planned for this project and request that alternatives developed must consider no new road construction.

IV. Purpose and Need for the Action

We disagree that "[t]here is a need to provide a sustainable level of forest products to contribute to the economic sustainability of the region. Providing old-growth timber would preserve a viable timber industry by providing timber volume in an economically efficient manner while providing jobs and opportunities for Southeast Alaska residents." There is not a need. The State of Alaska Division of Forestry currently has approximately 45 mmbf under contract in the Southeast State Forest, and the draft Five Year Schedule of Timber Sales has identified nearly 77 mmbf to be offered over the next five years.[9] For the Haines State Forest, the current Five Year Schedule of Timber Sales has identified 48.4 mmbf. The Alaska Mental Health Trust's (AMHT) Naukati Exchange Timber Sale is providing 100 mmbf over the next 10 years and the Trust has smaller sales in Icy Bay and near Kasaan.[10] The AMHT also has just issued a notice of a best interest decision to offer another 100 mmbf of old growth near Shelter Cove on S. Revilla Island.[11] In February of 2019, officials with Sealaska Corporation declared that it "intends to harvest 55-65 MBF per year from its timber base on Prince of Wales Island" and its "Icy Bay stumpage over the next two years [2020-2021] will add another 10-20 MBF per year."[12] Meanwhile, the volume of timber remaining under contract on the National Forest totals 53 mmbf.[13] This does not include settlement sales and additional smaller timber sale offerings described in the 5-Year Timber Sale Schedule 2021-2025.[14]

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[6] USDOT. 2011. Tribal Transportation: Prince of Wales Island. U.S. Department of Transportation, Federal Highway Administration, website, last updated April 5, 2011. http://www.fhwa.dot.gov/tribal/tribalprgm/govts/pow.htm

[7] Northern Tongass Integrated Weed Management. 2020. Available at: https://www.fs.usda.gov/nfs/11558/www/nepa/83394_FSPLT3_1448513.pdf.

[8] Wrangell-Petersburg Weed Management Project. 2013. Available at: https://www.fs.usda.gov/nfs/11558/www/nepa/83394_FSPLT3_1448513.pdf

[9] Alaska Department of Natural Resources, Division of Forestry.

[10] Alaska Mental Health Trust Authority. https://alaskamentalhealthtrust.org/trust-land-office/forestry/ accessed on October 13,2020.

[11] Alaska Mental Health Trust Authority, Trust Land Office. Notice of Decision for a Competitive Timber Sale – Shelter Cove – Ketchikan MHT #9101005. September 7, 2020.

[12] Alaska State Legislature. Senate Resources Committee, February 15, 2019. Hearing transcript available at: http://www.akleg.gov/basis/Meeting/Detail?Meeting=SRES%202019-02-15%2015:30:00

[13] U.S. Forest Service, Alaska Region, Remaining Timber Sales Volumes and Values on June 30, 2020

[14] U.S. Forest Service. August 2020. Tongass National Forest 5-Year Timber Sale Schedule 2021-2025.

Nor does it include other harvests occurring on village corporation lands. When tallied together, the known timber volume under contract or slated to be offered totals nearly 500 mmbf. That averages 100 mmbf a year for the next five years. In addition, the USFS granted three-year extensions to all timber contracts on the Tongass where harvests may have slowed or stopped in 2019-2020 due to trade wars and the coronavirus pandemic, underscoring the lack of justified need for additional timber volume on top of what is already in play.[15]

Two land exchanges have occurred over the past 6 years impacting the Tongass. The Sealaska Lands Bill of 2014 conveyed 70,075 acres of National Forest System lands to Sealaska Corporation,[16] and the Mental Health Trust Land Exchange Act of 2017 will ultimately convey an estimated 20,580 acres of forested National Forest lands.[17] If the U.S. Forest Service transfers high volume old growth forested lands out of the National Forest system to landowners who then log those lands under the more permissive laws of the Alaska Forest Resources & Practices Act and implementing regulations,[18] including former inventoried roadless areas, that timber harvest should be factored into the annual projected timber sale quantity. Upon doing so, the U.S. Forest need not continue to offer wasteful Tongass timber sales subsidized on the backs of taxpayers, which in 2019 cost the American public more than $16 million.[19] Based on this extraordinary waste, as documented by Taxpayers for Common Sense, we also find the statement in the Purpose and Need for Action, "[p]roviding old-growth timber would preserve a viable timber industry by providing timber volume in an economically efficient [*emphasis added*] manner" to be completely false. Furthermore, the increasingly tiresome notion trotted out by industry and the agency, that more timber will create more jobs, lacks all basis, since up to 50% of Tongass old growth and 100% of young growth is routinely exported without processing by local mill workers.

The USDA's 2016 projections of Tongass National Forest timber demand suggest that harvests on other ownerships were factored into the calculation of a projected timber sale quantity (PTSQ) of 46 mmbf per year from the Tongass.[20] This PTSQ forms the basis for the 2016 Tongass Forest Land Management Plan's timber objective.[21] We believe this analysis is now outdated given the above factors as well as timber market changes, the U.S. – China trade war and economic downturn resulting from the coronavirus pandemic, and should no longer be used by the Forest Service as the basis for offering additional timber sales on the Tongass. The bottom line is that there is no need for the timber volume proposed for sale under the Twin Mountain II Timber Sale project.

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[15] 85 Federal Register 20984.
[16] Southeast Alaska Native Land Entitlement Finalization and Jobs Protection Act 2014. Public Law 113–291. December 19, 2014.
[17] Consolidated Appropriations Act, 2017, Public Law 115-31, Division G, Section 431(a)(2), known as the "Alaska Mental Health Trust Land Exchange Act of 2017
[18] Alaska Statutes 41.17; 11 Alaska Administrative Code Chapter 95.
[19] Taxpayers for Common Sense. September 2020. Cutting our losses after 40 years of money-losing timber sales in the Tongass. Available at: https://www.taxpayer.net/energy-natural-resources/cutting-our-losses-tongass-timber-2/
[20] Daniels, Jean M.; Paruszkiewicz, Michael D.; Alexander, Susan J. 2016. Tongass National Forest timber demand: projections for 2015 to 2030. Gen. Tech. Rep. PNW-GTR-934. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 53 p.
[21] U.S. Forest Service. Land and Resource Management Plan, Tongass National Forest. December 2016. P. 5-13.

V. The Forest Service must acknowledge the importance of old growth forests for carbon sequestration.

NEPA and the National Forest Management Act (NFMA) require the Forest Service to use high quality, accurate, scientific information to assess the effects of a proposed action on the environment.[22] The Forest Service, in its analysis for the DEIS must 1) recognize the global importance of the Tongass for carbon storage, 2) use an appropriate scale of analysis that assesses the value of the Tongass and the effects of the proposed action under consideration, and 3) disclose and analyze credible information showing that old growth forests in the Tongass store substantially more carbon than saw logs and young growth.[23] In the FEIS for the 2016 Tongass Plan, the Forest Service recognized that the Tongass is "a critical component in the global carbon cycle" and that management actions on the Tongass can "affect climate change at a local, regional, and global scale." In keeping with that conclusion, the Forest Service must acknowledge and study the effect that logging and roadbuilding in this project will have, both on its own and in combination with historic, ongoing and foreseeable future logging and roadbuilding, on carbon sequestration or climate change.[24] The DEIS must also address the multitude of credible, scientific studies, described in detail in the report by Dr. DellaSala and Dr. Buma, that support the conclusion that temperate rainforests in general, and the Tongass particular, are globally important carbon sinks.[25] With these forests dwindling quickly on an international scale, scientists recommend protecting remaining intact areas, not logging them. The International Panel on Climate Change has similarly recommended avoiding land sector emissions—in other words, keeping trees standing.[26] Indeed, the catastrophic loss of millions of acres of forest in the American west this past season should give the Forest Service serious pause when it comes to moving forward with yet more old growth timber sales on the Tongass.

The Forest Service must also accept the scientific consensus that saw logs and eventual young growth do not store just as much carbon as standing old-growth forests.[27] This is in line with the Forest Service's own conclusions in the 2016 Tongass Plan Amendment FEIS, which acknowledged that logging old growth results in increased emissions because some wood is lost to sawdust, and furniture and other wood products degrade or are destroyed and release stored carbon.[28] The report prepared by Dr. DellaSala and Dr. Buma confirms this analysis and shows that the contiguous old growth areas of the Tongass stores significantly more carbon than saw logs or young growth. The Forest Service must address this information in the DEIS.

In addition, the analysis in the DEIS must not minimize the importance of Tongass old growth forests for carbon storage by using an inappropriate scale of comparison for this project. The Forest Service should provide a comparison of the emissions of each alternative so that the public and decisionmakers can compare the greenhouse gas contributions of each alternative. These emissions

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[22] See 40 C.F.R. § 1500.1(b); 36 C.F.R. § 219.3.
[23] See 40 C.F.R. § 1502.9(b) (requiring agencies to disclose, discuss, and respond to "any responsible opposing view"); *Center for Biological Diversity v. Nat'l Highway Traffic Safety Admin*., 538 F.3d 1172, 1227 (9th Cir. 2008) (holding environmental assessment was unlawful where agency's conclusion that rule's climate impacts would not be significant lacked adequate record support)
[24] *See* 2016 Tongass Plan FEIS at 3-13 and 3-19.
[25] DellaSala and Buma (2019). Analysis of Carbon Storage in Roadless Areas of the Tongass National Forest.
[26] *See id.* (discussing recommendations of scientists and the IPCC).
[27] *See* 2016 Tongass Plan FEIS at 3-16 (citing studies concluding that cutting old growth on the Tongass would reduce the carbon sequestering ability of the forest)
[28] *See* 2016 Tongass Plan FEIS at 3-19 to 3-20.

should be compared to regional or local emissions, not global or total US power sector emissions, to provide a more meaningful basis of comparison.[29]

VI. Alternatives

We request the USFS develop an alternative that does the following:

1) Provides small scale harvest offerings that conserve natural resources and aesthetic values and prioritize sustainable, value-added wood products industries in Southeast Alaska that strengthen local economies, rather than businesses dependent on round log exports.

2) Engages with the Tribes of Kasaan, Klawock, and Hydaburg to identify and set aside specific acres for cultural harvest of red and yellow cedar, the latter of which is becoming increasingly endangered and therefore poses a risk to southeast Alaska indigenous heritage; and provides an economic assessment that calculates the local demand in Southeast Alaska for cultural use of wood and wood products by carvers, artists, and local business owners working in Pacific Northwest art traditions;[30]

3) Addresses the backlog of restoration and recreation infrastructure work on Prince of Wales, where the U.S. Forest Service has cited more than $10 million in unfunded restoration work and deferred maintenance for recreational facilities, beyond that which is described in the out-year plan for the Prince of Wales Landscape Level Analysis.[31] [32] Funding restoration and recreation projects that provide valuable jobs at a critical time for forest workers, Tribal organizations, and community residents throughout Prince of Wales, is a far more sustainable investment for the American taxpayer than logging and roadbuilding.

4) Prioritizes habitat restoration and enhancements that specifically improve ecological resilience in the face of a rapidly changing climate and improves habitat productivity for our fish and wildlife populations. Young-growth stands in particular should be targeted for maintaining, prolonging, and/or improving understory forage production and accelerating development of old-growth characteristics for deer, bear, marten, wolf, goshawk, murrelets, ermine, and flying squirrel. This young-growth management work benefits the forest, provides jobs, and improves "hunt-ability" that sustains subsistence activities. Restoration work should also prioritize fish habitat improvements that address much needed stream restoration and fish passage repairs throughout the island's world class watersheds. These watersheds are essential for subsistence, sport fishing and Southeast Alaska's world class commercial fisheries.

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[29] *See High Country*, 52 F. Supp. 3d at 1190 ("Beyond quantifying the amount of emissions relative to state and national emissions and giving general discussion to the impacts of global climate change, [the agencies] did not discuss the impacts caused by these emissions."); *Mont. Envtl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1096–99 (D. Mont. 2017) (rejecting the argument that the agency "reasonably considered the impact of greenhouse gas emissions by quantifying the emissions which would be released if the [coal] mine expansion is approved, and comparing that amount to the net emissions of the United States"); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 76-78 (D.D.C. 2019) (holding BLM's conclusion that the emissions from oil and gas leases "represent an incremental contribution to the total regional and global GHG emissions level" was arbitrary and capricious because it was not supported by any data).

[30] See also: Request for cultural cedar trees and economic assessment of artisan economy. Letter from Organized Village of Kasaan, Klawock cooperative Association, Organized Village of Kake, and Hydaburg Cooperative Association to Chief Christensen and Forest Supervisor Stewart. March 17, 2020; Enclosed.

[31] Tongass Forest Supervisor, Earl Stewart. Electronic mail communication, May 27, 2020.

[32] U.S. Forest Service. Prince of Wales Landscape Level Analysis. Out-year plan. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd680205.pdf

5) The Forest Service must provide an economic analysis of the costs and benefits of this alternative, including the financial impacts and job creation that will result from its implementation, so that the public can sufficiently compare all the alternatives on a cost-benefit basis. In addition to other regional economic impact studies on the multiple uses and benefits of the Tongass, the Forest Service should review and incorporate relevant data and conclusions found in the University of Oregon's "Social and Economic Monitoring of the Tongass National Forest and Southeast Alaska communities: Monitoring Plan and Baseline Report."[33] The analysis must include an assessment of the region's economic contributions from the harvest and cultural use of wood and wood products by carvers, artists, and local business owners working in Pacific Northwest art traditions as described above, as well as the traditional (Indigenous), hunting, fishing, tourism, restoration and outdoor recreation economies that surpass the timber industry in the Southeast regional economy.

In our view, an alternative with the features described above is far more responsive to the multiple use objectives under the National Forest Management Act.[34] This alternative not only will provide immediate jobs for small timber operators, local mills and Native artisans, but improvements to fish and wildlife habitat will also generate employment. This in turn will support our commercial fisheries, subsistence hunting and fishing and outfitter guiding, and infrastructure improvements support the growing outdoor recreation and tourism sectors on Prince of Wales. This alternative prioritizes and protects the value of old growth Tongass forests for carbon in the face of climate change and will make our region more economically and culturally vibrant, and climate resilient.

We appreciate the opportunity to comment.

Sincerely,

Sally Schlichting
Environmental Policy Analyst
Tongass Forest Program
sally@seacc.org
(907) 957-3488

Enclosures:

Tribal Request for Cultural Use Trees, March 2020
DellaSala and Buma (2019). Analysis of Carbon Storage in Roadless Areas of the Tongass National Forest

[33] Social and Economic Monitoring of the Tongass National Forest and Southeast Alaska communities: Monitoring Plan and Baseline Report. 2020. Ecosystem Workforce Program, University of Oregon. Available at: http://ewp.uoregon.edu/TongassTransition
[34] 16 U.S.C. § 1600

March 17, 2020

RE: Request for Cultural Red Cedar Trees and Economic Assessment of Traditional Carving, Weaving, and Artisan Economy

To U.S. Forest Service Chief Christensen and Tongass National Forest Supervisor Stewart:

We have submitted the letter attached as a signification of our intent and desire to engage proactively with the Forest Service to procure cultural use trees for carving, conduct an economic assessment for our local demand and cultural and economic use of red cedar trees, and co-create a long-term management plan to identify how much red cedar is left in the Tongass and to protect and provide for our use of this important cultural resource. We would like to go through this process and conduct this assessment so that collectively, our tribal governments can engage in long-term planning for the provision of cultural use trees for the next seven generations - which is our traditional forest rotational timeline.

There are three specific things we would request of you as tribal governments.

1. Procurement of cultural use trees for totem poles for the tribes of Kasaan, Klawock, Hydaburg, and Kake (Summer 2020)
2. An economic assessment calculating the local demand in Southeast Alaska for cultural use wood and wood products that are the raw materials used by carvers and artists working in Pacific Northwest art traditions
    a. This demand for cultural use wood (based on the above economic analysis) needs to be specifically calculated into the Tongass Timber Reform Act mandate to "seek to meet market demand for Tongass timber."
3. The development of a long-term forest management plan for providing cultural use wood with adequate supply for 7 generations -- the traditional forest rotation time period practised by Native master carvers - that includes an official inventory of standing old growth cedar (conducted jointly between USFS silviculturalists and tribal carvers to teach proper identification of suitable cultural use wood)

We are concerned with the rate at which cedar trees have been removed from the forest, both historically and presently. The preservation of our cultural heritage depends on cedar trees being present for our art, carving, and weaving for generations to come. We would like our uses of cedar to be documented, economically assessed, and the remaining trees to be accounted for in an official manner. We look forward to working with the Forest Service to achieve these goals.

Sincerely,

Ronald Leighton, President

Organized Village of Kasaan

Barry Peratrovich, President

Klawock Cooperative Association

Joel Jackson, President

Organized Village of Kake

Sid Edenshaw, President

Hydaburg Cooperative Association

March 17, 2020

RE: Request for Cultural Red Cedar Trees and Economic Assessment of Traditional Carving, Weaving, and Artisan Economy

Dear U.S. Forest Service Chief Christensen and Tongass National Forest Supervisor Stewart:

Our sovereign, federally-recognized tribes have lived in what is now known as the Tongass National Forest since time immemorial. We have stewarded this land for over 10,000 years, and the land has provided for our people to develop complex societies and cultures that are rich in tradition and artistic expression. Tlingit and Haida people are renowned artists, carvers, blacksmiths, weavers, painters, and our artistic capabilities are internationally recognized. Our artistic expression is tied to our land, and we have always drawn both inspiration and materials for our creations from our surrounding lands and waters. Our totem poles are carved out of red and yellow cedar trees, which are durable and transmit our stories to future generations because they last for hundreds of years. Our regalia is woven from the wool of mountain goats, adorned with abalone buttons and other shells. We weave hats and baskets from red and yellow cedar bark. We have sustainably interacted with and depended on the abundance of these natural resources for thousands of years, and are just now coming to a period in which the future provision of these resources is in question. This letter signifies our intent and desire to engage proactively with the Forest Service to procure cultural use trees, identify how much red cedar is left in the Tongass, and conduct an economic assessment for our local demand and cultural and economic use of red cedar trees so that collectively, our tribal governments can engage in long-term planning for the provision of cultural use trees for the next seven generations - which is our traditional forest rotational timeline.

Prior to contact, our land remained in balance, which was maintained by our principles of good stewardship, hard work, and respect. Our land provided us with traditional foods, health, and materials for our prosperity. The natural resources from our traditional homelands are used to create clan houses, totems, canoes, regalia, baskets, hats, utensils, and our *at.'oowu*, our sacred clan objects. These items and the stories that they express are used as a method to pass on knowledge and information. Our people were able to live in balance with the land for such a long time because we had the foresight and knowledge of our ancestors to guide us.

The post-contact period and subsequent colonialism in Southeast Alaska destroyed this careful balance that we cultivated over millennia. Our resources were plundered for quickest economic return, as we first saw the desecration of the sea otters, followed quickly by our

salmon, and then our own forest. Although the pace of the logging has slowed, because the trees that are easiest and most economical to reach have already been harvested, there is still an attitude shared by the U.S. Forest Service and the present-day timber industry that the cedar trees of Southeast Alaska are better off being shipped to foreign countries, or to the contiguous United States, and sold as quickly as possible because of a spike in lumber prices rather than being used to provide for a long-term, sustainable return to our local economies and art.

Our creations have been stolen for years, shipped to far away museums and displayed for the enjoyment of many, at the expense of our people. Our tribes have been robbed of our cultural heritage for years, while it provides economic gain and respect to these museums and their collections. This steady flow of cedar from our homelands to the outside world has continued unabated for decades. We are thinking towards the future and our ability to continue creating our art, to continue passing down our traditions and stories to the next generations. Both the rate at which red cedar is being liquidated from our forests for the commodity market, and the rate at which yellow cedar is dying off due to climate change, endanger our cultural survival. Thus, we are writing to you in our capacity as tribal sovereigns to request your assistance in continuing our cultural traditions and strengthening our local artisan economy. We believe that fulfilling this request is the fiduciary duty of the U.S. government to our collective tribal members.

As the land manager and deciding official for our traditional homelands, which are now called the Tongass National Forest, you are tasked with making critical decisions regarding the use of resources that these lands and waters provide. You have been at the center of the debates and conflict over the years on how these lands are used, and whom your decisions should benefit. We have seen where there have been times when it was the American public at-large who benefited from decisions made by the Forest Service. We have seen where decisions have been made that have benefited the timber industry. But the overwhelming trend for us, as tribal nations, is that we have experienced times when decisions were made that did not benefit our indigenous people who have lived on these lands since time immemorial. The Forest Service has a chance to change this and start addressing some of our needs.

There are three specific things we would request of you as tribal governments.

1. **Procurement of cultural use trees for totem poles for the tribes of Kasaan, Klawock, Hydaburg, and Kake** (Summer 2020)

2. **An economic assessment calculating the local demand in Southeast Alaska for cultural use wood and wood products used by carvers, artists, and local business owners working in Pacific Northwest art traditions**
    a. This demand needs to include cultural use wood (based on the above economic analysis) being specifically calculated into the Tongass Timber Reform Act mandate to "seek to meet market demand for Tongass timber."
3. **The development of a long-term forest management plan for providing cultural use wood with adequate supply for the next 7 generations** -- the traditional forest rotation time period practiced by Native master carvers - that includes an official inventory of standing timber appropriate for cultural use wood

Our first request is to procure cultural use trees for carving into a totem pole and canoes. We ask that you designate a specific Forest Service employee that works with us to identify the trees and work through your agency processes so that we may be able to strip the bark, and harvest these trees to use for totem pole and cultural product carving.

The second request is for the Forest Service to conduct an inventory of the standing timber that is suitable for cultural use wood and bark weaving. We are currently in a time of wide-ranging conflict over the use of wood products on the Tongass. We are in the midst of transitioning from old growth to young growth harvest. However, our carving and weaving traditions require a supply of old growth wood, especially Red Cedar. At the same time that the agency and stakeholders are figuring out this transition, the timber industry is rapidly liquidating the remaining supply of old growth forests, especially the culturally significant Red Cedar trees that we depend on. We understand that the price in foreign and domestic markets for Red Cedar timber is high right now, and the timber industry wants to make as much money as it can while the prices are high and while there are still some old growth trees to harvest. However, our culture bearers and master carvers have always taught us to think out at least seven generations in the future. We need to ensure that we can still practice our culture, including bark weaving and totem carving, seven generations from now. Therefore, we would request that the Forest Service conduct an inventory and an assessment of the remaining timber supply to ensure that we have a supply of Red Cedar trees and bark that can be used for cultural uses like totem poles, canoes, regalia, clan houses, paddles, and other cultural and artistic expression. We would also ask that the Forest Service begin planning for seven generations of supply and a timber management rotation that ensures the supply and availability, on demand,

of the right type of wood. Our carving elders can help your silviculturists understand the characteristics of the wood that we are requesting.

The third request is that the Forest Service do an economic assessment of the local use of Red Cedar and calculate the "demand" for cultural use wood and wood products to supply our carvers, weavers, and artists. We know of the Tongass Timber Reform Act's mandate instructing the Forest Service to "seek to meet the market demand for Tongass timber," but we have never seen where Forest Service staff, economists, silviculturists, rangers, or Forest Supervisors have actually figuring out what that demand is for our local artisan market. We have seen studies that have calculated the demand that foreign nations might have for our timber and wood, but to our knowledge the local demand from the Alaska Native carvers, weavers, and artists that live here on the Tongass has never been assessed or reported by the Forest Service. In fact, much of the time, we have felt that our art, our culture, and our long tradition of local ecological knowledge, and our use of these wood products has been ignored, disrespected, underappreciated, and not factored into agency management activities, forest management, and timber demand studies. We do not know where this disregard comes from, whether it is disrespect, racism, continued colonialism, or just because Forest Service staff and economists are not sufficiently knowledgeable, educated, trained, and informed on our cultural use of wood and Northwest Coast Alaska carving and art traditions. This assessment of local demand can then be calculated into the metrics of the Tongass Timber Reform Act. The knowledge gained from this experience should then be used to develop a long-term forest management plan for providing cultural use wood with adequate supply for 7 generations, which is the traditional forest rotation time period practiced by Native master carvers.

Please consider this letter as a formal effort to inform you of the undocumented and documented value of Alaska Native artistic tradition, and our necessity for a supply of raw materials to create it. The economic significance of art to Alaska Native artists and the local economy has not been thoroughly surveyed, but a preliminary 2014 report by Raincoast Data on the Arts Economy of Southeast Alaska indicated that the arts sector, and specifically Northwest coast art, is a huge economic driver for Southeast Alaska that supports rural communities with otherwise limited employment opportunities in particular. Alaska Native artists are also twice as likely as non-Native artists to say that their art provides all their personal income. Ensuring a sustainable supply of the raw materials that Alaska Native artists depend on for their craft, especially the highly-contested resource of red cedar, is of our utmost concern so

when we are thinking about the supply of these wood products to supply our weavers and carvers for the next seven generations.

We would like to harvest the bark and the trees this summer. We would like to begin work on the inventory this spring. We would like the economic demand study to begin by April 2020. We request official government-to-government consultation on this project between the four tribes involved and USDA leadership at your earliest convenience. We will look forward to working with you and your staff on these efforts.

Sincerely.

Ronald Leighton. President

Organized Village of Kasaan

Barry Peratrovich. President

Klawock Cooperative Association

Joel Jackson. President

Organized Village of Kake

Organized Village of Kake

Sid Edenshaw. President

Hydaburg Cooperative Association

Photo- D. DellaSala

Analysis of Carbon Storage in Roadless Areas of the Tongass National Forest

Prepared by Dominick A. DellaSala, Ph. D, in consultation with Brian Buma, Ph. D

December 16, 2019

We have reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Alaska Roadless Rulemaking and, in particular, its analysis of carbon storage in the inventoried roadless areas of the Tongass National Forest. The DEIS substantially undervalues the global and national importance of old-growth trees on the Tongass for carbon storage. Research shows, for example, that primary (unlogged) forests on the Tongass store much more carbon than logged forests because of the relatively high percentage of old growth and long stable residence times of carbon stored in these forests. The DEIS incorrectly assumes the carbon emitted from logging represents a zero-sum game with carbon recapture in wood product pools and reforestation – this argument is completely false (see below).

- The Tongass is part of a global network of temperate rainforests that make up ~2.5% of the world's total forest coverage but these rainforests have exceptional carbon stores for

their relatively small spatial extent and are critically important in climate regulation collectively and individually.[1]

- The Tongass is one of only 4 other temperate rainforests world-wide that is still largely intact, which is a value of global importance grossly undervalued in the DEIS.[2]

- The Tongass occurs within the Pacific Coastal Temperate Rainforest bioregion (extends from Coast Redwoods to Alaska) that includes temperate rainforest ecoregions and climatically distinguishable subregions (subpolar, perhumid, seasonal, warm temperate) considered globally outstanding for their biodiversity and that collectively comprise over one-third of the world's entire temperate rainforest biome based on latest rainforest mapping that should be cited and elevated in importance in the DEIS.[3]

- Tongass carbon stores are substantially greater than any other national forest in the US and are irreplaceable as carbon sinks.[4]

- Primary (unlogged) forests on the Tongass store much more carbon than logged forests because of the relatively high percentage of old growth and long stable residence times of carbon stored in these forests, and in fact old growth forests are accruing biomass at a rate of approximately a Teragram a year.[5] The DEIS incorrectly assumes the carbon emitted from logging represents a zero sum game with carbon recapture in wood product pools and reforestation – this is completely false (see below).

- The Tongass may function as a climate refuge for species facing more extreme climatic conditions in the interior of Alaska and coastal rainforests further south if managed to protect old-growth forests and roadless areas, based on climate envelope modeling and downscaled climate projections for the region.[6]

- Globally, wilderness and intact areas have been declining at an accelerated rate, contain irreplaceable biodiversity and carbon stores, and these losses can be attributed to the "degazetting" (removal of protection status) globally – while roadless areas are not designated wilderness per se – the DEIS continues the alarming global trend of degazetting wild, irreplaceable places.[7] Instead, maintaining and restoring the integrity of intact forests and wild places is an urgent global priority for conservation and

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[1] DellaSala et al. 2011.

[2] DellaSala et al. 2011.

[3] DellaSala et al. 2011.

[4] Leighty et al. 2006; Keith et al. 2009; Buma and Thompson 2019. Also, using the dataset in Krankina et al. 2014, the Tongass is a national carbon champion.

[5] *See* Leighty et al. 2006; Keith et al. 2009; Buma and Barrett 2015

[6] DellaSala et al. 2015.

[7] Watson et al. 2016a.

sustainability efforts designed to halt the biodiversity and climate crises.[8] Intact areas are also much more likely to retain their native biodiversity than fragmented areas in a rapidly changing climate.[9]

- Large, old growth trees are critically important globally and scientists are calling for protecting places like the Tongass where large trees are especially concentrated to help avoid a biodiversity crisis.[10]

- Because of the global importance of primary (unlogged) forests and high concentration of old-growth forests on the Tongass, scientists are calling on governments to manage these forests to reach their maximum carbon potential via "proforestation" (nature-based climate solutions that allow forests to mature) in order to mitigate climate change.[11]

- The best option for storing carbon long term on public lands is the "no harvest option" for the Tongass and all US public timberlands.[12] Forgoing timber harvest in these areas is projected to result in a net increase of 43% in carbon stores nation-wide, for instance, and an increase in sequestration potential on the national forests such as the Tongass[12]. The DEIS needs to reflect these published estimates and provide a science-based assessment of carbon stored by old forests and estimated emissions from proposed logging given the national and global significance of the Tongass.

In sum, the Forest Service is responsible for stewarding arguably the most important national forest in the nation and has an ethical-moral and legal obligation to maintain remaining untrammeled areas on the Tongass as irreplaceable assets within the national forest system (as noted by 234 scientists in an October 2019 letter calling on land managers to leave the Roadless Rule in place in Alaska). These irreplaceable values need to be fully acknowledged and protected for their national and global significance.

Additionally, the Forest Service is taking unacceptable climate and biodiversity risks at a time when thousands of scientists have been calling for stricter protections as climate mitigation/adaptation strategies due to the global biodiversity and climate crises we now face.[13] The best alternative for storing carbon long term on public lands is a "no harvest option" for the Tongass and all US public timberlands.[14] Forgoing timber harvest in these areas is projected to result in a net increase of 43% in carbon stores nation-wide, for instance, and an increase in sequestration potential on national forests such as the Tongass. The DEIS needs to reflect these

[8] Watson et al. 2017; Ripple et al. 2019.

[9] Watson et al. 2016b.

[10] Keith et al. 2009; Lindenmayer et al. 2012, 2013; Krankina et al. 2014.

[11] Mackey et al. 2014; Moomaw 2019.

[12] Leighty et al. 2006; Depro et al. 2008

[13] Watson et al. 2016a,b; Ripple et al. 2017; Ripple et al. 2019.

[14] Leighty et al. 2006; Depro et al. 2008.

published estimates and provide a science-based assessment of carbon stored by old forests and emitted from proposed logging given the national and global significance of the Tongass and in relation to these cited studies.

A. THE DEIS UNDERVALUES FOREST CARBON AND GROSSLY UNDERESTIMATES EMISSIONS ATTRIBUTABLE TO LOGGING.

NEPA regulations state that:

> NEPA procedures must insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.[15]

To ensure that the agency has taken the required "hard look," courts hold that the agency must utilize "public comment and the best available scientific information"[16] or open themselves up to lawsuits.

Further, NEPA requires agencies to explain opposing viewpoints and their rationale for choosing one viewpoint over the other.[17] Federal courts have set aside NEPA analysis where the agency failed to respond to scientific analysis that calls into question the agency's assumptions or conclusions.[18]

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[15] 40 C.F.R. § 1500.1(b).

[16] *Biodiversity Cons. Alliance v. Jiron,* 762 F.3d 1036, 1086 (10th Cir. 2014) (internal citation omitted). Regulations implementing the planning provisions of National Forest Management Act (NFMA) also require the use of the best available scientific information (BASI). 36 C.F.R. § 219.3. As noted above, the proposed action includes adding 185,000 acres to the suitable timber base, which requires that the Forest Service amend the Tongass Forest Plan. The Forest Service's planning regulations apply to Forest Plan amendments. 36 C.F.R. § 219.1. Even if they do not apply, they establish sound agency practice and comport with NEPA's mandates regarding best available scientific information and high quality data.

[17] 40 C.F.R. § 1502.9(b) (requiring agencies to disclose, discuss, and respond to "any responsible opposing view").

[18] *See Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1168 (9th Cir. 2003) (finding Forest Service's failure to disclose and respond to evidence and opinions challenging EIS's scientific assumptions violated NEPA); *Seattle Audubon Soc'y v. Moseley,* 798 F. Supp. 1473, 1482 (W.D. Wash. 1992) ("The agency's explanation is insufficient under NEPA – not because experts disagree, but because the FEIS lacks reasoned discussion of major scientific objections."), *aff'd sub nom. Seattle Audubon Soc'y v. Espy,* 998 F.2d 699, 704 (9th Cir. 1993) ("[i]t would not further NEPA's aims for environmental protection to allow the Forest Service to ignore reputable scientific criticisms that have surfaced"); *High Country Conservation Advocates v. Forest Service*, 52 F. Supp. 3d 1174, 1198 (D. Colo. 2014) (finding Forest Service violated NEPA by failing to mention or respond to expert report on climate impacts).

The DEIS does not present or consider the best available scientific information about the impact of the proposed action on forest carbon. The DEIS presents a contradictory, scientifically flawed, inappropriately scaled and biased accounting of forest carbon losses associated with suspending the national roadless conservation rule on the Tongass. Not a single forest carbon life cycle analysis is presented, yet, the Forest Service draws sweeping conclusions that undervalue the global importance of carbon stored in old growth and roadless areas (IRAs) on the Tongass, while inappropriately minimizing the emissions footprint from roadless entry at a time when overwhelming scientific consensus urges governments to avoid additional emissions from forest degradation and to store more carbon in forest ecosystems.[19] Because agencies and academics have quantified and compared the carbon emissions of alternative logging proposals, the Forest Service cannot fail to undertake a similar analysis on the basis that it is too complex or complicated. Dr. DellaSala's 2016 report addressed carbon stores from wood products and concluded that logging Tongass old-growth forest under the 2016 Forest Plan would result in net annual CO2 emissions totaling between 4.2 million tons and 4.4 million tons, depending on the time horizon chosen.[20] The Bureau of Land Management a decade ago completed an EIS for its Western Oregon Resource Management Plan in which that agency also predicted and quantified the net carbon emissions from its forest and other resource management programs.[21]

Opening up roadless areas and logging in old-growth forests, as the proposed rule would do, conflicts with published research showing the most effective/efficient means to maintain the enormous Tongass carbon sink is to protect all remaining old-growth forests from logging.[22] The DEIS carbon assessment does not present the best scientific information, particularly in reference to the global climate emergency[23] or the importance of keeping carbon tied up in Tongass forests as recommended by scientists.[24] In fact, the DEIS goes as far as to boldly proclaim, without a single published scientific reference, that "the management mechanisms applied in all alternatives are consistent with internationally recognized climate change adaptation and mitigation practices identified by the IPCC (IPCC 2000, 2007)."[25] To the contrary, the IPCC (2018)[26] does not endorse roadless development as an appropriate climate mitigation/adaptation

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[19] Mackey et al. 2013, Mackey 2014, Mackey et al. 2016a,b, Griscom et al. 2017, Law et al. 2018, Ripple et al. 2019, Moomaw 2019.

[20] D. DellaSala, *The Tongass Rainforest as Alaska's First Line of Climate Change Defense and Importance to the Paris Climate Change Agreements* (2016) at 14, and available at https://forestlegacies.org/wp-content/uploads/2016/01/tongass-report-emissions-2016-01.pdf (last viewed Dec. 13, 2019).

[21] *See* Bureau of Land Management, Western Oregon Proposed RMP Final EIS (2009) at 165-181, excerpts attached.

[22] Leighty et al. 2006.

[23] Ripple et al. 2019.

[24] Leighty et al. 2006, DellaSala et al. 2011, Moomaw 2019.

[25] DEIS at 3-128.

[26] Given the large size of this report and the fact that the IPCC report is readily available online, we have provided only the only link and not the full pdf - https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf.

strategy. Rather, the IPCC has repeatedly recommended storing more carbon in ecosystems by avoiding additional emissions in the land sector.[27] The same is true for the published sources cited in these comments. We are unaware of any other research that supports the DEIS assertion that clearcutting old-growth rainforests and building roads into intact watersheds is consistent with adaptation and mitigation strategies.

Based on the recent IPCC assessment (2019), an estimated 23% of total anthropogenic greenhouse gas emissions (2007-2016) derive from agriculture, forestry, and other land use. Thus, IPCC recommends avoiding additional emissions from these sectors.

Notably from the IPCC (2019)

> "Achieving land degradation neutrality will involve a balance of measures that avoid and reduce land degradation, through adoption of sustainable land management, and measures to reverse degradation through rehabilitation and restoration of degraded land. Many interventions to achieve land degradation neutrality commonly also deliver climate change adaptation and mitigation benefits. The pursuit of land degradation neutrality provides impetus to address land degradation and climate change simultaneously (high confidence)."

There are at least two fundamental flaws (inherent *biases*) in the DEIS carbon assessment: (1) undervaluing long-term carbon stored in intact watersheds and old-growth forests compared to logged areas; and (2) understating cumulative emissions from logging and road building by using an inappropriate analysis scale and by overstating wood product stores that do not comport with recent published estimates (discussed below).

The DEIS also does not sufficiently meet the Forest Service's substantive obligation to protect Tongass resources because it: (1) proposes to enter intact watersheds that are acting as irreplaceable strongholds for fish and wildlife populations in a changing climate;[28] and (2) degrades intact areas containing nationally recognized carbon sinks at a time when scientists recommend avoiding entry into intact areas as critical to preventing the escalating climate and biodiversity crises underway globally.[29] Specifically, the DEIS should continue *to protect, preserve, manage, and restore* natural systems (roadless, old growth) on the Tongass, rather than degrade them by development, and then expecting them to somehow be miraculously restored and recovered with all emissions offset by regrowth and wood product stores – an assumption directly contradicted by the best available science (see below).

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[27] *See also* Griscom et al. 2017, Moomaw 2019.

[28] *See* DellaSala et al. 2011, DellaSala et al. 2015, Watson et al. 2016a,b; 2017.

[29] Watson et al. 2016a,b; 2017; Ripple et al. 2019.

To assess properly the impacts of the proposed exemption on carbon emissions and sequestration, the agency must address the following key elements and information not now considered in the DEIS.

Trees accumulate carbon over their entire lifespan. While growth efficiency declines as the tree matures, corresponding increases in a tree's total leaf area overcome this slow down as the **whole-tree carbon accumulation rate increases with age and tree size** (Figure 1 – the figure below and some of the text in this section was modified from materials sent to DellaSala by M.G. Anderson, pers. comm). A study of 673,046 trees across six countries and 403 species found that at the extreme, a large old tree may sequester as much carbon in one year as growing an entire medium size tree.[30] At one site, large trees comprised 6 percent of the trees but 33 percent of the annual forest growth. More recent studies show the largest 1% of trees in old-growth forests worldwide store ~50% of the total stand level carbon.[31] In the Tongass, old growth forests continue to accrue biomass and carbon at an amazing rate[32]. In sum, young trees grow fast, but old trees store a disproportionate amount of carbon over time given the larger leaf surface area for absorption and massive tree trunks and root wads that represent centuries of accumulated carbon.

Quoting directly from the abstract in Lutz et al. (2018):

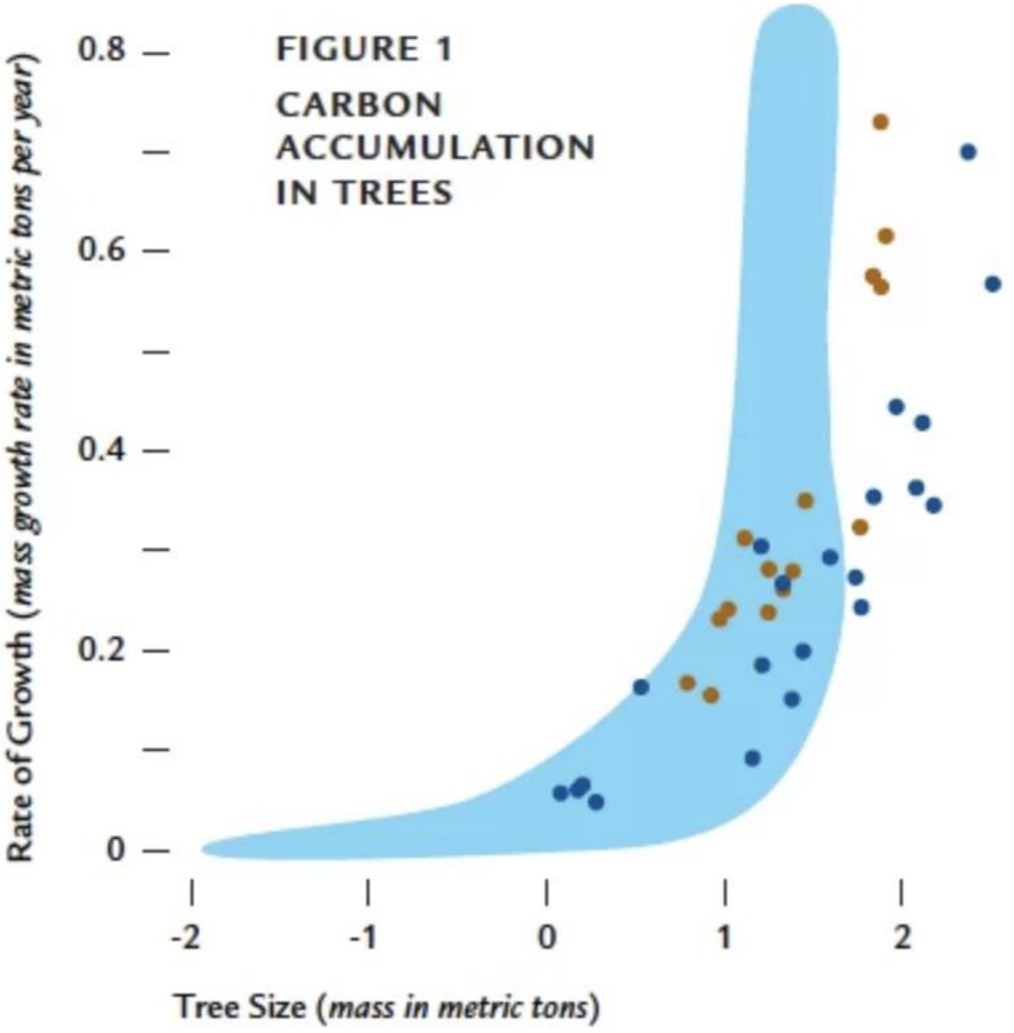
> Main conclusions: Because large-diameter trees constitute roughly half of the mature forest biomass worldwide, their dynamics and sensitivities to environmental change represent potentially large controls on global forest carbon cycling. We recommend managing forests for conservation of existing large-diameter trees or those that can soon reach large diameters as a simple way to conserve and potentially enhance ecosystem services.[33]

[30] Stephenson et al. 2014.

[31] Lutz et al. 2018.

[32] Buma and Barrett 2015

[33] Lutz et al. 2018



Aboveground mass growth rates for 58 species (shaded area) juxtaposed with two of the most massive tree species on earth: Swamp Gum (*Eucalyptus regnans*—brown dots) and Coast Redwood (*Sequoia sempervirens*—blue dots). Mass growth rate equals the total mass accumulated each year after accounting for respiration. The mass of a tree is primarily carbon, so the figure shows that annual carbon accumulation increases with the size of the tree. (Adapted from Stephenson et al. 2014.)

Old forests accumulate carbon and contain vast quantities of it. Although individual trees experience an increasing rate of carbon sequestration, forest stands experience an "S-curve" of net sequestration rates (e.g. slow, rapid, slow).[32] The expected decline in older stands is due to

Lutz et al. 2018.

tree growth balanced by mortality and decomposition. For instance, an international team of scientists reviewed 519 published forest carbon-flux estimates from stands 15 to 800 years old and found that, in fact, net carbon storage was positive for 75 percent of the stands over 180 years old and the chance of finding an old-growth forest that was carbon neutral was less than 1 in 10.[33] They concluded that old-growth forests are substantial carbon sinks, steadily accumulating carbon over centuries and containing vast quantities of it in relatively stable form.

Old forests accumulate carbon in soils. Soil organic carbon levels in old forests are generally thought to be in a steady state. However, as Alaska's climate increasingly overheats (twice the rate of the rest of the US), soils will be exposed to increased drying and reduced snowpack, and this will lead to methane release. Notably, Tongass soils store >50% of the carbon in the already incredibly dense ecosystem[33]. Moreover, protecting remaining unlogged forests provides for more stable microclimates (with less desiccation and lower temperatures). In fact, recent research shows that old-growth forests may act as a climate buffer as studies comparing logged vs. old growth in the Oregon Cascades found that old growth reduced maximum spring and summer air temperatures as much as 2.5 degrees C.[34] Thus, scientists have repeatedly acknowledged the superior climate benefits inherent to old-growth forests that are irreplaceable in human lifetimes.

Forests share carbon among tree species. Trees compete for sunlight and soil resources, and competition for resources is commonly considered the predominant tree species interactions in forests. However, recent research on carbon isotope labeling has shown that trees interact in more complex ways, including substantial exchange and sharing of carbon below ground. Aided by mycorrhiza networks, interspecific transfer among trees accounts for 40% of the fine root carbon: totally ~280 kg ha-1 per year tree-to-tree transfer.[35] Morrien et al. (2017), found that mycorrhiza soil networks become more connected and take up more carbon as forest succession progresses even without major changes in dominant species composition. Notably, old-growth forests compared to young growth contain more complex below-ground processes that connect trees at the subsurface level.[36] Thus, the Forest Service needs to provide information on the impacts of logging on soil microbial and mycorrhizae carbon exchange before concluding it is insignificant. Failure to include such information would violate NEPA's hard look and BASI mandates.

Primary forest carbon can help slow climate change. Griscom et al. (2017) systematically evaluated 20 conservation, restoration, and improved land management actions that increase carbon storage and avoid greenhouse gas emissions. They found that the maximum potential of natural climate solutions was ~2.4 Pg of carbon per-year while safeguarding food security and

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l. 2018

[33] McNicol et al. 2019

[33] Luyssaert et al. 2014.

[34] Frey et al. 2016.

[35] Klein et al. 2016.

[36] Morrien et al. 2017.

biodiversity.[37] To put the Tongass in this perspective – total Tongass stores = 2.8 Pg carbon with 16%-23% of that in IRAs – additionally, by maximizing carbon in IRAs and old growth (the scientifically recommended climate strategy) – the entire national forest benefits through the maintenance of linked ecosystem services and biodiversity (i.e., multifunctionality of forests maintained via carbon management).[38] New research (see below) suggests this strategy is the most cost-feasible option by a large margin[39] (also see below) and it should receive highest priority as a policy consideration[40] especially on the Tongass.[41] In addition to carbon, old forests also build soil, cycle nutrients, mitigate pollution, purify water, release oxygen, and provide habitat for wildlife at levels far superior than logged forests.[42]

Primary (unlogged) forests are far superior to logged forests in climate mitigation and biodiversity benefits. Globally, primary forests store 30-50% more carbon than logged forests (which is similar to the estimates provided in the DEIS on mature vs. logged Tongass forest stores[43]) and up to half of the carbon stored in a forest is represented by the largest/oldest 1% of trees at the stand level as noted.[44] As stated, logging primary forests results in a net carbon debt and other irreplaceable losses that are not made up for via reforestation or wood product stores as the carbon present in primary forests and soils takes centuries to accumulate compared to much shorter-lived wood products that represent only a fraction of the original forest store.

In part because the DEIS analysis fails adequately to account for this basic scientific information relevant to an assessment of the impact of the proposed exemption on carbon and climate impacts, the DEIS is flawed in at least the specific ways described herein.

Tongass carbon stores need to be prioritized as globally and nationally significant climate mitigation/adaptation strategies to be protected, preserved, and managed as unique ecological communities. Old-growth forests, in general, store massive amounts of carbon in trees, foliage, and soils. Pacific coastal rainforests, in particular, are global champions in this regard.[45] Of relevance, temperate rainforests in Alaska store >2.8 Petagrams (Pg) C (1 Pg = 1 billion tonnes) in biomass and soils, the equivalent of >8% of the carbon in all contiguous US forests, most of which is on the Tongass.[46] Based on FIA datasets, Tongass roadless areas represent ~16% to 23% of total carbon on the Tongass forest depending on categories used

[37] Griscom et al. 2017.

[38] *See* Brandt et al. 2014.

[39] Moomaw et al. 2019.

[40] McKinley et al. 2011.

[41] Leighty et al. 2006; Buma and Thompson 2019

[42] Mackey et al. 2014, Brandt et al. 2014.

[43] DEIS at 3-124.

[44] Lutz et al. 2018.

[45] Leighty et al. 2006, Keith et al. 2009, Krankina et al. 2014.

[46] Leighty et al. 2006; Buma and Thompson 2019; McNicol et al. 2019

(Table 1, 2). Thus, roadless areas – especially those with old-growth forests – are uniquely valuable as a long-term stable carbon sink compared to logged areas that emit most of their carbon (see below).

The Tongass stores a massive amount of carbon--the total carbon stored in Tongass roadless areas are equivalent to annual emissions of ~128, 550-watt coal-fired power plants.[47] Keeping carbon in forests is a fundamental climate mitigation strategy directly responsive to the climate emergency[48] and essential to offsetting some of the emissions from the energy sector. The Tongass stores a massive amount of carbon in its old growth forests, at levels that if emitted into the atmosphere would approach the emission equivalents of coal-fired power plants. At a time when the world is looking for leadership on cutting emissions at all scales, removing protection for this carbon storage is unsupportable. Table 1 provides a breakdown of Tongass old-growth roadless carbon values (including congressionally withdrawn areas), Table 2 just the IRA carbon values, and Figure 1 shows the spatial distribution of carbon stores on Tongass IRAs. Table 3 shows that Alternative 6 will place at risk 71.5% of the carbon stored in old-growth forests and soils, with most of that carbon emitted to the atmosphere (see Leighty et al. 2006). Table 4 provides an economic estimate of the carbon value at risk to logging on the Tongass under Alternative 6 (>$234 million), which may far exceed timber values. Additionally, if the Forest Service enters all roadless areas in this century >$2.2 billion in carbon assets will be squandered away, should an offset market develop. All these data were available to the Forest Service (Forest Inventory Assessment - FIA) and they need to be fully analyzed in the DEIS to provide reliable estimates of carbon assets and their relative (to timber), tradeoffs involved, and the economic importance on the Tongass of carbon, along with reliable estimates of emissions from logging. Disclosing these tradeoffs is especially relevant at a time when the IPCC (2018, 2019) and other reports (Ripple et al. 2017, 2019) have warned that we have about 10 years before severe climate impacts are locked in with irreversible consequences to biodiversity and the planet's life-giving systems.

[47] https://www.oregonlive.com/business/2010/12/pges_coal-fired_boardman_plant.html.

[48] *See* Moomaw 2019, Ripple et al. 2019.

Table 1. Estimated carbon biomass in old-growth forest among categories of roadless areas on the Tongass NF						
OwnerType_2019	**USDA FOREST SERVICE**					
POG	**OG Only**					
	low estimate	**high estimate**	**Total area**		**Estimate C in OG forest biomass**	
Row Labels	**Average of Carbon_ratio 58**	**Average of Carbon_ratio 46**	**Sum of GIS_Hectares**		**(low estimage in Mg)**	**(high est. in Mg)**
Roadless in 2001 Rule	264.7	333.7	999,179		264,443,913	333,444,106
Lg. Roadless Areas not in	257.1	324.1	76,166		19,580,156	24,689,023
Small Rdls Areas	242.4	305.6	58,329		14,139,031	17,828,070
Roaded-Roadless	249.3	314.4	14,357		3,579,634	4,513,860
Roaded Areas	263.3	332	156,023		41,076,507	51,794,893
Wilderness or NM	247.7	312.3	662,496		164,101,837	206,915,638
Non-USFS Lands	261.5	329.8	4,171		1,090,861	1,375,453
Unknown	187.5	236.5	982		184,209	232,273
Grand Total	**255.6**	**322.3**	**1,971,704**		**503,969,209**	**635,467,036**

Table 2. Carbon stored in roadless area categories on the Tongass.

Large Roadless Areas Average Mg per ha	Total Mg Carbon	"Roaded Roadless" Average Mg per ha	Total Mg Carbon	Small Rdls Areas Average Mg per ha	Total Mg Carbon	Roaded Areas Average Mg per ha	Total Mg Carbon	Protected by Congress Average Mg per ha	Total Mg Carbon	Non-USFS Lands Average Mg per ha	Total Mg Carbon	Total Average Mg per ha	Total Total Mg Carbon
242.58	**47,208,021**	**274.78**	**98,058**	**313.89**	**1,867,886**	**361.48**	**10,026,227**	**207.71**	**66,457,805**	**263.80**	**5,436,143**	**260.64**	**131,094,140**
245.92	2,081,610					317.13	83,671	224.49	36,976,406	205.86	248,378	224.82	39,390,064
224.39	7,939,491	248.04	7,679	361.21	317,926	374.39	1,469,914	179.03	2,579,177	277.13	198,836	277.09	12,513,023
255.70	18,610,022	295.11	85,792	305.53	1,322,520	356.44	6,423,528	210.15	11,972,020	286.92	3,550,567	278.05	41,964,449
231.40	17,172,289	226.63	4,587	304.03	227,439	371.92	2,025,237	144.80	7,123,632	252.95	1,407,175	261.84	27,960,360
190.38	1,404,610					234.51	23,876	185.47	7,806,570	228.97	31,187	192.89	9,266,244
232.20	**58,182,471**	**262.79**	**1,429,232**	**261.26**	**4,248,583**	**303.66**	**15,895,643**	**196.32**	**22,381,595**	**253.61**	**11,984,173**	**249.11**	**114,121,697**
236.71	9,363,695	232.25	279,800	213.54	756,243	291.33	3,979,300	167.72	2,705,767	252.31	1,048,227	244.24	18,133,031
248.42	4,621,788			282.27	61,790	345.31	264,235	231.39	6,290,381	200.47	149,533	246.54	11,387,728

201.6	14,044,	240.7	675,8	236.	1,737,	276.	4,000,	199.1	2,694,6	216.	3,418,	225.	
3	010	8	71	58	670	70	336	6	88	69	960	90	26,571,535
289.3	4,013,7	317.0		337.	1,008,	340.	3,176,	284.3	1,032,3	291.	521,09	311.	
9	21	4	8,473	44	771	32	035	1	43	65	0	71	9,760,434
237.9	26,139,	301.0	465,0	286.	684,1	320.	4,475,	177.9	9,658,4	268.	6,846,	254.	
6	257	6	88	21	09	59	736	3	16	36	362	25	48,268,969
229.9	**31,318,**	**247.6**	**892,2**	**238.**	**2,941,**	**290.**	**16,874**	**239.8**	**16,293,**	**268.**	**21,060**	**255.**	
6	**111**	**6**	**78**	**48**	**262**	**26**	**,911**	**6**	**468**	**92**	**,394**	**37**	**89,380,425**
264.7	5,634,5			226.		356.				265.	3,679,	266.	
3	63			80	397	33	2,846			96	426	56	9,317,233
219.8	15,720,	244.8	775,4	234.	2,586,	287.	15,078	258.0	7,425,9	261.	14,491	252.	
8	049	1	92	97	253	67	,975	7	74	59	,136	13	56,077,879
281.1	2,088,0	230.6	21,44	251.	236,8	294.	1,465,	196.9	4,999,4	315.	468,65	278.	
0	47	7	3	59	29	96	398	9	43	98	2	44	9,279,811
231.4	7,875,4	293.1	95,34	284.	117,7	322.	327,69	192.5	3,868,0	296.	2,421,	256.	
9	51	4	3	60	83	67	2	6	51	39	180	94	14,705,501
186.1	**53,884,**	**336.7**	**287,4**	**333.**	**595,5**	**312.**	**2,942,**	**149.4**	**66,534,**	**259.**	**5,757,**	**213.**	
3	**796**	**8**	**12**	**72**	**65**	**46**	**711**	**4**	**550**	**89**	**139**	**28**	**130,002,173**
192.5	11,619,	369.3	120,6	327.	275,9	313.	861,29	118.5	3,208,9	268.	1,822,	235.	
6	409	4	27	18	72	76	5	7	27	13	554	07	17,908,784
	1,228,3			368.	96,49	136.		159.8	18,154,	284.		168.	
62.94	45			10	0	68	78,974	4	192	05	46,875	06	19,604,876
						123.		181.0	31,003,	148.		179.	
						88	45	2	210	94	170	52	31,003,425
187.6	21,671,	288.4	136,4	309.	31,94	325.	1,478,	118.4	7,974,9	260.	721,35	212.	
2	798	9	81	91	3	86	419	1	12	51	8	07	32,014,912
192.0	19,365,	314.3	30,30	440.	191,1	322.	523,97	118.6	6,193,3	251.	3,166,	215.	
2	243	3	4	91	61	72	8	7	09	30	182	24	29,470,176
225.3	**190,59**	**264.3**	**2,706,**	**265.**	**9,653,**	**312.**	**45,739**	**196.0**	**171,66**	**263.**	**44,237**	**247.**	
2	**3,399**	**8**	**980**	**82**	**295**	**40**	**,492**	**9**	**7,419**	**11**	**,849**	**37**	**464,598,434**

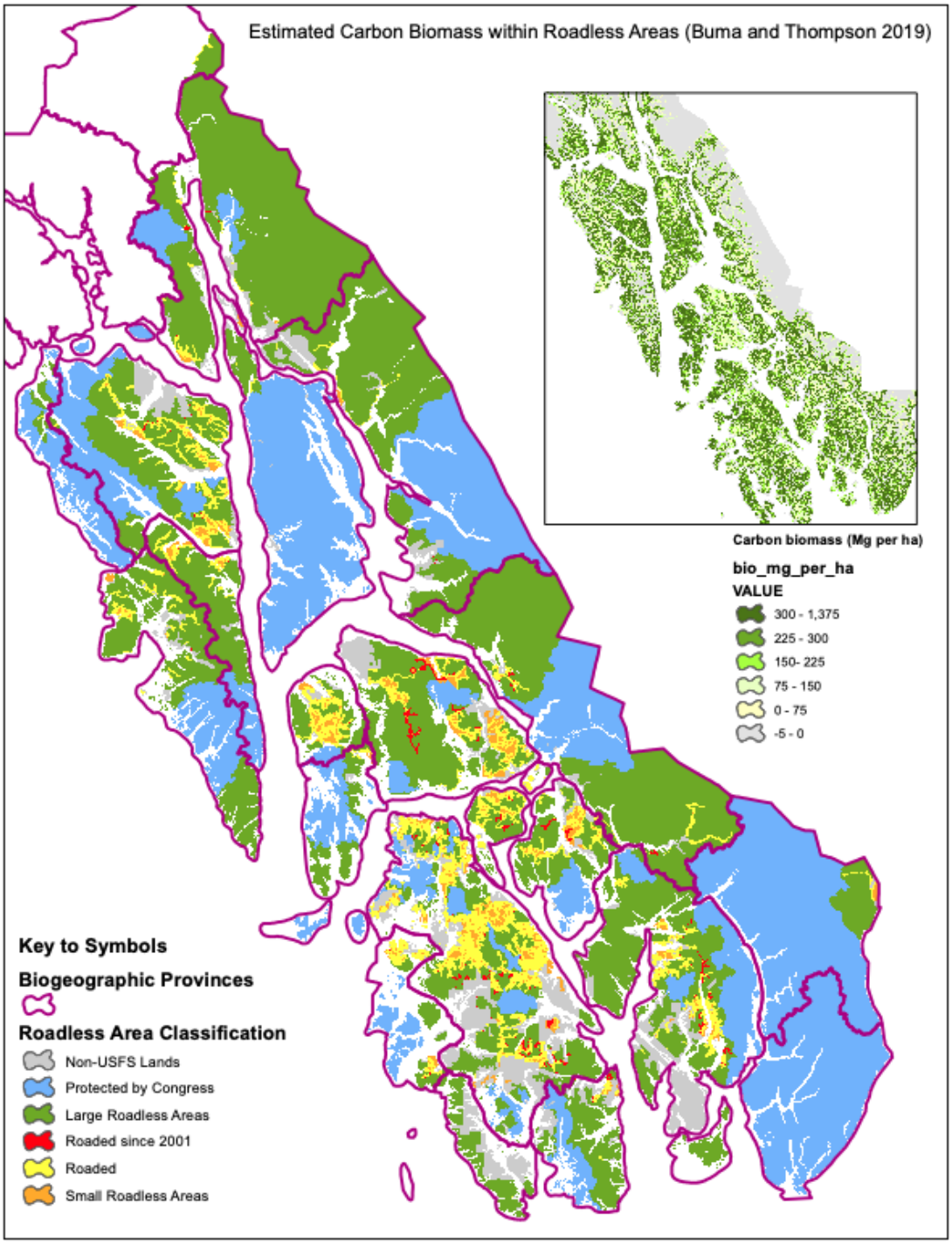
Estimated Carbon Biomass within Roadless Areas (Buma and Thompson 2019)
Carbon biomass (Mg per ha)
bio_mg_per_ha
VALUE
300 - 1,375
225 - 300
150- 225
75 - 150
0 - 75
-5 - 0
Key to Symbols
Biogeographic Provinces
Roadless Area Classification
Non-USFS Lands
Protected by Congress
Large Roadless Areas
Roaded since 2001
Roaded
Small Roadless Areas

Table 3. Estimated Mg of forest and soil carbon on lands suitable for old-growth logging under DEIS Alternatives

	Alternatives					
Forest & Soil Carbon Estimates	**1**	**2**	**3**	**4**	**5**	**6**
Suitable Acres (with Data)	229,564	249,888	307,778	387,941	394,997	394,997
Net Change from Alt 1 (acres)	0	20,325	78,214	158,377	165,433	165,433
Suitable Hectares (w/data)	92,901	101,126	124,554	156,994	159,850	159,850
Net Change from Alt 1 (hectares)	0	8,225	31,652	64,093	66,948	66,948
Total Forest C (low est)	23,625,799	25,643,535	31,591,558	39,655,731	40,508,557	40,508,557
% Increase from Alt 1 (low est)	0.0%	8.5%	33.7%	67.8%	71.5%	71.5%
Total Forest C (high est)	29,790,661	32,334,884	39,834,901	50,003,261	51,078,589	51,078,589
% Increase from Alt 1 (high est)	0.0%	8.5%	33.7%	67.8%	71.5%	71.5%
Total Soil C	34,284,875	37,153,086	45,699,226	56,497,163	57,468,262	57,468,262
% increase from Alt 1 (soil)	0.0%	8.4%	33.3%	64.8%	67.6%	67.6%
Forest + Soil C (low)	57,910,675	62,796,621	77,290,783	96,152,894	97,976,819	97,976,819
Forest + Soil C (high)	64,075,536	69,487,970	85,534,126	106,500,424	108,546,851	108,546,851

% Increase from Alt 1 (high)	0.0%	8.4%	33.5%	66.2%	69.4%	69.4%

Table 4. Economic value of at-risk carbon (Alternative 6 plus all suitable)

	Alt 6 suitable timber at-risk	All suitable timber at-risk
Acres	42,500	394,997
Low est total carbon	40,508,577	40,508,577
CO2 (carbon x 3.67)	148,666,478	148,666,478
Value of CO2 at-risk in suitable timber base* at $15/ton CO2	$240,839,694 40% logged in first decade = $96.3 million	$2.2 billion

*Suitable timber base = 10.8% of at-risk carbon under Alt 6, 100% at risk under all suitable acres

Carbon emissions assessment by the Forest Service provides a misleading comparison to other emissions and fails to include a social cost analysis. The DEIS is woefully inadequate as it compares emissions (prior and current logging) on the Tongass to gross emissions from the **entire US electric power sector in 2012** and **all US emissions in 2017**.[49] Federal courts have rejected this kind of skewed comparisons.[50] This arbitrary baseline ignores the incremental nature of carbon emissions and impacts and is inconsistent with recommendations of the IPCC (2018) to avoid additional emissions, and with the broader scientific consensus of fully protecting carbon sinks like the Tongass.[51] To comply with NEPA, the Forest Service must, at a minimum, explain why it is choosing to ignore these expert conclusions. The global community also has signaled its intent to protect carbon sinks under Article 5 of the Paris Climate

[49] DEIS at 3-124.

[50] *See High Country*, 52 F. Supp. 3d at 1190 ("Beyond quantifying the amount of emissions relative to state and national emissions and giving general discussion to the impacts of global climate change, [the agencies] did not discuss the impacts caused by these emissions."); *Mont. Envtl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1096–99 (D. Mont. 2017) (rejecting the argument that the agency "reasonably considered the impact of greenhouse gas emissions by quantifying the emissions which would be released if the [coal] mine expansion is approved, and comparing that amount to the net emissions of the United States"); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 76-78 (D.D.C. 2019) (holding BLM's conclusion that the emissions from oil and gas leases "represent an incremental contribution to the total regional and global GHG emissions level" was arbitrary and capricious because it was not supported by any data).

[51] Keith et al. 2009, DellaSala et al. 2011, Stephenson et al. 2014, Mackey et al. 2014, Law et al. 2018, Moomaw et al. 2019.

Agreement. While the US is irresponsibly withdrawing from the agreement, it is also irresponsible for the Forest Service to downplay the substantial regional emissions from Tongass roadless and old growth logging when the rest of the world is looking for ways to reduce and avoid emissions **at all scales**. Instead, the agency should choose the alternative with the least emissions – no action – and compare alternatives against no action with respect to reliable and accurate direct, indirect, and cumulative emissions. This also needs to be expressed in carbon dioxide equivalents to estimate the socio-economic cost of carbon. Additionally, the emissions need to be expressed at an appropriate **regionally specific scale**, as for instance, coal-fired power plant equivalents as mentioned above so that the public understands the true regional climate consequences of opening roadless areas to logging and development.

Further, the DEIS falsely asserts that "it is difficult and highly uncertain to ascertain the indirect effects of emissions resulting from these alternatives on global climate."[52] The Forest Service could easily express the indirect impacts of climate emissions by quantifying or estimating climate pollution volumes by alternative (as noted above in our analysis) and then using the social cost of carbon (SCC) to assess and compare the significance of the effects on global climate. The very purpose of the SCC is to assist decisionmakers in (conservatively) estimating the marginal damages from each additional ton of greenhouse gas emissions. To avoid this analysis irresponsibly kicks the emissions can down the road.

The DEIS incorrectly states that most of the carbon in trees after logging will be recovered via reforestation and stored in wood products for buildings instead of stored in forest ecosystems and this is completely false. As noted, a substantial portion of the total forest carbon is contained in foliage, branches and bark, root wads and soils.[53] Because much of the carbon in logs hauled to mills becomes waste, only a relatively minor portion of the total tree carbon ultimately ends up in wood products.[54] Up to 40% of the harvested material does not become forest products and is burned or decomposes quickly on site, and a majority of manufacturing waste is burned for heat. One study found that 65% of the carbon from West Coast forests logged over the past 100 years is still in the atmosphere with just 19% stored in long-lived products; the remainder is in landfills.[55] Additionally, Leighty et al. (2006) reported that a century of Tongass logging has emitted 6.4-17.2 Tg C that is still in the atmosphere (again – it matters most what the atmosphere "sees" more than what is stored in wood products). Further, Hudiburg et al. (2019) note that state and federal reporting of emissions has erroneously excluded some product-related emissions, resulting in 25-55% underestimation of total CO2 emissions from logging. Thus, the Forest Service needs to fully disclose and provide reliable estimates on how much carbon is emitted by clearcutting given the substantial fall down and problems with underestimating emissions as noted. Large amounts of logs, stumps, root wads and slash are left on the ground after clearcutting and soils are noticeably disturbed by heavy equipment. This cannot be simply dismissed as an insignificant impact in the DEIS.

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[52] DEIS at 3-127

[53] Campbell et al. 2007.

[54] *See, e.g.*, Harmon et al. 1990, Harmon et al. 1996, Ingerson 2008, Law et al. 2018, Harmon 2019.

[55] Hudiburg et al. 2019.

It is also wrong for the Forest Service to assert that carbon stored in Tongass saw logs (wood product pools) compensates for carbon emitted by logging long-lived (hundreds of years) trees in the Tongass old-growth carbon sink.[56] The carbon debt created by expansive clearcut logging (past, present, future) must be calculated using reliable and accurate estimates via a carbon life cycle analysis that accounts for how long carbon remains in the atmosphere (after all, it's what the atmosphere "sees" that matters most in the long run). Thus, at a minimum, NEPA requires that the Forest Service conduct a carbon life cycle analysis using published sources and the Forest Service should use FIA/timber stand data on estimated carbon uptake and stores in old growth vs. young growth to calculate age-related differences in carbon stores and associated emissions from logging (e.g., using the carbon values for Tongass old growth and IRAs in our comments) at the regional scale. The following analysis components should be included in the DEIS:

- In-boundary emissions – at the stand and landscape level, this includes carbon entering the atmosphere from the substantial "fall down" and defect of uneconomical logs, slash, and stumps – based on Tongass timber stand inventory data (2016-18) fall down alone (uneconomical material) may be as high as 70% of felled trees (carbon emitted directly to the atmosphere) with old-growth defect at least 30%.

- Out-of-boundary emissions – this includes: (1) carbon emitted via wood processing waste at the mill (see Law et al. 2018 for example); (2) fossil fuels used in transport and manufacture of wood products, including emissions from log exports sent to China and then exported for distribution as products, the lower 48 states and elsewhere (note - transport emissions are easily obtained from the Alaska Department of Environmental Conservation Division of Air Quality (greenhouse gas emission inventory[57]; and (3) estimated emissions from road building.[58]

- Use more recent studies on wood product substitution estimates – Harmon (2019), for instance, re-examined substitution assumptions questioning their *reliability* in life cycle analysis and concluding that any benefits depend on duration of fossil carbon displacement, longevity of buildings being assumed, and nature of the forest supplying building materials (also see below):

  "Substitution of wood for more fossil carbon intensive building materials has been projected to result in major climate mitigation benefits often exceeding those of the forests themselves. A reexamination of the fundamental assumptions underlying these projections indicates long-term mitigation benefits related to product substitution may have been overestimated *2- to 100-fold (emphasis added)*. This suggests that while

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[56] *See, e.g.*, DEIS at 3-127.

[57] *See* https://dec.alaska.gov/air/anpms/projects-reports/greenhouse-gas-inventory)

[58] *See* Loeffler et al. 2008 for how to estimate this -note – this is a Forest Service publication easily accessible to the agency.

product substitution has limited climate mitigation benefits, to be effective the value and duration of the fossil carbon displacement, the longevity of buildings, and the nature of the forest supplying building materials must be considered."[59] Failure to address this scientific study would violate NEPA's and NFMA's mandate that the Forest Service use the best available science and that the agency explain why its approach differs from that of experts.

- The need for reliable published references to estimate wood product stores– Researchers report most carbon is emitted to the atmosphere when old trees are logged, accounting for wood product stores is only a fraction of the carbon pool (e.g., ~35% of the live carbon is rapidly emitted when an old-growth forest is logged with another 30% emitted at the mill and even more in transportation).[60]

- The reference to an albedo effect in the DEIS (at 3-123) is unreliable, cannot be verified, is inconsistent with the BASI requirement, and should be dropped. The DEIS provides no citation or support for its unsubstantiated albedo assumption, which likely was extrapolated from the boreal regions where albedo has been reported as having a potential cooling affect because of the reflectance properties of snow. The Forest Service cannot make this same claim for the Tongass given that low-elevation temperate rainforests experience relatively little snow (and therefore have low albedo/reflectance properties), especially in a changing climate (as noted in the DEIS). Without a life cycle analysis that first estimates logging emissions and then compares emissions to whatever insignificant albedo effect is anticipated in temperate regions with little snow, the albedo cooling assumption is falsified and cannot be used for disclosing climate impacts of Tongass logging. In sum, large regional and ecosystem type variations have been observed in albedo and one cannot compare albedo from one region to another or one forest type to another.

In this regard, the DEIS echoes unsupportable claims and assumptions by the wood products industry that substituting wood for concrete and steel reduces the overall carbon footprint of buildings and thus is unreliable and inaccurate. The agencies' wood production substitution claim has been refuted by recent analyses that reveal forest industries have been using unrealistic and erroneous assumptions in their models, overestimating the long-term mitigation benefits of substitution by 2- to 100-fold.[61] An additional recent analysis concluded that the carbon footprint of wood is 6% higher than concrete (Stiebert et al. 2019), and that assessment did not include the reduced forest carbon sequestration and storage caused by forest losses as discussed. Importantly, a very recent breakthrough in solar energy production will soon make it possible to dramatically reduce the carbon footprint of concrete and steel even further.[62] Additionally,

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[59] Harmon 2019. –

[60] *See* Harmon et al. 1990, Harmon et al. 1996, Law et al. 2018, Harmon 2019.

[61] As discussed, Law et al. 2018, Harmon 2019.

[62] https://www.cnn.com/2019/11/19/business/heliogen-solar-energy-bill-gates/index.html.

regarding the noted problems with exaggerated wood substitution benefits,[63] there is no assurance that concrete and steel replaced by wood will not be used in application somewhere else (i.e., leakage from using steel/concrete used elsewhere). For the substitution benefit to accrue, an equivalent amount of concrete or steel would need to not be produced and used in construction; otherwise, substitution is purely speculative (not best science) and unreliable. Further, the DEIS did not account for the high recycled content in most steel or recent/future anticipated advances in reducing the carbon footprint of concrete. For instance, changing manufacturing methods impact embodied energy, as for example, if fly ash is added to concreate it could yield 22-38% reductions in embodied energy required in manufacturing processes, thereby reducing the displacement value of wood.[64] Using clean, renewable energy instead of coal in concrete and steel manufacturing also can lower the substitution value and is part of the mix of energy sources being expand upon by the global community (i.e., over the next few decades new energy sources and processing efficiencies will emerge to reduce concrete/steel emissions and this needs to be factored into a "best case scenario" for energy efficiency upgrades in the DEIS). This change is already underway.[65]

To construct a proper life cycle analysis that provides a science-based assessment of carbon stocks and flows on the Tongass, the DEIS should adopt a method similar to the approach used by Hudiburg et al. in their 2019 life cycle analysis of emissions from logging. The following abstract summarizes their methodologies:

> Abstract
> Atmospheric greenhouse gases (GHGs) must be reduced to avoid an unsustainable climate. Because carbon dioxide is removed from the atmosphere and sequestered in forests and wood products, mitigation strategies to sustain and increase forest carbon sequestration are being developed. These strategies require full accounting of forest sector GHG budgets. Here, we describe a rigorous approach using over one million observations from forest inventory data and a regionally calibrated life-cycle assessment for calculating cradle-to-grave forest sector emissions and sequestration. We find that Western US forests are net sinks because there is a positive net balance of forest carbon uptake exceeding losses due to harvesting, wood product use, and combustion by wildfire. However, over 100 years of wood product usage is reducing the potential annual sink by an average of 21%, suggesting forest carbon storage can become more effective in climate mitigation through reduction in harvest, longer rotations, or more efficient wood product usage (emphasis added). Of the~10,700 million metric tonnes of carbon dioxide equivalents removed from west coast forests since 1900, 81% of it has been returned to the atmosphere or deposited in landfills (emphasis added). Moreover, state

[63] *See* DEIS at 3-123.

[64] Harmon 2019.

[65] *See* J. Gillis, The Steel Mill That Helped Build the American West Goes Green, The New York Times (Oct. 16, 2019) (describing Colorado steel mill's decision to manufacture steel using only renewable energy), available at https://www.nytimes.com/2019/10/16/opinion/solar-colorado-steel-mill.html (last viewed Dec. 13, 2019).

> and federal reporting have erroneously excluded some product-related emissions, resulting in 25%–55% underestimation of state total CO2 emissions. For states seeking to reach GHG reduction mandates by 2030, it is important that state CO2 budgets are effectively determined or claimed reductions will be insufficient to mitigate climate change.[66]

Logging involves transportation of trucks and machinery across long distances between the forest, the mill, and point of distribution and the DEIS needs to properly disclose these emission sources. For every ton of carbon emitted from logging, an additional ~17% is estimated from fossil fuel consumption to support transportation, extraction, and processing of wood[67], not including the significant emissions from building roads.[68] There is no indication that this was even accounted for in the DEIS.[69] As noted, the Forest Service should consult with state emissions data to obtain reliable estimates of emissions from transport and manufacturing of wood products, particularly the incredibly long hauling distances involved with exporting logs to China and the burning of fossil fuels to get them there (plus when manufactured products are shipped again to retail and distribution areas). In the Tongass this is an especially valid concern given the remote location, no road access (necessitating saltwater barges), and weather which requires extensive and long transportation chains.

The DEIS does not account for the reduction in carbon sequestration and storage potential in forests due to logging-caused soil compaction and nutrient loss. This is despite the fact that these combined impacts can reduce forest carbon storage potential contributing to an overall carbon debt not explained or assessed in the DEIS. We note that this debt is not trivial because ~60% of the carbon lost through logging since 1700s has not yet been recovered by the land sector[70] and 81% of carbon previously stored in West Coast forests has been returned to the atmosphere via logging since 1900.[71] These are centuries-long atmospheric carbon emissions coming at a time when we are in a climate emergency.[72] This is why scientists are calling for policies that avoid emissions and store more carbon in forests compared to wood product pools.[73]

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[66] Hudiburg et al. 2019.

[67] Ingerson 2008.

[68] *See* Loeffler et al. 2008.

[69] The DEIS at 3-127 includes "transporting wood products" in a laundry list of potential cumulative impacts to consider in its climate analysis, but provides no analysis at all of the scale or nature of that impact, violating NEPA's hard look mandate.

[70] McKinley et al. 2011.

[71] Hudiburg et al. 2019.

[72] Ripple et al. 2019.

[73] Hamon et al. 1990, 1996, Leighty et al. 2006, McKinley et al. 2011, Mackey et al. 2016a,b, Law et al. 2018, Moomaw 2019.

Additionally, there are other greenhouse gas effects such as methane and nitrous oxide emissions from soil impacts that will impact the climate from logging.[74]

In sum, the DEIS fails to include peer-reviewed science on forest carbon and emissions that shows: (1) primary (unlogged) forests are far superior to logged forests at carbon uptake and storage long term; (2) trees accumulate carbon over their entire lifespan; older trees capture and store far more carbon than young trees; (3) old, primary forests accumulate far more carbon than they lose through decomposition and respiration, thus acting as net carbon sinks; (4) logged forests are an emission source for at least the first decade and never fully recapture the emitted carbon stored in the pre-logged old-growth forest due to short rotation harvests and carbon losses throughout the wood product distribution chain; and (5) the superior carbon benefits of old forests are especially evident when taking into account the role of undisturbed soils (which may contain ~50% of carbon stores[75],) and below ground carbon exchange losses from logging and climate change impacts.

B. DEIS CLAIMS ABOUT TEMPERATE RAINFORESTS AND FOREST MANAGEMENT ARE NOT BASED ON BEST AVAILABLE SCIENCE

In addition to failing to analyze important information about the Tongass and its value for climate and carbon storage, the DEIS fails to analyze important information about the value of temperate rainforests.

- **Temperate rainforest amount reported in the DEIS is incorrect** – The DEIS grossly underestimates the global importance of coastal temperate rainforests, including the Tongass, for carbon regulation (0.5% global cover; no citation given).[76] DellaSala et al. (2011) provided the first computer generated map of all the world's temperate rainforests reporting that the total area for this rainforest biome is actually 2.5% of all forests globally (5 times that reported in the DEIS). The Pacific Coastal rainforests (California Coast Redwoods to Alaska) are globally significant as they represent over one-third of all temperate rainforests world-wide and because the Tongass is one of only 4 other relatively intact temperate rainforests (Great Bear – BC; Valdivia – Chile; Russian Far East; Southern Siberia). Thus, even though the overall global footprint of this rainforest biome is relatively small, the climate regulation properties of these forests – because of their enormous carbon stores – along with their myriad biodiversity and ecosystem benefits[77] – are globally significant and irreplaceable.[78] The Forest Service therefore has a national and global responsibility to maintain the intactness of this region and opening up roadless areas will have global ramifications contributing to the pace and scale of forest degradation globally. This is why 234 scientists signed a letter urging the Forest

[74] McKinley et al. 2011.

[75] Campbell et al. 2007. McNicol et al. 2019

[76] DEIS at 3-122.

[77] Brandt et al. 2014.

[78] DellaSala et al. 2011.

Service to protect the region's roadless areas (attached). The decision to open up roadless areas therefore is not based on best available science. At an absolute minimum, the Forest Service must correct its evaluation of the global importance of the Tongass's temperate rain forests and respond to these expert reports.

- **Unsubstantiated claims are made about management activities approximating and promoting natural processes** – The Forest Service states, without a single citation, that logging and prescribed fire tend to approximate and promote natural processes and that such actions can result in long-term carbon uptake and storage that somehow increases resilience.[79] We note that prescribed fire is not even relevant on the Tongass rainforest and has no purpose in this DEIS. The statement overall also has no basis in the ecological literature, and certainly none for the Tongass's temperate rainforest, and seems to imply that forest degradation is a net gain in carbon and ecosystem processes even though the IPCC (2018, 2019) and numerous scientific studies indicate otherwise.[80] As discussed, the Forest Service needs to provide a reliable life cycle analysis and evidence-based review of the literature to back assertions that clearcut logging and road building somehow resemble natural disturbance processes – including effects on biodiversity (e.g., deer, wolves, murrelets and other old growth species). The statement, in fact, is reflective of old-school forestry ideologies long dismissed in the ecological literature and even by many foresters. Notably, given the lack of fire on the Tongass, primary disturbance agents are blow down from wind storms (canopy gap, stand, landscape level), landslides (watershed-landscape level), and tree mortality (stand level – canopy gaps – and watershed-landscape yellow cedar death from climate impacts). In no way do clearcuts, roads, mines, dams, etc. resemble any of these natural disturbances as natural disturbances leave prodigious amounts of biological legacies[81] that "life-boat" a forest through successional stages while these developments in old growth and IRAs will remove nearly all biological legacies. The long return interval of natural disturbances allows for old growth to develop over centuries, whereas, logged areas can be logged again in <100 years; this is insufficient time for forests to recoup carbon emitted from logging and to reach their maximum carbon potential.[82] We note that Public Law 113-291 (2014) allows up to 15,000 acres of young growth to be logged from 2016-2025 in stands < 95% CMAI and there is flexibility in NFMA to allow a continuation of harvesting at young ages beyond 2025 – thus, the carbon debt from re-logging these forests on a sustained yield basis is never recaptured and remains in the atmosphere for over a century at a time when we are in a climate emergency. The Forest Service needs to properly account for this carbon debt in the DEIS.

[79] DEIS at 3-123.

[80] *See e.g.*, Harmon et al. 1990, Harmon et al. 1996, Mackey et al. 2014, Law et al. 2018, Moomaw 2019.

[81] DellaSala 2019; Buma et al. 2019.

[82] Moomaw 2019.