Alaska Longline
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Hon. Sonny Perdue, Secretary
U.S. Department of Agriculture
1400 Independence Ave. SW
Washington, DC 20250

Ms. Vicki Christiansen, Chief
U.S. Forest Service
1400 Independence Ave. SW
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Secretary Perdue and Chief Christiansen:

The following petition requests that you undertake a Salmon Conservation Rulemaking for the Tongass National Forest to respond to recent run declines, changing environmental conditions and the importance of Southeast Alaska salmon to the regional and national economy.

Executive Summary

The Alaska Longline Fishermen's Association (ALFA) is a southeast Alaska-based commercial fishing organization that represents and advocates for community-based, small commercial fishing businesses. ALFA represents commercial fishing vessel owners, deckhands and business members from nearly every community in southeast Alaska who participate in, or otherwise support and benefit from the commercial fishing economy.[1] ALFA has received national and statewide recognition for its work to rebuild fish stocks, improve fishery monitoring and to protect fish habitat and ensure the socio-economic viability of coastal communities. Its members participate in longline fisheries and in all southeast Alaska commercial salmon fisheries – seine, gillnet and troll.

According to the Alaska Sustainable Fisheries Trust's Sea Bank 2019 Annual Report, coastal ecosystems like Southeast Alaska are the most economically productive ecosystems in the world.[2] These areas comprise only 8 percent of the planet's surface but generate 43 percent of the global ecosystem service economic value. They are also vulnerable ecosystems experiencing rapid environmental change as the global climate warms and industrial developments degrade high value habitats like coastal forests and freshwater aquatic systems.

Recent research by resource economists has shown that the degradation of natural capital and associated loss of ecosystem services caused by converting habitats to industrial uses causes a net economic loss. For example, Southeast

[1] ALFA also has members throughout the Alaska and the United States, including numerous members in Washington State.

[2] http://seabank.org/wp-content/uploads/2020/07/SeaBankv3.pdf

Alaska's old-growth and recovering, second growth forests are far more valuable for fishery production, wildlife habitat and recreation than for low value, short-term uses by timber companies. The poor economic performance the Tongass National Forest's timber sale program is consistent with research showing that industrial logging is economically inefficient, with loss of non-timber products, fish and wildlife species and carbon stocks routinely exceeding timber values.

The U.S. Department of Agriculture currently plans to exempt the Tongass National Forest from the 2001 Roadless Area Conservation Rule ("Roadless Rule") which currently protects many salmon producing watersheds from roadbuilding and industrial scale clearcutting. The no-action alternative is the only option for sensibly and sustainably preserving most of southeast Alaska's unroaded, unlogged natural capital. ALFA wishes to make clear that the U.S. Department of Agriculture should abandon the Alaska Roadless Rulemaking and leave the Roadless Rule intact in Alaska. This petition seeks separate solutions for salmon needed in addition to the Roadless Rule, and regardless of the outcome of the Alaska Roadless Rulemaking.

The Roadless Rule is critical to maintaining much of Southeast Alaska's natural capital but by itself will not sustain the region's most economically valuable resource, salmon. Roughly half the stream miles of salmon habitat are in conservation status while the remainder are vulnerable to industrial logging authorized under the 2016 Tongass National Forest Land and Resource Management Plan. The Forest Plan relies on an inadequate reserve system and weak standards that fail to adequately protect salmon. Planned second growth logging may permanently reduce the productivity of recovering watersheds.

There is a need for a Salmon Conservation Rulemaking that re-evaluates whether to re-allocate areas designated for timber production for salmon conservation. 21st century salmon science research shows that sustainable populations rely on a "portfolio effect" which requires available habitat across multiple areas and ecosystems to ensure diversity and buffer against ongoing shifts in watershed productivity. In addition, new and effective, science-based standards are necessary to protect salmon in areas zoned for timber uses.

Thus, ALFA petitions the U. S. Department of Agriculture to commence a rulemaking process, to create comprehensive protections for salmon in the Tongass National Forest and the people who depend on them. The requested rulemaking would be a new rulemaking separate from the ongoing Alaska Roadless Rulemaking process that you should abandon by adopting the no-action alternative. This Salmon Conservation Rulemaking should consider the entire salmon portfolio of watersheds, and develop forest-wide conservation measures.

I. Introduction: Petition for Salmon Conservation Rulemaking

Pursuant to the Administrative Procedures Act, 5 U.S.C. § 553(e), ALFA petitions the U.S. Department of Agriculture to promulgate a new Salmon Conservation Rule on the Tongass National Forest to identify, protect and develop standards for the protection of the salmon resource on the Tongass National Forest that has supported commercial fisheries for over a century. We request the development of new and binding standards through a formal rulemaking that will guide the agency land managers toward a more sustainable future for salmon.

The purpose of this rulemaking should be to provide decisionmakers and the public with an analysis of strategies for conserving riparian and aquatic ecosystems in watersheds where anadromous fish habitat is present or where there is potential for use or recolonization by anadromous fish, particularly in areas currently available for clearcutting or timber road construction.

The need for this rulemaking is to respond to the rapidly declining status of anadromous fish stocks in Southeast Alaska, changing environmental conditions associated with climate change in recognition of the numerous studies showing that freshwater habitat is a common causal factor in declines in salmon populations throughout their range. Recent and significant changes in the Southeast Alaska salmon portfolio require a precautionary approach to managing freshwater anadromous salmon habitat. The basic principle embodied in the precautionary approach is the recognition that scientific certainty often comes too late to design effective management responses to environmental changes.

II. The importance of Tongass National Forest salmon warrants protection and better long-term management of salmon habitat.

At one time, the Pacific Northwest supported the largest Pacific salmon runs and fisheries in the world. Habitat loss was a major factor in the decline of Pacific salmon populations at the southern end of their range, extirpating 29 percent of 1,400 salmon populations in the Pacific Northwest and California. Many remaining runs are in peril. Degradation of freshwater spawning and rearing habitat by industrial logging and timber road construction was a significant contributor to these run failures.

Southeast Alaska's island ecosystems and mainland rivers together form one of the two largest remaining productive salmon systems in the world in large part because of natural capital assets that include the region's coastal temperate rainforest. The Tongass National Forest is a major producer of "forest fish," producing 75 percent of the salmon caught in the region each year.[3] Fisheries

[3] Johnson, A.C., J.R. Bellmore, S. Haught, and R. Medel. 2019. Quantifying the monetary value of Alaskan National Forests to commercial Pacific salmon fisheries. North American Journal of Fisheries Management. https://www.fs.fed.us/pnw/pubs/journals/pnw_2019_johnson002.pdf.

scientists believe the physical and biological diversities of southeast Alaska's salmon producing watersheds are globally unique and merit comprehensive protections that assure no net loss of watershed condition.

The same threats to forests that reduced salmon populations in the Pacific Northwest are present in Southeast Alaska. Clearcutting and timber road construction have harmed habitat in many watersheds. Fishery managers and scientists familiar with southeast Alaska's salmon identify timber extraction activities, along with climate change, as the greatest risks to salmon productivity. A major concern is that habitat degradation caused by industrial logging will coincide with periods of low marine productivity, which climate change is making more frequent. These two factors can cumulatively cause serious long-term risks to the salmon portfolio.

A. Forest Fish Ecology: the importance of aquatic ecosystems

Salmon depend on both marine and freshwater environments. Spawning and rearing mostly occur in freshwater streams. Juvenile fish then migrate to the marine environment to feed and mature before returning to natal streams to reproduce. Forests are vital to salmon productivity in these ecosystems by controlling sediment inputs and regulating stream temperatures. The productivity of marine habitat is variable and cyclical, increasing the importance of freshwater habitat and forests in maintaining salmon populations.

Most watersheds in Southeast Alaska provide habitat for multiple species of salmon. The most prevalent species in island ecosystems managed by the Forest Service are pink and coho salmon. The Tongass National Forest produces nearly all of the pink salmon harvest and roughly two-thirds of the coho harvest. Each of the five Pacific salmon species utilizes available habitat in different ways and at different times - pink and chum salmon spawn first, beginning in early July. Adult coho return to the outer coast during the summer and spawn throughout the fall. Sockeye and Chinook return to spawn in late spring/early summer.

Pink salmon utilize over 2,500 smaller streams in the region for spawning and are the most numerous of the five salmon species. They return to spawn in every two years. There has been a significant disparity between odd and even year cycles for some time, with much lower harvests during even years. Stocks also have a distinct separation between the northern and southern portions of Southeast Alaska. Southern Southeast Alaska fishing districts provide most of the pink salmon harvest during the even year cycle and in some years as much as ninety percent of the harvest.

Coho salmon inhabit freshwater ecosystems for at least a year before migrating to the marine environment, and most juveniles will remain in freshwater for two years. The availability of rearing habitat in small streams, ponds, lakes and off-channel areas is critical for coho and they are highly vulnerable to changes in freshwater habitat. After rearing, coho typically spend 16 months in the marine environment before returning to the outer coast during the summer and spawning in the fall. Four thousand streams and the large mainland rivers produce the region's coho salmon. Over half of the annual return consists of small populations that utilize small to medium stream systems.

The Tongass National Forest also supports sockeye salmon harvested in the commercial fisheries – at times, half the harvest. Sockeye are also the most important Pacific salmon species for local subsistence uses. Sockeye salmon utilize various freshwater habitat types but nearly all Southeast Alaska's roughly 200 sockeye stocks spawn in systems that include lakes. Lake-type juveniles often spend 1 to 3 years rearing in lakes. Juvenile sockeye typically leave freshwater systems in the late spring and spend two to three years in the marine environment before returning to spawn. Primary producers of sockeye include mainland rivers and larger island ecosystems such as Prince of Wales Island.

B. The economic importance of TNF salmon

A 2019 report by Forest Service researchers identifies forest rivers and lakes as important to sustaining the value and volume of Tongass National Forest salmon production, the commercial fisheries, and community well-being and the regional economy. Indeed, Southeast Alaska's commercial seafood harvesting and processing industry is one of the region's two largest private sector economies and supports fifteen percent of regional employment. Fishermen can produce over 300 million pounds of seafood a year, generating over 8,000 harvesting and processing jobs and up to $500 million in earnings, with an estimated $700 million total economic impact on the region. Seven of the top 100 fishing ports by value in the entire country are in Southeast Alaska. The fisheries are critical to all 33 communities in the region, supporting every business and generating jobs in the transportation, academic and government sectors.

Salmon is the most abundant and valuable seafood species for the fisheries and supports 1 in 10 jobs in the region. Over 1,800 gillnet, seine and troll salmon permit holders typically participate each year. Seining is the highest value fishery overall, averaging $73.5 million in annual ex-vessel value (the amount paid to the fishermen) from 2010-2019. As many as 1,000 salmon troll permit holders may fish in any year, making the troll fishery the second largest fleet in the Alaska. The fishery typically generates over $33 million in ex-vessel value per year. The gillnet

fishery averaged over $27 million in ex-vessel value from 2010-2019. Tongass National Forest salmon production is critical to these fisheries, producing average annual harvests of 37 million pink salmon worth $42 million, 1.8 million coho worth $14.8 million and 276,000 sockeye worth $2.2 million.

But a decline in catches of wild salmon over recent years is a concerning trend for the Southeast Alaska salmon economy. In 2017, 50.1 million salmon generated an ex-vessel value of $169 million. Because of declining pink salmon returns, the 2018 total salmon harvest was extremely low at 21.2 million fish and generated $133.6 million in total ex-vessel value. The 32.2 million salmon harvested in 2019 generated a lower ex-vessel value of $102 million. These harvests and values would have been significantly lower but for a buffering effect from hatchery chum salmon production which offset declines in harvests of wild pink and coho salmon in both 2018 and 2019. Both hatchery chum and wild stock returns plummeted in 2020, heightening the concern for the health of wild salmon stocks and triggering the need to develop more precautionary, protective measures for Tongass National Forest salmon habitat. The estimated seine and gillnet ex-vessel fishery values at the end of the 2020 season were $8 million and $7 million, respectively, or 11 percent and 25 percent of their normal value.

The Forest Service has historically managed the Tongass National Forest for its timber resources. The timber industry – the few timber sale purchasers who manufacture products - has become very small during the 21st century. Eight of the nine active sawmills are a small cottage industry and do not purchase large timber sales. The one larger mill operator, Viking Lumber, is the second largest purchaser of federal timber, and relies extensively on raw log exports. The largest timber sale purchaser, Alcan, is a General Partner of a Canadian company, Transpac Alaska, and its business model relies almost entirely on raw log exports to China. Thus, there are very few timber jobs in the region – at best, 1% of total regional employment and earnings. Federal timber is an even smaller part of this economy, accounting for a fraction of a percent of regional employment.

In order to supply these two companies, the Tongass National Forest timber sale program incurs a substantial net loss each year, as shown in a September 2020 report by Taxpayers for Common Sense. Over the last five years, timber sale revenues averaged $590,000 per year. In 2019, the timber sale program generated a loss of $16.1 million. Over the past 40 years, the Tongass National Forest lost $1.7 billion, or $44 million per year on average. Planned timber sale volumes could cost taxpayers nearly $190 million over the next five years. These costs combined with the agency's raw log export economic model have caused concern that current forest management primarily benefits Chinese economic interests rather than that of local businesses. Petitioners submit that a Salmon Conservation Rulemaking that shrinks the area available for large timber sales will greatly benefit, rather than harm, local, regional and national economies.

III. Risks to salmon

The Forest Service's Pacific Northwest Research Station laboratory in Juneau recognizes that the region's highly valuable Pacific salmon are vulnerable to the impacts of logging and mining. As explained in their 2019 report:

> although Alaska Pacific salmon populations remain relatively healthy, these populations are susceptible to the same set of factors that have led to declines in other regions. Moreover, these populations will have to contend with rapid environmental changes associated with climate change, which may negatively impact the capacity for forest streams to sustain Pacific salmon via a variety of mechanisms. Our findings illustrate that reductions in the capacity of forest streams to produce Pacific salmon could have consequences for commercial fisheries, as well as the regional economy.

This petition provides new information showing that southeast Alaska's salmon populations are no longer "relatively healthy" and are highly susceptible to the combined effects of resource extraction and climate change.

A. Lower salmon abundance trends warrant additional, precautionary measures to protect Southeast Alaska's forest fish

The harvests of pinks, sockeye and coho salmon during the summer of 2020 were some of the lowest in Southeast Alaska since Alaska became a state in 1959. Harvests by the gillnet and seine fisheries may reach all-time lows, prompting requests by fishing communities for federal fisheries disaster declarations. The most serious concern is the recent decline in pink salmon harvests. The first federal fishery disaster declared for pink salmon was in 2016, when fishermen caught 18 million pink salmon. In 2018 the harvest dropped to 8.1 million pink salmon – the lowest since 1976. Returns failed to meet escapement targets throughout the region ("escapement" is a fishery management term for the number of fish making it back to streams). The 2019 pink salmon harvest of 21.1 million fish was the lowest odd-year harvest in over three decades. The poor returns have caused extensive fishery closures across the region.

The 2020 harvest was even lower than in the parent year of 2018, at 7.1 million fish. The Alaska Department of Fish and Game closed pink salmon fisheries in southern southeast Alaska early due to poor harvest and poor escapements. There was no fishing on pinks in northern southeast Alaska in 2020. Long-term drought conditions and marine "heat waves" are likely contributors to the run failure.

There is also a declining trend in coho salmon harvests. Coho harvests by all

gear types have fluctuated between 2 million and 3.5 million fish over the past decade with an annual average harvest of 2.5 million fish and peak harvests exceeding 3 million fish in 2013 and 2014. In 2018 and 2019, harvests of 1.4 and 1.5 million fish were below average. The troll fishery catches most of the cohos and its 2020 harvest of slightly more than 700,000 fish was fifty percent less than 2019 and the second lowest on record for the previous 32 year period. 2020 escapement projections are at or below the lower end of escapement goals. 2020 Sockeye harvests were also the lowest in decades.

There is increasing concern that freshwater habitat conditions, particularly summer stream temperatures and low flows, may have a more significant role that initially thought in contributing to declines of Southeast Alaska salmon and salmon declines throughout the entire state, warranting more precautionary and protective management of freshwater habitat.

B. Warming climatic conditions poses specific threats to southeast Alaska's forest fish

Alaska overall has warmed twice as fast as the rest of the U.S. over the past century with increasing numbers of record high temperature events. 2014-2016 and 2018 were four of the five warmest years on record in Alaska. Southeast Alaska has warmed by roughly 2.3° to 3° Fahrenheit over the past half-century and experienced record warm temperatures in 2019 during the winter, spring and summer. A prolonged drought with record low rainfall amounts coincided with the record warm temperatures. Alaska climate scientists expect that the frequency and intensity of these weather events will accelerate in the future.

Scientists project that Southeast Alaska may experience the largest change in number of winter days above freezing in all North America. Watersheds currently fed by snowpack will change into rain-fed systems. Within three decades, most of coastal southeast Alaska will lose twenty to thirty percent – or more – of historical snowpack levels – a phenomenon known as "snow droughts."
These changes will increase winter stream flows, reduce summer stream flows and cause year-round increases in stream temperatures.

Salmon use a combination of freshwater, estuarine and marine habitats at different stages of their life cycle, resulting in exposure to numerous climate change threats. Melting glaciers, warmer aquatic and marine habitats and shifting precipitation patterns will stress salmon stocks by disrupting migration patterns, altering the marine food web, changing stream flow patterns in summer and winter, and altering both marine and freshwater temperature regimes.

Warmer ocean temperatures and associated changes in the food web likely will reduce overall marine ecosystem productivity, particularly for ectothermic (cold-

blooded) fish species. Marine heat waves dominated the North Pacific from 2014 through 2016 and again in 2019. The Gulf of Alaska, where Southeast Alaska's forest fish forage, had both record sea surface temperatures and record ocean heat content. Continued climate change increases the risk of more marine heat waves in the future.

NOAA Fisheries' Northwest Fisheries Science Center for the Pacific Northwest's climate vulnerability assessment for salmon identified four major concerns for freshwater habitats: (1) stream temperature (summer); (2) summer water deficit; (3) extreme precipitation or flooding events and (4) changing hydrologic regimes – *i.e.* the balance between rain and snow in winter precipitation. These risks are consistent with climate change studies specific to southeast Alaska salmon, and planned clearcutting and timber road construction will increase the risks associated with these changes.

Summer low flows and warmer temperatures often cause pre-spawning mortality events and work together to sever connections between habitats, reduce water quality and generally reduce habitat values for growth, spawning and survival. Even modest changes can shift development rates, the timing of key life cycle events such as spawning and fry emergence, and ultimately reduce survival rates and lead to population declines or collapse.

Coho salmon are highly vulnerable to stream warming because of the lengthy freshwater phase of their life cycle. Pink salmon, which return to streams in summer, face increased exposure to combinations of high stream temperatures and low late summer flows, which cause pre-spawning mortalities. Poor freshwater survival caused by low stream flows and high temperatures likely had a significant role in the current run failures.

Alaska's water quality standards for temperature are 15° Celsius (59° F) for migration routes and rearing areas and 13° Celsius (55.4° F) for spawning areas and egg and fry incubation. Temperatures above 20° Celsius (68° F) are generally deemed lethal for salmon. In one of the few heavily logged Southeast Alaska watersheds with available temperature data, summer stream temperatures exceeded lethal levels each of the past three years, with daily mean temperatures of roughly 17° Celsius in 2017, 20° Celsius, in 2018 and 20° Celsius again in 2019. Peak stream temperatures reached 25° Celsius (78° Fahrenheit) in 2018-2019. It is likely that there are similar but undetected temperature exceedances throughout Southeast Alaska.

Other anticipated major hydrological changes have significant consequences for ecosystem productivity that may challenge rearing and spawning salmon. An overall warmer, wetter climate will increase flood sizes and alter stream habitats. Higher winter flows have mostly negative effects that include increased embryo mortality and damage to steeper, confined stream reaches that may eliminate as much as ten percent of coho spawning habitat over the next two decades. All of these

effects will be worse in the more heavily logged watersheds that comprise a significant portion of the region's salmon portfolio.

Industrial scale logging and timber road construction add to risks caused by a warming climate. Numerous studies of Pacific Northwest habitats show that stream temperatures increase substantially in heavily logged areas. Removing riparian forest stands increases summer temperatures in several ways - by directly removing vegetation, exposing the landscape to increased heat and increasing erosion and debris flows. Riparian buffers do not adequately protect against these increases because of susceptibility to windthrow and because numerous factors affect stream temperatures. Also, unbuffered, smaller streams comprise the bulk of the stream mileage in Southeast Alaska watersheds.

According to the National Marine Fisheries Service, roads are a primary cause of salmonid decline, and may have unavoidable effects on streams *regardless of design or maintenance level*. Timber roads increase sediment, degrade water quality, fragment habitat, and increase temperature regimes. Sediment delivery to streams in particular is a principal and widespread cause of declining salmon runs.

IV. Need for Rulemaking: Protect the Salmon Portfolio

Because of fluctuations in salmon returns and marine and freshwater habitat qualities, fishery scientists emphasize the need to manage salmon-producing ecosystems in a way that maintains diversity through a salmon "portfolio." Properly functioning ecosystems should resemble well-designed financial portfolios. Investment analysts developed portfolio theory to address the challenges associated with making reliable projections about the outcomes of financial systems. The more diversity an asset portfolio has, the more stable its overall returns, over time. For salmon populations, the "portfolio effect" relies on diverse populations (assets) from many watersheds to provide fishery stability.

The salmon portfolio has multiple assets – genes, populations, species, landscapes or ecosystems. The availability of intact aquatic and estuarine habitats is a critical salmon portfolio asset. Population diversity is also critical. As with an investment portfolio, diversity across a regional population complex buffers against stock declines in any given year from one or several watersheds, and ensures continuing dividends to the fisheries every year. This management approach recognizes that it is difficult to anticipate species- or stock-specific performance in the future. Portfolio management and population diversity are also critical to maintaining fisheries in rapidly changing ecosystems.[4]

[4] Griffiths, J.R., D.E. Schindler, J.B. Armstrong, M.D. Scheurell, D.C. Whited, R.A. Clark, R. Hilborn, C.A. Hold, S.T. Lindley, J.A. Stanford & E.C. Volk. 2014 Performance of salmon fishery portfolios across western North America. Journal of Applied Ecology.

A study of one of Alaska's best performing salmon portfolios – Bristol Bay - shows that the diversity of its salmon populations has had a stabilizing role for both ecosystem and fishery performance. Portfolio assets include nine major rivers that support hundreds of locally adapted populations which vary in run strength from year to year. The population diversity significantly reduced interannual variability, which is critical to maintaining fisheries.[5] Studies of the Bristol Bay portfolio showed that diversity was particularly important for salmon, because both climate and population productivity can fluctuate over time and space within a watershed, with the productivity of specific locations within an aquatic system changing widely from year to year.[6]

Southeast Alaska has nearly 14,000 miles of anadromous or potentially anadromous salmon habitat. Approximately 5,500 individual streams and tributaries support salmon with varying levels of productivity. By the 1990s, more than half of the length of anadromous stream habitat was in intact watersheds while the remainder – over six thousand miles of anadromous streams - flowed through watersheds exposed to some degree of timber harvest which varied in intensity. In other words, the salmon portfolio includes populations that utilize intact ecosystems, and populations persisting in watersheds with previous and variable levels of logging.

Tongass National Forest planners to a large extent wrongly rely on reserves to address salmon conservation. Reserve systems consist of protected watersheds distributed in different places based on perceived or projected productivity or on political and economic considerations. Reserve networks may be appropriate for preserving small, remnant populations. But for areas still sustaining salmon fisheries, a diverse portfolio is essential to maintaining populations over time and conservation strategies based on protecting a few selected watersheds entail unacceptably high long-term risks. Even a well-designed reserve system cannot account for constantly shifting productivity between or even within watersheds or the challenges associated with projecting future productivity.

The spatial distribution of the Forest Plan reserve network is uneven and does not protect the portfolio. Some of the acreage in protective land use designations does include productive watersheds in old-growth forests. But there are also large portions of these areas that are alpine, glacial or otherwise areas that do not produce salmon. The current spatial distribution of fishery resources illustrates the flaws with relying on reserves. Roughly two-thirds of the acreage of the Forest Plan's "Tongass 77" reserve network, for example, is adjacent to fishing districts in northern

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[5] Schindler, D.E., J.B. Armstrong & T.E. Reed. The portfolio concept in ecology and evolution. Front Ecol. Environ. 2015: 13(5) 257-263.

[6] Brennan, S.R., D.E. Schindler, T. J. Cline, T.E. Walsworth, G. Buck & D.P Fernandez. 2019. Shifting habitat mosaics and fish production across river basins. In: Science 24 May 2019. Vol. 364, Issue 6442 pp. 783-786.

southeast Alaska, where pink salmon productivity is so low that there has been no directed pink salmon fishery in most of these areas during the past five years. Many of these reserve watersheds are not even identified among the region's 243 "Primary Fish Producer" systems.

In contrast, the "Tongass 77" reserve network protects no watersheds at all on some of the region's largest islands and other large landscapes in southern Southeast Alaska. It protects only three watersheds on the most productive portions of Prince of Wales Island – the third largest island in the United States and largest island in Southeast Alaska which is by far the most important salmon ecosystem in the region based on the number of stream miles that provide salmon habitat and numbers of "Primary Fish Producer" watersheds.

Many of the unprotected watersheds were the most highly productive fish habitat in Southeast Alaska but overlapped with areas damaged by clearcutting and logging road construction. These are the most vulnerable but at the same time critical portfolio assets left unprotected by the designers of the Tongass 77 network. Even the most damaged watershed could be recolonized by salmon in the future. And the vulnerable southern southeast portion of the region still supports fishery harvests in half of southeast Alaska's regulatory fishing districts. The exclusion of these areas significantly reduces the diversity of southeast Alaska's salmon portfolio. A Salmon Conservation Rulemaking should analyze reducing the number of stream miles in central and southern Southeast Alaska vulnerable for the timber sales, and, as discussed below, develop more protective standards for any areas subject to development by the timber companies.

V. Develop and implement appropriate forest-wide conservation measures and management direction to protect Tongass National Forest salmon

Tongass Land and Resource Management Plan desired conditions and standards for fish instruct the agency to maintain "habitat … to ensure sustainable fish and wildlife and their uses" and "sustain the diversity and production of fish …." Aquatic habitat quality should be "good to excellent" so "[f]ish thrive in the Forest's lakes and streams due to good water quality and other habitat features, *and provide world-class fisheries*." The agency should, among other things, prevent adverse effects to rearing and spawning habitat.

Petitioners request that the U.S. Department of Agriculture task the Forest Service with developing more comprehensive and effective standards for sustaining Southeast Alaska salmon. There is new information showing significant resource declines, with habitat degradation and a rapidly changing climate as potential causal factors. The agency needs to promptly arrest declines in habitat conditions in areas previously logged or available for logging, initiate appropriate habitat restoration, and protect remaining intact habitat.

There is uncertainty about the effects of past and present Tongass National Forest management on specific salmon populations. Most past industrial logging occurred disproportionately in the highest quality salmon habitat, leaving a legacy of watersheds deficient in many key habitat features. Fluctuations in marine survival and weather cycles, variation in region-wide commercial harvests, and other factors have made it difficult if not impossible to detect specific population declines in heavily logged and roaded individual watersheds. Alaska fishery scientists believe there has been an undocumented but significant loss of productivity from watersheds degraded by past logging.

Petitioners submit that a Salmon Conservation Rulemaking needs to consider: (1) an updated, forest-wide watershed inventory and assessment and directives to prepare watershed analyses prior to implementing timber projects; (2) new standards and guidelines to limit clearcutting and road construction in or near fish habitat, particularly expanded riparian buffers and headwaters streams protections and (3) binding goals to fix red culverts and sediment sources. Forest standards in the Pacific Northwest, for example, are more protective of salmon habitat – a disparity that requires corrective action.

A. Full watershed condition analyses are needed at multiple scales

The Forest Service should engage fisheries research scientists and fisheries managers in an inventory of watersheds and road systems that identifies risks to specific salmon stocks, and causes which may vary for different species and in different island ecosystems. Road systems cross multiple watersheds in island ecosystems, making it necessary to assess impacts and conditions on a larger scale. There has not been any meaningful assessment of Tongass National Forest watershed conditions that affect fish since the 1990s. There is a need to understand existing watershed/fish habitat conditions such as summer stream temperatures, identify areas in need of immediate restrictions on timber extraction and consider corrective measures, such as barrier culvert replacement.

Appendix C to the 2016 Forest Plan allows the Forest Service to plan large scale timber and road construction projects without conducting watershed analyses used to assess riparian and aquatic values and processes in a watershed. This needs to change - the agency should prepare full assessments for all projects that consider watershed condition, status of salmon stocks in watershed and the magnitude, frequency, duration and timing of impacts. A full watershed analysis is necessary to inform decisionmakers when timber projects create unacceptable risks by impacting key habitat features or life cycle stages.

An urgent concern that warrants watershed analyses at regional and project-specific scales is summer stream temperature. Forest Plan Guideline F directs the agency to "maintain or restore optimum water temperatures for salmonids …."

Summer stream temperatures on known fish-bearing streams should be between "50 & 68 degrees Fahrenheit or at natural levels." As previously noted, summer stream temperatures throughout Alaska and in the Tongass National Forest have recently and significantly exceeded levels deemed safe for fish. But the Tongass National Forest does not collect stream temperature data as part of project-level analyses, and wrongly relies on narrow riparian buffers to regulate stream temperatures.

Timber projects significantly elevate stream temperature, even in systems with riparian buffers. Shade removal on unbuffered, Class IV streams is also a major factor. Watershed analyses are necessary to assess factors that cumulatively affect water temperatures, whether cumulative loss of riparian shading or microclimate regulation due to roads, landing and logging. Loss of temperature regulation services caused by logging and road construction can be irreversible. Thus elevated water temperatures of just a half degree Fahrenheit are a significant concern in a changing climate because they cause serious and chronic negatively impacts on all forest fish, including direct habitat loss, thermal passage barriers, reduced egg survival and increased susceptibility to disease.

B. Forest fish need wider riparian buffers

There is a significant concern about the effectiveness of Best Management Practices (BMPs) in mitigating harms to fish habitat, particularly compared to limiting or avoiding activities that damage aquatic habitat in the first place. A Salmon Conservation Rulemaking needs to consider effective avoidance strategies that prohibit logging and road construction activities in a riparian no-cut buffer with sufficient width to prevent or reduce transmitting upslope impacts to streams. The Tongass National Forest relies largely on riparian buffers to meet planning objectives to protect aquatic habitats and their water quality and manage them for short- and long-term biodiversity and productivity, including fish production. The problem is that Tongass National Forest no cut buffers only extend to 100 feet of either side of Class I streams and Class II streams that flow directly into a Class I stream. These buffer requirements exclude smaller streams that influence downstream water quality and are not wide enough to reduce upslope impacts, to maintain riparian functions or prevent further degradation of aquatic habitat conditions.

Forest planners in the lower 48 recognized that water quality in streams that support Pacific Northwest salmon depended on the integrity of surrounding upland and riparian areas. Measures to conserve the species included extended riparian habitat conservation areas to 300 feet for fish-bearing streams, and 150 feet for permanent non-fish bearing streams and around ponds, wetlands and other waterbodies greater than one acre. The wider, no-cut buffers respond in part to studies showing that the wider buffers were the most effective way to limit impacts from upslope logging disturbances.

Wider buffers are also necessary because roads contribute sediment to streams at multiple points whenever they are relatively close to streams, particularly in areas with high levels of precipitation. Studies from the Pacific Northwest found that roads within 300 feet of streams cause significant increases in sediment delivery to downstream fish habitats. Road construction and use outside of the Tongass National Forest's narrower 100-foot buffers immediately elevates erosion and sediment delivery and can cause elevated sediment delivery relative to undisturbed areas for decades. This is a major problem because roads are the single largest source of fine sediment which is the most harmful to salmon. Another significant problem is that roads pierce buffers at stream crossings, significantly weakening buffer effectiveness.

Finally, buffer requirements need to encompass currently unbuffered headwaters streams (Class III and IV streams that do not normally provide habitat for fish) that are a major source of sediment delivery to downstream fish-bearing streams. These streams are collectively important because they usually comprise the bulk of a stream network and are more vulnerable to sedimentation and peak flow alteration by roads, and upslope activities. The failure to buffer these smaller streams will degrade various downstream fish habitat features, including temperatures, that affect salmon survival and productivity.

C. The Tongass National Forest needs a road density standard

Numerous scientific studies show that watersheds with high proportions of roadless area support higher numbers of salmon and more diverse salmon populations. In other words, road density increases degrade salmon habitats and reduce in salmon populations. The Forest Service's own researchers (Gucinski et al, 2001; USFS & USBLM 1997) have found ample evidence showing that increasing road densities, even at low levels, lead to declining salmon populations. The Tongass National Forest needs to engage fisheries scientists in the development of standards that prohibit additional road construction within watersheds at specific thresholds. For example, a road density of .1 mile per square mile generally means a low level of stream degradation while .7 miles per square mile equates to high levels of habitat degradation. Road construction, including temporary roads, can cause enormously elevated sediment relative to undisturbed areas for decades. There are no Best Management Practices that can eliminate these impacts, particularly sediment discharges at stream crossings.

D. The Tongass National Forest needs to fix barrier culverts

A major habitat problem for Southeast Alaska salmon is the number of stream miles blocked by failed culverts ("red" or "barrier culverts"). Road crossings of any

kind over streams, and particularly failed culverts, can over time begin to impede fish passage or become complete barriers. Barrier culverts throughout a watershed cumulatively reduce salmon stream productivity by impairing in-stream migration and foraging by juveniles, slowing their growth and development.

During the 1990s, the Alaska Department of Fish and Game surveyed 60 percent of Tongass National Forest roads to assess fish passage problems. Two-thirds of the culverts on Class I streams (179) and 85 percent of the culverts on Class II streams (531) failed fish passage standards. The Forest Service addressed some of these problems between 1998 and 2006, fixing roughly 50 sites per year. The culvert repair program ended in 2006 due to funding cuts. Now there are 1,100 red culverts blocking 270 stream miles of fish habitat, with most of them concentrated in central and southern Southeast Alaska. In central southeast Alaska islands, there are 432 red culverts. Plans to repair three of them in 2020 are now on hold. On Prince of Wales Island, the agency considered fixing fourteen out of 447 red culverts in 2020, but only funded fixing three.

Habitat loss in the form of stream miles blocked by barrier culverts has an adverse economic impact on salmon fisheries. Conservative estimates value each salmon spawning stream mile worth $10,000 in annual fishery production value. The minimum annual lost fishery production value of these failed culverts is $2.7 million. Removing or replacing red culverts is the most important and effective salmon recovery measure because they completely block access to habitat. The Forest Plan directs the agency to "[m]aintain, restore, or improve," stream conditions that impede fish passage and "include funding for maintenance in the planning and budgeting for all projects. The Tongass National Forest has failed to meaningfully address fish passage concerns for two decades, and a specific directive and funded program are needed to fix these problems now.

VI. Conclusion: The Tongass National Forest needs a Salmon Conservation Rulemaking

The current course is incompatible with fishery uses of the Tongass National Forest and presents significant risks to long-term salmon productivity. Changing socioeconomic demands by Southeast Alaska communities, and the need for a precautionary approach to conserving salmon habitat in a changing environment require a fundamental management shift.

We reiterate, as expressed in numerous letters regarding the Alaska Roadless Rulemaking, that any exemption to the Roadless Rule would have severe implications for the region's salmon portfolio. We support maintaining these protections on the Tongass National Forest and nothing in this petition should be interpreted as support

for any action other than the no-action alternative. The existence and retention of intact watersheds is critical to maintaining many salmon populations.

However, nearly half of the stream miles of anadromous salmon habitat in Southeast Alaska are, will or could be exposed to varying levels of degradation by past or present old-growth logging and associated road construction under standards that are inadequate to protect salmon. Proposed second-growth logging may permanently impair many stream systems in the region. Petitioners submit the protecting the Southeast Alaska salmon portfolio for community well-being and the salmon themselves requires a Salmon Conservation Rulemaking.

Thank you,

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