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Dear Supervisor Sherman: February 20, 2025

On behalf of the University of New Mexico and Museum of Southwestern Biology, I am providing comments on the draft Assessment reports supporting the revision of the Tongass National Forest land and resource management plan (forest plan or plan). I am a Distinguished and Regents Professor of Biology and Curator of Mammals at the University of New Mexico (and formerly at the University of Alaska Fairbanks). For the past 34 years, my graduate students (23), postdocs (4), and I have studied the mammals (and associated symbionts) of the Tongass National Forest. I have completed multiple contracts focused on the mammalian communities of your incomparable forest, principally supported through the USDA Forest Service, US Fish and Wildlife Service and National Science Foundation. Based on that support, we have published more than 60 peer-reviewed papers (bibliography attached) on the wildlife of the Tongass.

Ecosystem "integrity" assessment criteria must be applied on an island-by-island approach.

The most compelling theme that emerges from our body of work is that the primary driver of the terrestrial ecosystems in Southeast Alaska is the fact that the Tongass NF is spread across a vast archipelago in a region of Alaska that is itself isolated from the rest of the continent. Isolation leads to distinctive, endemic plants and animals. From a conservation standpoint, island endemics are the most threatened worldwide. In the last 400 years, more than 50% of all terrestrial vertebrate extinctions have occurred on islands. Hence, the Tongass NF is spread across a complex landscape that is heavily prone to endangerment. Effectively managing this vast forest and the wildlife it sustains will require an "island centered" approach, much as we see management plans that have been implemented in other archipelagos with substantial numbers of species of concern (e.g., Haida Gwaii, Hawaii, Galapagos, Indonesia).

All island endemic flora and fauna should be considered species of conservation concern until adequate research evaluates their vulnerability.

USDA (and to a lesser extent USFWS and USGS) reviews of Tongass wildlife have tended to focus on a few old-growth associated, charismatic (goshawks, murrelets, deer, etc) species on the Tongass. More recently, "young growth" or secondary forests that are slowly emerging following clearcuts have become a major focus. Nearly 30 years ago a group of investigators began to look at the regional fauna from the perspective of the effects of isolation (endemism)--- a major driver in evolutionary biology. First, the region is largely isolated from the remainder of

North America by the coastal mountains with just a few river corridors connecting Southeast Alaska to BC. Second, the archipelagic landscape of much of the Tongass is a classic example of complexity wrought by isolation (with each island potentially representing an independently evolving set of wildlife populations). And third, clearcut logging had transformed many corridors into barriers or in some cases, completely annihilated ("skinned") old growth habitat on entire islands that potentially held endemic populations. All three of these scales can isolate populations and cause divergent evolution. Geographic isolation and small population sizes increase the strength of genetic drift in island populations, which can lead to relatively rapid evolution of novel diversity and endemism. Conversely, small populations hold less genetic variation, potentially reducing the possibility that populations will be able to adapt to changing conditions.

Key findings of the Final Tongass Assessment must include the need for a robust monitoring program that prioritizes data collection on endemic island species.

Unfortunately, there remains extremely limited documentation of diversity (and potentially endemic populations) across this vast archipelago (>1000 names islands requires substantial effort to document species identity and distribution). What has been the consequence? Heaviest deforestation has occurred on Prince of Wales Island, an island where we have subsequently found the signature of highest endemism across wildlife species. Not a good outcome and the kind of federal mismanagement that will lead to poor outcomes. Complex questions (and landscapes) require data to make informed decisions. The Tongass Plan should clearly direct the USDA Forest Service to work with others to continue to develop the biodiversity infrastructure necessary to manage this incomparable landscape in more robust and thoughtful ways.

The Final Tongass Assessment must address the lack of implementation of the 1997 TLMP requirements for Endemics, and use this inadequacy to identify specific actions that can be taken to protect endemic species with implementation of the 2012 planning rule in this next plan revision.

Resource allocations for wildlife studies have continued to flow primarily toward a few high profile species over the past 3 decades (you can see the list of "important" species by simply noting the names of the scientific panels convened (in 1996) for the 1997 TLMP). However, one science panel raised the issue of endemic taxa in the 1996 scientific review and endemism was the single topic that delayed the 1997 TLMP (by the courts). It would be valuable for planners to finally address the shortfall in critical information related to endemics and island centered management. External scientific review of the TLMP in 1997 (Shaw et al. 2000, Boyce and Szaro 2005, Smith 2005) prompted the inclusion of monitoring of endemics. Although the TLMP called for "surveys for endemic mammals prior to any project that proposes to substantially alter vegetative cover" since 1997, more than 2 decades later, no protocols or funding have been defined for long-term monitoring of endemics. Island endemics are especially sensitive to anthropogenic disturbance, as evidenced by the overrepresentation of insular endemic taxa among recently extinct (>54% for all vertebrate groups, Fernandez-Palacios 2021) and critically endangered vertebrate species globally (>35%, Tershy et al. 2015).

Endemics are Distinct Population Segments and should be evaluated as such for the Final Tongass Assessment.

The idiosyncratic nature of extinction and colonization on islands, combined with recent translocations or invasions (Doherty et al. 2016), complicate regional management and highlight the need to identify (i) appropriate units of conservation for endemics (e.g., Distinct Population Segments; DPSs) and (ii) goals for these units, before making decisions that impact endemics (Cook and MacDonald 2013). As defined by the United States Fish and Wildlife Service (USFWS; Fay and Nammack 1996), a DPS represents a discrete population or group of populations that are significant - ecologically, genetically, morphologically, or otherwise - relative to the entire species and which may be granted protected status under the US Endangered Species Act (16 U.S. Code Chapter 35). DPSs extend to subspecies and lineages or discrete populations with a distinct evolutionary history. Islands are landscapes that likely support DPS of native species.

Endemics are vulnerable to climate change and the vulnerability of island endemics to climate change needs to be analyzed as part of the Final Assessment, and identified as a priority in the Need for Change.

Further, with regard to vulnerabilities of Tongass wildlife to climate change, islands stand out as landscapes of high concern. One simply needs to look south to Haida Gwaii to see how changing environmental conditions have upended wildlife management priorities in the last decade. A large body of general work has been written about island conservation and climate change. To reiterate, effective management of an archipelago requires special consideration of island-focused conservation. This is especially true when considering climate disruption. Of the 3 primary options for species response to climate change (Move, Adapt, or Die), the first is either diminished or off the table on much of the Tongass. Adaptation is also diminished in small, genetically-depauperate insular populations. Hence, Die (extirpation or in the case of endemics extinction) is a very real outcome. Preliminary investigations suggest the Alexander Archipelago has elevated levels of endemism. This forest is complex and distinctive from most other USDA National Forests. The complexity of "island biology" must set the foundation for wildlife and forest management for the next Tongass Plan.

Here, it is important to note one example from the 1997 TLMP when the scientific review convened a panel that focused on only a single species of marten in the Tongass (*Martes americana*), yet subsequent molecular genetic work clearly pointed to the validity of two distinctive species on the forest (as was originally proposed more than a century before). One of these, the Pacific marten (*Martes caurina*), is now found only on Kuiu and Admiralty islands in Southeast Alaska and is likely to disappear on the former island soon. Overharvest of the Pacific

marten in the 20 century on some islands or subsequent introduction of the wrong species (*M. americana*) to *M. caurina* islands or deforestation (or a combination of all) may have led to the demise of endemic *M. caurina* populations, but we have little information. Still the prior TLMP was managing these two species as the same as late as the early 2000's (and effectively still does). Sadly, lack of proactive and meaningful incorporation of the principles of island conservation into management plans in Southeast Alaska by state and federal natural resource managers will likely lead to loss of endemic taxa and potentially difficult and complex litigation under ESA 1973 and NFMA 1976. How do we build resilience into Tongass management headed into changing environmental conditions? For one, we need to maintain evolutionary

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potential. Lack of information about endemics will lead to expensive mistakes for future generations.

Habitat corridors on specific islands, and across small island complexes must be identified, and rates of immigration, emigration, and isolation should be measured to indicate where fragmented populations are vulnerable to extirpation through loss of key habitat corridors

and further isolation.

Multiple habitat corridor areas within this complex landscape may be of special importance to the conservation of mammals and should be acknowledged by the next Tongass Plan. These include the habitats likely to experience climate effects along the Alsek, Chilkat, Taku, Stikine, Unuk, Kelsall, Whiting, Bradfield, and Chickamin river systems that potentially link the North Pacific Coast with the remainder of North America and between islands (see define biogeographic units) or within islands (pinch points on topographically complex islands like Kuiu-where logging has impacted corridors for wildlife movement).

The Final Assessment should identify and analyze threats to island endemics from non-native species introduced to islands of the Tongass National Forest.

Finally, the introduction of non-native animals, plants, and pathogens to Southeast Alaska should be avoided and monitored through coordination with ADF&G. The introduction and resulting spread of Red Squirrels to various islands in the Alexander Archipelago may prove detrimental to a number of populations of nesting birds. Similarly, the recent introduction of Elk to Etolin I. may be considered too "successful". Introductions elsewhere have had disastrous effects on island biotas. For endemic Haida ermine (*Mustela haidarum*'s global distribution is just a few islands in this region) and Pacific marten, the management of human pathogens (SARS CoV2) and human pets (canine distemper) are cause for concern (remember more than 1.5 million mink were highly susceptible to Covid and were destroyed in Belgium alone). The federal resources now being invested in Hawaiian bird conservation (related to climate change but primarily due to invasive pathogens and vectors is substantial. Will the Tongass being doing the same soon?

A key initial step in the Assessment process is identifying the attributes of ecosystem diversity, ecological integrity, and species persistence that will be measured and evaluated in the Assessment. These same attributes would then be considered in the development of plan components and the monitoring program and as effects in the NEPA process. For the responsible official to determine whether plan components provide ecological conditions to maintain the diversity of plant and animal communities, the Assessment must ensure that information is provided about those conditions. The responsible official should include key conditions in the Assessment within the following categories:

? Ecosystem and habitat type diversity (36 C.F.R. § 219.9(a)(2)): variety and relative extent of ecosystems

? Key characteristics associated with terrestrial and aquatic ecosystem types (and riparian areas)

? Rare aquatic and terrestrial plant and animal communities

? Diversity of native tree species

? Ecosystem integrity (36 C.F.R. § 219.9(a)(1)): quality or condition of these ecosystems

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? Composition

? Structure

? Function

? Connectivity

? Species composition and diversity

? Focal species including endemics

? Species persistence (36 C.F.R. § 219.9(b)): a prerequisite for species diversity and ecosystem integrity. Ecological conditions include human structures and uses as well as

the biological habitat characteristics that may overlap with characteristics for ecosystem integrity. Amount, quality, distribution and connectivity of habitat should be included among these conditions:

? Ecological conditions necessary to contribute to recovery of each threatened and endangered species

? Ecological conditions necessary to conserve each proposed and candidate species

? Ecological conditions necessary to maintain a viable population of each species of concern within the plan area

The habitat needs of endemic species should be an important consideration in defining ecosystems and selecting their key characteristics. Consequently, the first factor that should be considered for an Assessment is target species for the revised plan.

The regional forester should evaluate any suggested potential species against the criteria in 36 C.F.R. § 219.9(c) upon request. If the information about a species' abundance, distribution threats, trends or response to management indicates that the species may not continue to persist over the long term in the plan area with a sufficient distribution to be resilient, then the regional forester must select it as an SCC. If not, the regional forester must document the rationale for finding that a potential species does not meet the SCC criteria. Species considered as potential SCC but not meeting the criteria in 36 C.F.R. § 219.9(c) may be selected as public interest species.

During the process of determining if an endemic is at risk in the plan area, the regional forester should compile information about the ecological conditions necessary to comply with 36 C.F.R. § 219.9(b) for each species, including ecosystem composition, structure, function, and connectivity. These should include the most important habitat elements for an endemic, and should represent limiting factors or those being threatened by actions that may be influenced by plan components. This information should be largely applicable to a species across multiple plan areas. It would be provided to the responsible official to use in selecting key ecological conditions for these species.

An analysis of population viability may be appropriate to use to determine if endemics are currently at risk and should be considered a SCC and should be already available to be used for an Assessment for a revised. A new analysis of projected population viability may be appropriate as part of the diversity evaluation that occurs in the planning phase pursuant to 36 C.F.R. § 219.9(b). Identification of SCCs by the regional forester is a preliminary planning step. It consists of applying regulatory criteria to species in the plan area based on best available

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scientific information. While it requires the exercise of professional judgment, it permits no discretion by the Forest Service. It is appropriate and necessary for this determination to occur prior to most of the Assessment process. Selection of SCC may be revisited throughout the planning process as required by new information applicable to the two criteria in 36 C.F.R. § 219.9(c).

The purpose of focal species is to provide "meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area." 36 C.F.R. § 219.19. Therefore, focal species, especially endemics, should be part of the overall strategy for identifying species at risk and key ecological conditions, and the regional forester should play a role in identifying focal species as well as SCC. Effective monitoring may require that some SCCs be selected as focal species.

Thank you for the opportunity to comment on the draft Assessment reports for the Tongass National Forest plan revision. Spread across the Alexander Archipelago, the Tongass is unique in the National Forest System. Revising the forest plan presents an opportunity to address shortcomings of the existing plan and for wildlife that means more effective monitoring and management of endemics. I hope that my suggestions assist the Forest Service in achieving these objectives.

Sincerely,

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