March 9, 2026

U.S. Forest Service
Tongass National Forest

Re: South Revilla Timber Project – Support for Ketchikan Indian Community Objection and Required NEPA Supplementation

To Monique Nelson, Tongass National Forest Supervisor:

The Central Council of the Tlingit & Haida Indian Tribes of Alaska (Tlingit & Haida) submits this letter in support of the Ketchikan Indian Community's (KIC) objection regarding the South Revilla Timber Project. We share KIC's concerns and fully concur that the deficiencies identified in the current analysis must be remedied before any lawful Record of Decision (ROD) is issued.

The failure to address the issues raised in KIC's comment letter is not merely a procedural oversight; it is a substantive violation of the law. The omissions concerning Cultural Trees (CTs), cultural wood stewardship, projected climate-driven yellow-cedar mortality, and ANILCA subsistence impacts go to the heart of the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA), and the Administrative Procedure Act (APA). These are not peripheral matters—they are legally required considerations that must be meaningfully analyzed and incorporated into the Final Environmental Impact Statement (FEIS) and Final ROD.

Tlingit & Haida is deeply shocked and troubled by the information indicating that the Forest Service has altered Old Growth Reserve (OGR) boundaries on the Tongass without complying with the 2012 Planning Rule, NEPA, the Endangered Species Act, or its Government-to-Government consultation obligations. The apparent pattern of modifying, eliminating, and creating OGRs—without environmental analysis, public notice, Tribal consultation, or coordination with expert wildlife agencies—raises profound concerns about transparency, legality, and the integrity of forest management. The suggestion that OGR boundaries have been shifted or replaced without any evidentiary record demonstrating that newly designated areas meet old-growth ecological or wildlife requirements is alarming. Such actions undermine Trust obligations, disregard Tribal interests, including work currently underway on cultural tree stewardship, and threaten the ecological foundations the reserves were intended to protect.[1]

Tlingit & Haida strongly supports KIC's call to

1. Invoke the Appendix K process to modify OGR boundaries and restore the system's integrity following the AMHT exchange.
2. Convene an Interagency Team to identify "biologically preferred locations" for replacement reserves (2016 Forest Plan, App. K, p. K-2).
3. Update the Biological Evaluation to incorporate the findings of the 2023–2025 pre-assessment reports regarding climate resilience and habitat fragmentation.

The Forest Service must rectify the omissions identified by supplementing the NEPA analysis and incorporating explicit, enforceable CT and cultural wood stewardship mandates into all alternatives and the selected alternative in the Final ROD. The FEIS must also provide a detailed, project-specific explanation of how this action interacts with projected climate-driven yellow-cedar mortality and ANILCA subsistence protections. Addressing these issues now will not only resolve potential legal deficiencies but will also serve as a much-needed model for the ongoing Forest Plan Revision.

We expect the FEIS (via a supplemental EIS) and Final ROD to reflect these mandatory cultural and ecological protections. Accepting and resolving these concerns would significantly strengthen both this project and the broader Plan Revision effort. Conversely, failure to address these issues in a project of this magnitude could jeopardize not only this decision but also public confidence in the Plan Revision process itself.

The Forest Service chose to resurrect this project and must ensure that it now addresses all current legal and factual circumstances. The agency must not "pre-decide" issues or "pre-commit" management direction in a manner that predetermines fifteen years of action and contradicts the findings of the Plan Revision Final Assessments (BASI). To do so would constitute arbitrary and capricious decision-making. The South Revilla Project and the Plan Revision must be coordinated and harmonized—not positioned so that the former becomes an unlawful, irretrievable commitment of resources that constrains the latter.

No directives or external pressures alter the agency's statutory obligations. No meaningful opportunity for public comment on this project has occurred in nearly six

[1] Unauthorized changes to the OGRs calls into question the functionality of the entire conservation strategy of which the reserves are a part. We note that the recent Notice of Intent to prepare an environmental impact statement for the forest plan revision effort expressly stated that the Forest Service will not be revisiting the conservation strategy: however, given that it appears that the conservation strategy may not be functioning as intended, we strongly advise the Forest Service to consider retaining but updating the conservation strategy to improve its functionality. *See*, Berkley et al., *Relevance and Need For the Tongass Old-Growth Conservation Strategy - A Forest Plan Revision Pre-Assessment* (Aug. 2023); Brockmann, *Elements of the Tongass Old-Growth Conservation Strategy* (Aug. 2023).

years. While circumstances may have evolved and administrations have changed, NEPA and the APA remain fully applicable. So does the reality of accelerating climate change and ongoing Tribal subsistence needs. Addressing these realities is not optional; it is central to the Forest Service's legal duties under NFMA, NEPA, and the APA.

Finally, we call attention to two resolutions recently adopted by Tlingit & Haida that directly reinforce and amplify KIC's comments on the South Revilla Timber Project: EC 26-03, opposing the proposed rescission of the 2001 Roadless Area Conservation Rule and affirming continued protection of the Tongass National Forest, and EC 26-04, affirming Indigenous forest stewardship, conservation, and climate-responsive management across Tlingit & Haida homelands. Together, these resolutions articulate clear Tribal policy supporting durable roadless protections, the conservation of old-growth systems, and management approaches grounded in Indigenous stewardship and climate science. The concerns raised by KIC regarding Cultural Trees, cultural wood access, climate-driven yellow-cedar decline, subsistence protections, and the need to reduce clearcutting are fully consistent with—and indeed compelled by—these resolutions.

Any decision on South Revilla that weakens old-growth integrity, increases landscape fragmentation, or disregards Tribal co-stewardship obligations would directly conflict with the policy direction formally adopted by Tlingit & Haida and would further underscore the need for the Forest Service to meaningfully align this project with Tribal resolutions and ongoing Plan Revision efforts.

Tlingit & Haida look forward to the Forest Service's decision to update and supplement the NEPA analysis and to make this project the strongest possible example of lawful, climate-informed, and culturally responsible forest management.

Gunalchéesh/ Háw'aa,

Richard J. Peterson
President

Relevance and Need
For the
Tongass Old-Growth Conservation Strategy
A Forest Plan Revision Pre-assessment

Review Team:
Elizabeth Berkley, U. S. Forest Service, Alaska Region, Anchorage, AK
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August, 2023

U.S. Forest Service
Tongass National Forest

Executive Summary

As part of the Pre-assessment phase of an impending Tongass National Forest Plan revision, the Forest Service convened a Review Team to evaluate the need for and relevance of the existing Tongass Old-Growth Conservation Strategy (Conservation Strategy or Strategy) under a new Forest Plan. The objective of this review was to evaluate three potential options: (1) maintaining the Strategy as is, modified only as necessary to comply with the 2012 Planning Rule; (2) eliminating the Strategy in favor of more general, ecosystem-level guidance less focused on old-growth forest; and (3) updating or otherwise modifying the Strategy to improve its functionality.

The Conservation Strategy was developed in the 1990s and adopted as an integral part of the 1997 Forest Plan, to ensure continued existence of viable populations of old-growth dependent and old-growth associated wildlife, well-distributed across the Tongass. The Strategy includes a system of Large, Medium, and Small old-growth reserves, a network of old-growth corridors connecting the Medium and Large reserves, and a series of Standards and Guidelines that provide additional protection for species and species groups with conservation needs not fully addressed by the reserve system alone.

The Review Team considered the original purpose and subsequent evolution of the Conservation Strategy, and reviewed recently published scientific information on old-growth-associated species for which the Strategy was developed, additional species for which conservation concerns have been identified, landscape-scale conservation, and reserve design. This information was evaluated in the context of the 2012 Planning Rule's direction on conservation of ecosystem integrity and diversity, species viability, and climate change resilience. The report evaluates how each of the three options (i.e., keep, eliminate, or modify the Strategy) could work to protect the unique wildlife diversity of the Tongass National Forest, which is characterized by many endemic subspecies and genetic lineages.

The Review Team concluded that the structure and content of the existing Conservation Strategy appears to be largely consistent with the 2012 Planning Rule and that the Strategy continues to be relevant and necessary. Although the existing Strategy provides a solid basis for conservation of old-growth dependent species, the Team identified several potential modifications that would help address additional requirements of the 2012 Planning Rule, particularly those associated with ecosystem diversity and climate change resilience. The Team also recommends modifications to a few of the existing Standards and Guidelines to improve protection for vulnerable species. Ultimately, the Team recommends Option #3 – updating the Strategy to improve its functionality (i.e., keep, but modify).

The following recommendations, supported by analysis and citations in the main text, are provided:

- Update the existing Strategy to include explicit consideration of ecosystem diversity and climate resilience (Option #3 – keep, but modify).
- Update existing Standards and Guidelines addressing species-specific needs by:
  - Developing guidance on management of "post fledging areas" around each 100-acre goshawk nest buffer, to protect adequate habitat for fledglings learning to fly and hunt.
  - Increasing seasonal buffers around known wolf dens to reduce disturbance during pup-rearing, and maintain adequate forest cover for wolves and their prey species.
  - Improving connectivity of Small Old-Growth Reserves (through corridor protection and forest restoration) for flying squirrels and other wildlife.

    - Protecting old-growth stands occupied by marbled murrelets, rather than only known nests (which are not routinely searched for, difficult to find, and rarely discovered).
- Consider additional conservation measures for species with emerging conservation concerns (marbeled murrelet, little brown bat, western screech owl, and yellow-cedar).
- Develop monitoring programs for vulnerable species to inform adaptive management.
- Develop a GIS database of existing old-growth corridors that connect designated reserves.
- Identify and retain existing “Very Large” old growth reserves in each biogeographic province.
- Include ADF&G, USFWS, and Tribes in discussions related to modification of the Strategy.
- Retain the Interagency Review Process for OGR modifications (Appendix K).
- Compile all elements of the Conservation Strategy into a discrete, stand-alone document.
- Appendix C lists additional evaluations recommended by the Team to inform the Assessment and Plan Development phases of the revision.

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Relevance and Need for the Tongass Old-Growth Conservation Strategy

Introduction

In 1997, the U.S. Forest Service adopted an updated Land and Resources Management Plan (Forest Plan) for the Tongass National Forest (Tongass) in Southeast Alaska that included a comprehensive strategy intended to provide for long-term viability of wildlife species associated with or dependent on old-growth forest (USFS 1997 ROD). This strategy, referred to as the Tongass Old-Growth Conservation Strategy (Conservation Strategy or Strategy), was retained with minor modifications through 2008 and 2016 amendments of the Forest Plan (USFS 2016 ROD, 2008 ROD). The Forest Service is now initiating a comprehensive Tongass Forest Plan revision under planning rules adopted in 2012 (2012 Planning Rule). The process of revising a Forest Plan begins with an Assessment to evaluate existing information relevant to the plan area within the broader landscape, prior to development of a proposed plan for analysis and public comment. This report is intended to inform the Assessment and aid in development of a revised Forest Plan.

Forest Service planners are currently considering evaluation of three options for the Conservation Strategy during the Forest Plan revision: (1) maintaining the Strategy as is, modified only as necessary to comply with the 2012 Planning Rule; (2) eliminating the Strategy in favor of more general, ecosystem-level guidance that includes old-growth forest with other ecosystems; and (3) updating or otherwise revising the Strategy to improve its functionality. This report provides background to inform development and evaluation of these three options.

Report Organization

In this report, we review the purpose and evolution of the Conservation Strategy and describe relevant new science available on species for which the Strategy was designed, as well as literature for species for which there are emerging conservation concerns. We also discuss recent developments and reviews of conservation strategy design that may be useful to the Assessment. Following this review of new science, we address several relevant aspects of both the 2012 Planning Rule, which will guide the Forest Plan revision process, and Executive Order 14072, which addresses management of federal forest lands, with focus on mature and old-growth forests. With this background, we describe and evaluate the three options listed above (i.e., retain, eliminate, or modify the Strategy). The main text concludes with a list of our recommendations for the Conservation Strategy. Appendices A and B, which follow our bibliography of cited literature, provide additional background and summarizes scientific information that has become available since the last comprehensive review of the Conservation Strategy in 2007, for each of the original eight species for which the Strategy was developed, and for four species with emerging conservation concerns. Appendix C offers an annotated list of evaluations that we believe would help inform the Assessment and Development phases of the Forest Plan revision.

Purpose and Evolution of the Tongass Old-Growth Conservation Strategy

1997 Revised Forest Plan

The Conservation Strategy was initially developed by a team of nine wildlife biologists representing three agencies (U.S. Forest Service, Alaska Department of Fish and Game, and U.S. Fish and Wildlife Service) in the 1990s. This interagency team, known as the “Interagency Viable Population Committee” or “VPOP”, was tasked by the Forest Service with developing a strategy for maintaining viable populations of native wildlife, well-distributed across Southeast Alaska. The committee screened 356 vertebrate species that occur in Southeast Alaska and identified eight species associated with old-growth forest habitats for which there were viability and/or distribution concerns. These species, which served as “design species” for the strategy, included northern goshawk (*Accipiter gentilis laingi*), great blue heron *(Ardea herodias fannini*), Alexander Archipelago wolf (*Canis lupus ligoni*), brown bear *(Ursus arctos*), American marten *(Martes americana*), river otter (*Lutra canadensis mira*), mountain goat *(Oreamnos americanus)*, and northern flying squirrel (*Glaucomys sabrinus*). The proposed strategy ultimately included a network of protected habitat patches (“reserves”) connected by forested corridors (primarily marine beach fringe and freshwater riparian buffers), and species-specific management standards deemed important for maintaining viability and distribution (Suring et al. 1993).

The reserve system was developed as a “coarse filter” element to meet the needs of species requiring forested tracts of various sizes and was intended to provide “umbrella” habitat protection for a broad diversity of species beyond the eight old-growth associated species that were used to guide design of the system. Species-specific standards were added as “fine-filter” elements to provide additional protections in the managed “matrix” lands outside the reserves, for species whose needs would not be fully met by the reserve system alone.

The draft strategy was peer-reviewed by 18 research scientists from across the country, with expertise in conservation biology (Kiester and Eckhardt 1994). This review, which was coordinated by the Forest Service’s Pacific Northwest Research Station, led to modifications of the proposed strategy (Suring et al. 1994), particularly with respect to reserve sizes and corridor widths.

Various versions of the individual Conservation Strategy elements (i.e., reserves, beach buffers, riparian buffers, species-specific standards, etc.) were included in different combinations across 10 different action alternatives evaluated in the 1997 Forest Plan amendment environmental impact statement. Risk assessment panels composed of species experts rated relative risk of each Forest Plan alternative to continued persistence of each of the design species (Shaw 1999). The findings of these panels were described in Appendix N of the 1997 Forest Plan Final Environmental Impact Statement (USFS 1997 FEIS, App N) and by Shaw (1999).

A revised version of the Strategy was ultimately adopted as an integral part of the 1997 Forest Plan (USFS 1997 ROD, pp. 6-7). Elements of the Strategy were dispersed throughout the plan, and included mapped reserves, Standards and Guidelines, and Appendices. The Forest Plan designated a system of Large, Medium, and Small Old-Growth Reserves (OGRs) that met specified minimum size, composition, and spacing criteria (USFS 1997 Forest Plan, App. K). The reserve system included all “non-development” Land Use Designations (LUDs) that were already in protected status, such as congressionally designated Wilderness, National Monument, and LUD II Roadless Areas, and Forest Service-designated LUDs such as Remote Recreation or Municipal Watershed that did not allow timber harvest (USFS 1997 ROD p. 7).

Where necessary to meet the size and spacing criteria of the Conservation Strategy, a new Old-Growth Habitat LUD was applied to dedicated OGRs. Small OGR locations were considered draft and were to be reviewed by interagency teams during project-level analyses (USFS 1997 Forest Plan, OG Management Prescription WILD122, p. 3-80 to 3-82; and App. K). Additional guidance on interagency review of Small OGRs was provided by the Tongass Plan Implementation Team (TPIT) (1998, p. 1).

At least one "very large" OGR (>120,000 acres) was identified in each biogeographic province where possible (USFS 1997 FEIS App N, p. 21 and ROD, p.7), to address concerns expressed during the peer review for conservation of brown bear and wolf, which have large home ranges and are sensitive to human interactions (Keister and Ekhardt 1994). These reserves were not formally designated as "Very Large", but were included within the "Large" reserve category (all of which were to exceed 40,000 acres). Specific criteria requiring very large reserves in each province were also not included in the Forest Plan's Appendix K reserve criteria. (We recommend that proposals to adjust large reserves should account for, and maintain, these very large reserves, which are not explicitly described in the Forest Plan.)

Connectivity between OGRs was provided by 1,000-foot-wide, protected buffers along all marine and estuary shorelines, and riparian buffers of variable widths. The original VPOP proposal had called for riparian buffers of at least 100 feet on each side of streams (200+ feet total buffer width) to provide corridors for animals moving through managed matrix lands (Suring et al. 1993). This criterion matched riparian buffers required at the time by the Tongass Timber Reform Act (TTRA, P.L. 101-626) to protect anadromous fish habitat. The 1997 Forest Plan substantially increased riparian protections, particularly for headwaters and other non-fish-bearing streams, with adoption of stream protection measures recommended by the Anadromous Fish Habitat Assessment (AFHA 1995). New standards and guidelines required identification and delineation of Riparian Management Areas for each project where land disturbance would occur. Buffer widths varied with stream gradient and channel type. These enhanced riparian buffers were to be integrated into the Conservation Strategy as they were identified for each project (USFS 1997 FEIS, p. N-23; ROD, p. 7; Plan, pp. 4-52 to 4-55).

The network of marine shoreline and freshwater riparian buffers was intended to provide landscape linkages between Large and Medium OGRs. Where these buffers failed to provide continuous, forested connectivity between reserves, additional corridors were to be designated during project-level analyses (USFS 1997, Plan, p. 4-118). Additional guidance on evaluation and designation of old-growth corridors was provided by TPIT (1998, pp. 14-15). Their preliminary review of existing corridors identified several old-growth reserves with inadequate connectivity due to previous harvest and isolation.

No connectivity was required among Small OGRs. Instead, Small OGRs were intended to serve as temporary habitat for animals moving between the larger reserves, and as longer-term habitat for species with smaller home ranges (e.g., 20 to 40 flying squirrels per reserve) (Suring 1993; USFS 1997, Plan, App. K). Acres allocated to Small OGRs could also be used to protect corridors between Medium and Large OGRs where necessary (USFS 1997, Plan, p. 4-118).

Beach, estuary, and riparian buffers were expected to provide adequate habitat for river otters, without additional fine-filter, species-specific standards (Suring et al., p. 35). Forest-wide standards and guidelines were included for each of the other design species (USFS 1997 Plan, pp. 4-111 to 4-117). Standards and guidelines that applied only in areas that had been most impacted by timber harvest (not Forest-wide) required retention of legacy forest structure in timber harvest units larger than two acres to provide habitat for goshawks and marten.

Timber harvest was prohibited on all islands smaller than 1,000 acres to protect endemic terrestrial species (USFS 1997 ROD, p.7 and 36). Surveys for endemic terrestrial mammals were required prior to any project proposing to substantially alter vegetative cover (e.g., road construction, timber harvest, etc.) on islands smaller than 50,000 acres, and projects were to be designed to provide for long-term persistence of any distinctive taxa present (USFS 1997 Plan, p. 4-117).

Additional Standards and Guidelines were included in the Forest Plan for several other species (e.g., marine mammals, seabirds, shorebirds, moose, waterfowl, other raptors, etc.) not directly addressed by VPOP, peer reviews, or risk assessment panels. We consider these plan components important but outside the scope of the Conservation Strategy and this report.

2008 Forest Plan Amendment

In preparation for a Forest Plan amendment, the Forest Service hosted an interagency workshop with invited scientists in April 2006 to review new scientific information relevant to the Conservation Strategy (USFS 2008 Workshop Proceedings). The Forest Service also commissioned a comprehensive review of scientific information on conservation strategies, conservation planning, population and species viability, and landscape ecology produced since the Conservation Strategy was originally developed (Haufler 2006). The presentations, discussions, and literature review all suggested that the design of the Conservation Strategy structure (i.e., "coarse filter" system of connected reserves supplemented by a "fine filter" set of species-specific management standards and guidelines to protect vulnerable species in the matrix outside reserves) remained well-supported by current science.

Several modifications (termed "Considerations" in the language of the workshop) were recommended to improve effectiveness of the reserve system and management standards, based on research from Southeast Alaska on goshawks, wolves, marten, brown bears, forest birds, endemic small mammals, and other species. The findings and recommendations shared at the workshop, and subsequent discussions among panelists, were summarized in workshop proceedings (USFS 2008 Workshop Proceedings) and in a comprehensive review and analysis of the Conservation Strategy included in the 2008 Forest Plan FEIS (USFS 2008 FEIS App. D).

Haufler's (2006) review recommended several modifications, including finer-scale viability analyses for endemic and isolated populations of vulnerable species to determine adequacy of the Conservation Strategy for endemic species and an evaluation of plant association representation in the reserve system to ensure comprehensive conservation of ecosystem biodiversity.

The 2008 Forest Plan revision adopted final locations for all but a few of the Small OGRs, eliminating the need for most project-level OGR reviews. It also combined and replaced goshawk and marten Standards and Guidelines describing legacy forest structure requirements with a simplified and less restrictive Legacy Forest Structure Standard and Guideline that applied only to harvest units larger than 20 acres (rather than two acres as required in the 1997 Forest Plan) over a larger portion of the Forest. A new guideline was included that allowed harvest of probable goshawk nesting habitat if no evidence of nesting was observed in two consecutive years. These changes to goshawk and marten standards effectively weakened habitat protections within the matrix. The endemic terrestrial mammal standard was modified to allow the use of existing inventory data, rather than project area surveys, where existing information was considered adequate to assess project-level effects on endemic mammal distribution. Guidance on project-level analyses of wolf mortality was modified to require consideration of human access to the project area via all roads, not just roads open to vehicular traffic. Other improvements recommended during the 2006 Interagency Conservation Strategy Review workshop were not adopted.

2016 Forest Plan Amendment

In 2016, the Forest Plan was amended to expedite transition away from old-growth timber harvesting and towards a forest products industry that uses predominantly young-growth forests (USFS 2016, Forest Plan ROD, p. 5). Additional Forest Plan components were developed to facilitate development of renewable energy sources and manage the Forest's transportation system corridors.

Under the amended 2016 Forest Plan, young-growth may now be harvested within the Old-growth Habitat LUD, and in beach and estuary fringe and Riparian Management Areas (stream buffers), with certain restrictions, during the 15 years following adoption of the amended plan. The net effect of such harvest in reserves and corridors on wildlife was expected to vary depending on the type of treatment, condition of surrounding forest stands, size of created openings, species being considered, and extent of harvest (Bennetsen and Jacobson 2016). Little or no young-growth has been harvested on these conservation lands to date, so the impacts are believed to be negligible at this time.

Old-growth harvest was further restricted, but young-growth harvest was allowed, within development LUDs located in watersheds identified as high conservation priority by Trout Unlimited ("T77 watersheds") (Trout Unlimited undated) or as "Conservation Priority Watersheds" by The Nature Conservancy and Audubon Alaska in their 2007 conservation assessment of Southeast Alaska (Albert and Schoen 2007, pp. 34-43) (USFS 2016, ROD pp. 7-8 and 37). This additional protection potentially reduces risks to old-growth-dependent and –associated species in those areas. The ROD commits the Forest Service to a review of the environmental effects of young-growth harvest in these conservation priority areas after five years of Forest Plan implementation. This review is in progress with a draft completed by the Interdisciplinary Team in collaboration with the Tongass Transition Collaborative.

Land Transfers

Modifications to the Conservation Strategy reserve system have occurred as a result of two major land transfers. The National Defense Authorization Act for Fiscal Year 2015 authorized conveyance of 18 parcels of Tongass National Forest land totaling 69,585 acres to Sealaska, the Alaska Native regional corporation for Southeast Alaska (USFS 2016 Forest Plan ROD, p. 21). Substantial portions of the conveyed lands were formerly Medium or Small OGRs that may now be logged under the less-restrictive forestry regulations of the State of Alaska. To compensate for loss of the conservation lands, Congress designated approximately 152,000 acres of new LUD II Roadless Areas, providing more protection to undeveloped areas remaining in the vicinity of several of the land conveyances.

Following completion of the conveyances, an interagency review team evaluated the remaining protected areas for compliance with the OGR size, spacing, and composition criteria of the 2008 Forest Plan's Appendix K. The team recommended several OGR modifications that were adopted as part of the 2016 Forest Plan amendment, resulting in a net increase of 6,171 acres of OGR and 7,148 acres of productive old-growth forest in the reserve system from post-conveyance levels (USFS 2016 Forest Plan ROD, p. 21).

A 2018 interagency team reviewed one of the small OGRs affected by the Trust land exchange and recommended modifications to compensate for the impacts to habitat connectivity, as part of the Interagency Review Process initiated for the POW Landscape Level Analysis (POW LLA) (IRT 2018). The recommendation was not implemented because the proposed modification would not have overlapped activities proposed by the POW LLA (USFS 2019, pp. 19-20).

In 2022, the Forest Service completed a land exchange with the Alaska Mental Health Trust (Trust). Approximately 21,000 acres of National Forest System lands (including 10,200 acres suitable for timber production and 1,300 acres of Old-Growth Habitat LUD) were conveyed to the Trust. These lands are expected to be logged, to provide income for the Trust. The Forest Service acquired approximately 18,000 acres, all of which will be managed for natural conditions and recreation (as required by enabling legislation). Approximately 1,950 acres of acquired lands will be managed as old-growth habitat.

No comprehensive interagency review was done specifically for the land exchange, as specified by Appendix K of the 2016 Forest Plan. Instead, an internal review concluded that "Requirements of the Old-Growth Conservation Strategy continue to be met in areas where old-growth habitat was conveyed" (Stewart 2022 Correspondence with enclosure, dated April 26, 2022).

Implementation of specified interagency OGR review procedures following land conveyances was identified as a chronic issue at the 2006 Conservation Strategy review workshop (USFS 2008 Workshop Proceedings. Pp. 102-103). We recommend that guidance on the Interagency Review Process be included in Forest Plan components or as an appendix addressing land conveyances, to alert lands staff to the procedural requirements similar to that of Appendix K. Such guidance should point out that transfer of any lands from non-development LUDs could affect functioning of the reserve system and should trigger a review process.

New Information on Conservation Strategy Design Species

The 2012 Planning Rule requires the Forest Service to use the best available science and document how that information was used to inform development of Forest Plans. The original Conservation Strategy was developed using the best available scientific information and expertise available at that time on the ecology of select focal species and methods for conserving important elements of their habitat (USFS 2008 FEIS App. D). Modifications to the Conservation Strategy should likewise reflect the latest scientific findings on landscape-scale conservation of the species for which the Conservation Strategy was designed, or other species as indicated by the best available science.

In Appendix A, we provide brief synopses of each of the eight original design species, summarize vulnerabilities and conservation status of each, and offer examples of information published since the last comprehensive review in 2007, as part of the 2008 Forest Plan amendment process (USFS 2008 Workshop Proceedings, USFS 2008 FEIS App D). (A brief review was conducted for the 2016 Forest Plan amendment (USFS 2016 FEIS, App. D) to evaluate potential impacts to the "integrity" of the Strategy. This review did not include species-specific accounts beyond discussions related to proposed modification of individual Standards and Guides.)

Below we highlight some of the relevant new information on the original design species. Our discussions here are cursory and intended to be introductory. We recommend more thorough investigation of these species during the Forest Plan revision if substantial modifications to the Strategy are considered. See Appendix A for additional information on each of these species.

Queen Charlotte Goshawk

Recently available literature on the Queen Charlotte goshawk subspecies (*A. G. laingi*) includes comprehensive reviews of species ecology and habitat management needs (Boyer 2020, Parks Canada Agency 2018, Vennesland 2018, McClaren et al. 2015, Smith 2013, CFCI 2012, USFWS 2007), foraging ecology and diet (Case 2021), and genetic diversity and differentiation (Kunz et al. 2019, Geraldes et al. 2019, Bayard de Volo 2013, Sonsthagen et al. 2012). The Northern Goshawk Habitat Recovery Implementation Group in British Columbia has produced a habitat and territory model for the subspecies in Canada that offers good insight into habitat needs (Smith and Sutherland 2008) that could be adapted as a method of monitoring habitat capability for goshawks in managed portions of the Tongass.

One shortcoming of the Tongass' Conservation Strategy is insufficient conservation of suitable habitat to create "post-fledging areas" surrounding more rigidly protected nest stands, to provide adequate forested habitat for fledgling goshawks learning to fly and hunt, as recommended by Smith and Flaherty (2023), Parks Canada Agency (2018), McClaren et al. (2015), Smith (2013), CFCI (2012), and USFWS (2007). Smith (2013) evaluated foraging habitat around 136 known goshawk nests across Southeast Alaska and found that most were in areas with inadequate protection of suitable foraging habitat, for either fledglings or resident adult females. Smith and Flaherty (2023) concluded that the Conservation Strategy "is not contributing sufficient secure habitat to sustain breeding pairs of the northern goshawk across southeast Alaska".

The VOP committee recommended that no timber harvest be allowed within a core area of about 1,600 acres surrounding each goshawk nest, no roading or recreational development within ¼ mile (126 acres) of each nest, and harvest of no more than 5 percent of the productive old growth per decade in the remainder of the (approximately 5,000-acre) home range outside the core area (Suring et al. 1993). These recommendations were not implemented in the 1997 Forest Plan.

The current Forest Plan provides for 100-acre buffers of unharvested productive old-growth around confirmed goshawk nests. (This protection lasts only two years around probable but unconfirmed goshawk nests, which is inconsistent with known goshawk nesting behavior). This buffer is intended to minimize disturbance to nesting goshawks and presumably provide habitat for fledglings near the nest, but is well below standards recommended by goshawk specialists. Boyer (2020) and Doyle (2006) provided examples of treatments to improve second-growth in post fledging areas. We note that timber harvest need not be prohibited in the post fledging area (outside core nest stand areas which are currently protected by 100-acre nest buffers on the Tongass). Instead, most management guidelines recommend restrictions on timing, extent, and methods of timber harvest in the post fledging area.

Alexander Archipelago Wolf

New information on Alexander Archipelago wolves includes analyses of diet (Roffler et al. 2021), habitat and den site selection (Roffler et al. 2018, Roffler and Gregovich 2018, Person and Brinkman 2013, Person and Russell 2009), and wolf harvest vulnerability (Gilbert et al. 2022, Gilbert et al. 2016, Wolf Technical Committee (WTC) 2017, Person and Brinkman 2013, Person and Logan 2012, Person and Russell 2008). Management of deer habitat is tightly connected to wolf management and has been addressed by WTC (2017), Gilbert (2015), Brinkman et al. (2011), Person et al. (2009), Nelson et al. (2008), Farmer and Kirchoff (2007), Farmer et al. (2006), and Schoen and Kirchoff (2007). Bennetsen (2020) provided a recent literature review of young growth management for both wolves and deer. Additional information on deer foraging ecology can be found in Hanley et al. (2014, 2012) and Shanley et al. (2021). Genetic evaluations of wolf taxonomy and evolutionary history have been published by Pacheco et al. (2022), Zarn et al. (2019), Hendricks et al. (2019, 2018), Schweizer et al. (2016), Weckworth et al. (2015), Cronin et al. (2014), and Weckworth et al. (2011). Each of these topics are reviewed in USFWS (2015).

Recommendations specifically addressing management of denning habitat on the Tongass are provided by Roffler and Gregovich (2018), who recommended expanding seasonal den site buffers to at least 734 m (approximately ½ mile), including as much flat, low-elevation old-growth near freshwater as possible, and retaining productive old-growth forest on at least 61 percent of each core denning area. Additional habitat recommendations are provided by WTC (2017).

The U.S. Fish and Wildlife Service is currently evaluating a 2020 petition to list the subspecies as threatened or endangered (the fourth such petition since 1993). The petition was prompted primarily by harvest mortality from trapping and hunting on POW that has exceeded the State of Alaska's guideline harvest level of 30 percent of the estimated fall wolf population several times in recent years. Road systems built largely in support of timber harvest on the island have been implicated as increasing wolf vulnerability to harvest. The importance of large reserves in minimizing overharvest of wolves, and the impacts associated with higher road densities, are highlighted by Person and Logan (2012), Person and Russell (2008), and WTC (2017).

Northern Flying Squirrel

Although Forest Plan Standards and Guidelines refer to northern flying squirrels generally, conservation concerns on the Tongass have focused on the POW flying squirrel (*G. S. griseifrons*), a subspecies restricted to several islands in the POW complex. Recent research on the species includes work on home range size, fine-scale movements, dispersal, foraging, and energetic costs of traversing fragmented forest on POW (Flaherty et al. 2010, Flaherty et al. 2008). Pyare et al. (2010) studied den site selection in fragmented landscapes while Shanley et al. (2013) looked at local and landscape scale habitat selection based on composition and structure. Several authors (including Smith and Flaherty 2023, Trapp et al. 2019, Smith 2012, Smith et al. 2011, and Smith and Person 2007) evaluated flying squirrel dispersal and landscape connectivity.

Smith and Person (2007) studied demographic viability of flying squirrels in small reserves of various composition, with different levels of landscape connectivity versus isolation. They concluded that small OGRs do not have a high probability of supporting flying squirrel populations in isolation for long periods. The contribution of small OGRs to conservation of flying squirrels depends on the degree of isolation and functional connectivity with other large, medium, or small reserves. Smith and Person (2007) suggested that conservation planning that explicitly considers quality and configuration of OGRs in a modified landscape is essential to ensure functional metapopulations of flying squirrels. Additional research suggested that local extirpations are likely, especially in smaller reserves (Smith et al. 2011).

Small OGRs across the POW complex currently provide an average of about 1,300 acres of productive old-growth, ranging from about 300 to over 3,500 acres per small OGR (Tongass OGR Tracking Table 2013. This suggests that most small OGRs would require immigration on the lower end of Smith et al.'s (2011) estimates, to maintain viable flying squirrel populations. These findings, though, underscore the importance of habitat connectivity between small OGRs, which is currently not required by the Forest Plan. (The original VPOP recommendations (Suring et al. 1993, pp. 29-30) included connecting corridors of old growth forest between all reserves, including small reserves, with gaps no greater than 65 feet to allow flying squirrels to glide across openings). Additionally, Smith et al. (2011) recommended spacing reserves no more than 1 km (0.6 miles) apart to facilitate successful dispersal between reserves and increasing the amount of productive old-growth in small OGRs.

This work on the inadequacy of small OGRs to provide for persistence and dispersal of flying squirrel populations was later cited by Smith and Flaherty (2023) in their critique of the existing Conservation Strategy. These studies of flying squirrel demographics and dispersal through forested and harvested landscapes are directly relevant to an update of the Forest Plan and its Conservation Strategy.

American Marten and Pacific Marten

Recent literature on marten includes research on habitat selection (Flynn and Shumacher 2016), dispersal distances (Pauli et al 2012), foraging ecology (Manlick et al. 2019), population dynamics (Flynn and Schumacher 2009), genetics and endemism (Collela et al. 2018, Collela et al. 2019, Collela et al. 2021, Dawson et al. 2017), and colonization history and distribution (Pauli et al. 2015, Dawson et al. 2017).

Concerns have emerged for isolated populations of Pacific marten (*M. caurina*), now considered a distinct species limited, in Southeast Alaska, to Kuiu Island (where it hybridizes with American marten) and Admiralty Island (where genetic diversity is low) (Collella et al. 2021, Collela et al. 2019, Collela et al. 2018, Dawson et al. 2017, Cook and MacDonald 2013, MacDonald and Cook 2007). Genetic evidence suggests that where the two marten species hybridize, as documented on Kuiu Island, asymmetrical gene flow can result in slow removal of Pacific marten genetics, ultimately leading to genetic swamping and extirpation of Pacific marten (Collela et al. 2021, Collela et al. 2019, Dawson et al. 2017). Some authors suggest that this may have occurred on POW and other islands in Southeast Alaska (Collela et al. 2019, Dawson et al. 2017, Pauli et al. 2015).

A habitat selection study on Chichagof Island (using data from the 1990s) confirmed selection for structurally complex, old-growth forest habitats (Flynn and Schumacher 2016). On Kuiu Island, important predictors of marten habitat at landscape scales included lower elevation, closed canopy old-growth forest in areas with higher densities of salmon streams near the coast (Koch 2016). The predictor variables of marten habitat from Koch (2016) confirm the continuing need for old-growth forest and riparian zone protections in lower elevation areas, and provide support for potential modifications where such habitat protection is lacking.

An apparent emerging threat to American marten is recent fisher (*Pekania pennanti*) colonization along mainland rivers (especially the Taku River) in Southeast Alaska (Kupferman et al. 2022). Where there is range overlap, fishers are a dominant competitor that suppress marten populations (Pauli et al. 2022, Manlick et al. 2017).

Prince of Wales River Otter

We found no new science on the POW river otter subspecies. However, during NEPA analyses, wildlife and subsistence biologists often cite the Conservation Strategy or Forest Plan standards and guidelines as sufficient to protect river otter habitat, highlighting the ongoing importance of beach and estuary fringe buffers and riparian management areas for this species.

Brown Bear

New findings on brown bears include studies related to resource and habitat selection, spatial use, movement patterns, and home range sizes (Crupi et al. 2014, Flynn et al. 2007); diet and the role of bears in the food web (Harrer and Levi 2018, Shakeri et al. 2018); and impacts of humans on bear foraging (Wheat and Wilmers 2016). The most relevant findings from Flynn et al. (2007) documented differences in habitat selection by male and female brown bears in altered versus less altered watersheds on Chichagof Island. They found that bears, especially females, spent more time farther from salmon spawning streams, and female bears were more abundant and consumed more salmon in less altered watersheds. Based on spatial use patterns adjacent to salmon streams, Flynn et al. (2007) recommended retention of at least 500 ft no-cut buffers along streams with spawning salmon and larger buffers and/or increased habitat protections where bear populations are a management objective. This recommendation was effectively incorporated into a guideline in the current Forest Plan (pg. 4-88).

Mountain Goat

Recent literature on mountain goats confirm that they are sensitive to climatic variables including amount of snowfall in winter and heat stress in summer, both of which can reduce mountain goat survival (White et al. 2018, White et al. 2011). White et al. (2018) predicted that projected increases in summer temperature would have stronger negative effects on mountain goat populations than the potential positive effects of reduced winter snowfall, prompting concerns over species persistence.

Other research focused on colonization history, phylogenetics, habitat selection and genetic isolation of Southeast Alaska populations (Shafer et al. 2012, Shafer et al. 2010). Shakeri et al. (2021) demonstrated that mountain goats exhibited a strong degree of seasonal range fidelity, with space use expanding in the summer and constricting during the winter. Continuing to emphasize protection of critical winter habitat, which is often old or mature forests in lower elevation areas near cliffs, may be an important consideration in the Conservation Strategy and in light of future climate scenarios.

Pacific Great Blue Heron

Recent research on Pacific great blue heron (*A. h. fannini)* in British Columbia demonstrated that colonies close to bald eagle nests experience higher reproductive success than those far from bald eagle nests (Jones et al. 2013). Breeding colonies close to bald eagle nests were large enough that the occasional losses of chicks to the resident pair were outweighed by higher reproductive success. Relevant implications to the Conservation Strategy of this study are limited, other than the importance of protecting both known roosting/colony sites of herons and bald eagle nests (requirement under law (Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act).

Additional background on each of these original design species is provided in Appendix A.

Species with Emerging Conservation Concerns

Recent information suggests that several old-growth-associated species that were not part of the original design of the Conservation Strategy may need further consideration. Here we review four such species, including marbled murrelet (*Brachyramphus marmoratus*), little brown bat (*Myotis lucifugus*), western screech-owl (*Megascops kennicottii*) , and one plant, yellow-cedar (*Callitropsis nootkatensis*).

Marbled Murrelet

The marbled murrelet was considered abundant and well distributed in Southeast Alaska in the 1990s, when the Conservation Strategy was developed. Since then, substantial and potentially alarming population declines have been reported across Alaska, including an estimated 79 percent decline in marbled murrelet numbers in Southeast Alaska between 1994 and 2006 (Piatt et al. 2007). Declines were more recently documented in 2016 by ADF&G in Tracy and Endicott Arms of Southeast Alaska: about half as many marbled murrelets were recorded in July 2016 (Nesvacil et al. 2018) as in July 2002 (Kissling et al. 2011). Causes of the observed population declines have not been explicitly investigated in Southeast Alaska.

Other recent studies of marbled murrelets in Alaska have focused on marine space use, movements, foraging behaviors, and disturbance by vessels (Barbaree et al. 2015, Bertram et al. 2016, Haynes et al. 2008, 2010; Haynes and Nelson 2011, Pontius and Kirchhoff 2009, Schoen et al. 2013). One recent study investigated the nesting ecology of marbled murrelets in Southeast Alaska (Barbaree et al. 2014).

Little Brown Bat

Populations of the little brown bat have been declining across North America, primarily due to mortality caused by white-nose syndrome, a fungal disease that has spread rapidly since it was first detected in New York in 2006. The disease was detected in British Columbia in 2023, and is expected in Southeast Alaska in the near future. The U.S. Fish and Wildlife Service is currently evaluating whether to list the species range-wide.

Research on the Tongass has documented that little brown bats near Juneau hibernate in dispersed sites, close to summering areas, which may slow the spread of white-nose syndrome and reduce impacts to Southeast Alaska populations should it arrive in Alaska (Blejwas et al., 2021).

Western Screech-Owl

Recent research in Southeast Alaska has confirmed that the species is found primarily at lower elevations and is often associated with riparian habitats (Lewis and Kissling 2009). Concerns over impacts to screech-owls due to habitat loss and competitive exclusion by barred owls (*Strix varia*) have led to federal listing of the western screech-owl as “Threatened” under the Species at Risk Act in adjacent British Columbia (COSEWIC 2012, Elliot 2006). Similar concerns for habitat impacts and competitive displacement by barred owls have been raised for (unlisted) populations elsewhere (Acker 2012, Cannings and Angell 2001, Hardy et al. 1999).

Competition from barred owls for prey and nest sites, and suspected direct predation have also been implicated in declines of spotted owls *(Strix occidentalis*)*,* screech-owls, and other species in the Pacific northwest, as barred owls have expanded their range across the region (Acker 2012, Olson et al. 2005, Kelly et al. 2003, Pearson and Livezey 2003, Cannings and Angell 2001). Similar dynamics may be occurring as the barred owl expands its range northerly into Southeast Alaska. Kissling et al. (2009b) documented apparent displacement of western screech-owls in southern Southeast Alaska by barred owls, as the distribution and occupancy rate of barred owls expanded, particularly on the mainland, and distribution of screech-owls narrowed between historic (1986-1992) and recent (2005-2008) surveys.

Lewis and Kissling (2009) and Kissling and Lewis (2009) recommended continued or expanded protection of valley-bottom forests and riparian zones to assure presence of large snags with natural cavities, given the paucity of primary cavity excavators (woodpeckers) in Southeast Alaska, to provide adequate nest sites. Kissling and Lewis (2009) also recommended retention of patches of legacy forest structure in timber harvest units to provide nesting and roosting structure for owls, and more intensive investigation of genetic structure among owl populations across Southeast Alaska. They also recommended further evaluation of diet and habitat use by barred owls in Southeast Alaska, as potential competitors of screech-owls and other raptors, including goshawks.

Yellow-Cedar

Although not a wildlife species, yellow-cedar is a common tree across much of Southeast Alaska that has been in decline as a result of its vulnerability to climate change. The U.S. Fish and Wildlife Service recently produced a status assessment for the species (USFWS 2018) as part of its evaluation of a petition to list the species as threatened or endangered. Listing was ultimately found to be not warranted, due to the expected widespread distribution of the species in spite of acknowledged declines in the core of its range (Fed. Reg. 84(194):53342-53343, 10/7/2019).

Special consideration may be warranted on the Tongass because mortality of the tree is most common in the southern portion of Southeast Alaska. An updated Conservation Strategy that more fully addresses conservation of biodiversity could include protection of existing stands in areas expected to offer climate refugia (such as higher-elevation, north-facing stands less prone to thaw-freeze cycles during snow-free periods), dispersal corridors to sites expected to offer suitable habitat over several generations (measured in centuries), and perhaps assisted migration efforts.

Additional information on each of these species with emerging conservation concerns is provided in Appendix B.

Recent Developments in Conservation Reserve Design and Management

In its review of the Conservation Strategy, the 2016 Forest Plan FEIS pointed out that the basic structure of a connected reserve network with constraints on management in the matrix outside the reserves remained well supported by scientific literature (USFS 2016 FEIS App D). The review noted the importance of freshwater systems as nutrient sources and movement corridors for a variety of organisms within ecosystems, supporting inclusion of riparian buffers as part of the Conservation Strategy. The review highlighted the importance of managing human uses outside the reserves to help support wildlife populations, regulate movement of organisms, buffer sensitive areas, and maintain integrity of aquatic systems.

The 2016 review also discussed a “reverse-matrix” model of conservation design in which conservation lands serve as the matrix within which development activities are carefully managed to maintain healthy environmental conditions across the plan area. More intensive activities would occur on “islands” within the “sea” of conservation land (Schmiegelow et al. 2006). This approach was also recommended by peer reviewers of the original strategy developed by VPOP in 1993 (Keister and Eckhardt 1994, p. 16 and pp. 146-147). Such a scheme could be a good fit for the Tongass, where much of the landscape remains undeveloped, but would require substantial planning and consideration to ensure that specific resources are conserved in spatial arrangements that protect a broad range of values and ecosystem services (including many beyond those considered by the existing Conservation Strategy alone).

Lertzman and MacKinnon (2013) recommended a watershed approach to reserve design, particularly along the North Pacific coast of Southeast Alaska and British Columbia, where opportunities to protect undeveloped watersheds, from headwaters to saltwater, still exist. Schoen and Albert (2007) developed an example of how such an approach could work on the Tongass by integrating Albert and Schoen's (2007) "Conservation Priority Watersheds" where ecological values were highest, and "Timber Production Watersheds", where ecological values were lower and timber harvest could be concentrated within the smallest land base and fewest miles of roads with the least cumulative impact on intact habitat values. The strategy was specifically designed to maintain biodiversity and ecological integrity of the Southeast Alaska rainforest ecosystem while also providing for a sustainable timber industry within the region. (Old-growth forest in Albert and Schoen's (2007) Conservation Priority Watersheds were designated as unsuitable for harvest in the 2016 Tongass Forest Plan.)

A watershed approach allows for effective conservation of representative ecosystem and species diversity, and continuation of ecological processes and natural disturbance regimes. Protection of adjacent watersheds can be particularly good for providing connectivity to surrounding lands (Lertzman and MacKinnon 2013). Many of the reserves in the Tongass' Conservation Strategy currently cover complete watersheds. A review of Large and Medium OGRs may reveal opportunities to extend such protection and improve reserve functionality where existing boundaries exclude portions of undeveloped watersheds. We do not recommend proposals that would reduce conservation of entire watersheds where such protection currently exists.

Much research and analysis has been devoted to evaluation of the Northwest Forest Plan (NWFP), a 1994 strategy that amended 19 National Forest plans and seven Bureau of Land Management resource management plans in western Washington, Oregon, and California (Davis et al. 2022). Like the Tongass Conservation Strategy, the NWFP protected a network of habitat reserves and established management constraints across the federal lands to conserve old-growth-dependent and endemic species. Full attainment of the objectives of the plan were expected to take one to two centuries (Davis et al. 2022, DellaSala et al. 2015).

Periodic reviews have established that the NWFP has successfully protected late successional and old-growth forests within the plan area in spite of large wildfires (Davis et al. 2022, Davis et al. 2015), although increases in wildfires, invasive competitors, and forest pathogens (all facilitated by climate change) have potential to compromise long-term attainment of the plan's objectives (Spies et al. 2019, DellaSala 2015).

Inadequate consideration of climate change during development of the NWFP has been identified as a potential weakness of the NWFP (Spies et al. 2019, Spies et al 2018, DellaSala et al. 2015). Because the effects of climate change are expected to be pervasive, rather than localized like most stochastic stressors, there is concern that persistence of even widely dispersed species could be compromised in spite of the redundancy provided by many widespread local populations (DellaSala et al. 2015).

Spies et al. (2019, 2018) and DellaSala et al. (2015) asserted that the NWFP has made substantial progress toward meeting many of its goals, with some cautionary notes. For example, while old-growth forest declines have been dramatically reduced, populations of both northern spotted owls (*Strix occidentalis caurina*) and marbled murrelets (two of the flagship species for which the plan was established) continued to decline, but at slower rates of decline (of either populations or habitat) on federal lands compared to adjacent, non-federal lands. These declines have been attributed primarily to biotic factors, including competition from invasive barred owls suppressing recruitment and survival of spotted owls and nest predation on murrelets by abundant jays and other corvids. Improvements were also reported for several of the aquatic habitat conditions monitored across the plan area, although the number of salmonid species and population units listed under the Endangered Species Act increased (Spies et al. 2019).

Smith and Flaherty (2023) recently issued similar cautionary notes about species conservation on the Tongass. For example, small OGRs were originally intended to serve the dual purposes of providing temporary habitat for animals dispersing through the managed matrix and supporting resident species with smaller home ranges (specifically, 1 female marten and 20 to 40 flying squirrels in each small OGR) (Suring et al. 1993). Research on population demographics and dispersal capability of flying squirrels on POW, however, suggests that many small OGRs are too small to reliably support populations of flying squirrels over the long term, and are too isolated to allow for adequate immigration from source populations (Smith and Flaherty 2023, Smith et al. 2011).

Additional examples from Smith and Flaherty (2023) include inadequate conservation of foraging habitat surrounding identified goshawk nests on the Tongass, and competitive displacement of an endemic old-growth specialist, the Wrangell Island vole (*Myodes gapperi wrangeli*), by the more widespread habitat generalist, Keen's mouse (*Peromyscus keeni macrorhinus*) following clearcut logging.

Wildlife conservation within the NWFP area (and on the Tongass) is complicated by many forces beyond the control of the Forest Service. Some of these factors have compromised progress toward the NWFP's goals (Spies et al. 2019). Nevertheless, there are actions that the Forest Service can take to address perceived deficiencies. DellaSala et al. (2015) recommended a variety of improvements to the NWFP, including enhanced forest reserve protections, carbon storage capacity, aquatic conservation, and at-risk species recovery. Spies et al (2019) recommended collaboration with stakeholders to restore ecosystem dynamics and structural diversity at multiple scales using local workers as a way to simultaneously promote climate change resilience, economic opportunities, and public support for agency management. Many of these recommendations could likely be adapted to the Tongass, to address or avoid analogous issues.

Given the inherent uncertainty associated with viability and fate of affected species and the roles of various taxa in ecosystem function, monitoring and adaptive management will remain crucial to maintaining the effectiveness of both the NWFP (Spies et al. 2019, Spies et al. 2018, DellaSala et al. 2015) and the Tongass' Conservation Strategy (Smith and Flaherty 2023, Marcot 2013, USFS 2008 Workshop Proceedings, Haufler 2006). Statistically defensible monitoring programs can often be resource intensive, but creative approaches that rely on emerging technologies to document species presence (e.g., acoustic monitoring, environmental DNA, etc.) and habitat distribution (e.g., habitat capability modeling based on remote sensing) may allow for increased efficiencies.

Novel modeling approaches have been developed to incorporate habitat needs of target species into evaluations of reserve effectiveness (e.g., Burns et al. 2013, Suring 2012, Haight and Travis 2008). Some combination or variation of these methods could prove useful in an evaluation and potential update of the reserve system on the Tongass. Such models rely on data that may not exist for many of the species in Southeast Alaska, however.

Climate Change Considerations

Like the NWFP, the Tongass' Conservation Strategy was developed without explicit consideration of climate change. The Tongass, however, has been recognized as an important contributor to global climate mitigation due to its ability to sequester vast quantities of carbon, amounting to approximately 20 percent of the entire carbon stock held by the entire National Forest system (DellaSala et al 2022). The documented ability of mature and old-growth forests to capture and hold carbon far more effectively than younger forests (Moomaw et al. 2019), and the Tongass's globally significant contribution in this regard, has prompted recommendations to increase protection of older second-growth in roadless areas and on other conservation lands, and old-growth across the Forest (DellaSala et al. 2022).

Several regions of the Tongass are likely to offer relatively stable climatic conditions through at least year 2080 in comparison to other areas of the North Pacific rainforest (which extends from northern California to the Kodiak archipelago) (DellaSala et al. 2018). These recent findings support DellaSala's (2015) earlier recommendation to consider more and larger reserves on the Tongass, particularly on north-facing slopes as potential climate micro-refugia. Areas identified as likely to provide greater climate stability should also be considered for reserves, if not already protected (DellaSala et al. 2018).

As vegetation responds to climate change, we can expect broad shifts in habitat conditions and distributions (DellaSala et al. 2018, Buma and Barrett 2015, Shanley et al. 2015). Along with these changes in habitat, we can expect some species to move into Southeast Alaska from the south and east. There are currently many "peripheral" species that occur in the southern portion of Southeast Alaska (e.g., Revillagigedo and Prince of Wales, Misty Fjords National Monument, and vicinity) but not northern Southeast Alaska. Many of these have distributions that extend far to the south, and southern Southeast Alaska represents the northern limit of their range. Plants such as Pacific silver fir (*Abies amabilis*), western red cedar *(Thuja plicata*)*,* and Pacific yew *(Taxus brevifolia*)*,* for example, are all projected to expand their ranges further into Southeast Alaska (Case et al. 2017, Coop and Waring 2011). Animals such as band-tailed pigeon (*Patagioenas fasciata*) and purple shore crab (*Hemigrapsus nudus*), which are largely restricted to southern Southeast Alaska, could extend their ranges northward (limited, in some cases by their dispersal abilities among the islands of the Archipelago). Some species are likely to migrate upslope where higher elevations will provide suitable conditions in the future.

Movement of species from the east, down mainland river corridors, may also be facilitated by receding glaciers and reduced snowpack in the Coast Mountains. Fishers, for example, have recently been documented in the Taku River drainage (Kupferman et al. 2022), where they are likely to impact porcupine and marten populations (Pauli et al. 2022, Manlick et al. 2017). Moose and brown bears have also recently colonized portions of Southeast Alaska via mainland river corridors.

Building climate change resilience into Forest Plans is a focus of the 2012 Planning Rule. The Forest Service is currently evaluating several aspects of climate change and how it may affect management of the Tongass. A thorough review of the topic is beyond the scope of this report, but it is clear that many elements of the current Conservation Strategy, such as protected reserves and connecting corridors, will remain important as the Forest Service endeavors to provide for biodiversity in a changing environment. It is likely that some aspects of the Conservation Strategy could be expanded or otherwise modified to serve broader purposes than originally envisioned.

We recommend, for example, a spatially explicit evaluation of the connecting corridors designated in the current Conservation Strategy to ensure their adequacy to support movement (including upslope and northerly migration) and maintenance of species expected to be affected by climate change. Nuñez et al. (2013), demonstrated a methodology for identifying broad corridors for movement of organisms between areas where human influence was low while simultaneously routing the corridors along present-day spatial gradients of temperature to facilitate climate resilience in the Pacific Northwest. Such an approach may be useful on the Tongass. Carroll et al. (2010) used climate change projections to model resiliency of conservation reserve systems in the Pacific Northwest for northern spotted owls and 130 other species. They recommended including climate refugia, and incorporating core habitats of diverse taxa in addition to biodiversity hotspots, to maximize reserve system resilience.

Climate change is likely to trigger or facilitate many other impacts to species and habitats across the Tongass. With continued warming, hydrologic changes related to more rapidly melting glaciers and rising elevation of the winter snowline will alter discharge in many rivers and streams across Southeast Alaska, which will have important consequences for terrestrial ecosystems (Wolken et al 2011). Effects of climate change on salmon, and the many species that rely on nutrients provided by them, are likely to vary depending on location and extent of temperature changes, and could include accelerated or depressed growth rates, or elevated mortality (Zhang et al. 2019). Invasive competitors, novel pathogens and forest pests, increased occurrence of fire, more frequent and significant droughts and floods, loss of alpine habitats to forest encroachment, accelerated primary succession of deglaciated areas, and shifts in plant and insect phenology are all likely to occur (Buma and Barrett 2015, Shanley et al. 2015, Marcot 2013, Wolken et al. 2011, Gayton 2008, Haufler 2006). Increases in vapor pressure deficits could reduce growth of trees (Lopez et al. 2021, Grossiord et al. 2020), impacting timber harvest and forest restoration programs. These changes are likely to interact in unpredictable ways that could create additional unforeseen impacts.

In addition to providing for climate-induced migration, Gayton (2008) recommended reducing non-climate-related stressors to minimize impacts to climate-vulnerable species. We recommend a review of each species expected to be vulnerable to climate change, to consider what threats might be within the Forest Service's ability to reduce. Haufler (2006, p. 25) suggested that such a review could be informed by viability analyses at the scale of individual islands or island groups, for endemics and other species perceived as sensitive to climate change or other habitat impacts on the Tongass.

Ecosystem Integrity and Diversity

Ecosystem <u>Integrity</u> and <u>Diversity</u> are two focuses of the 2012 Planning Rule. The existing Conservation Strategy was designed specifically to conserve <u>integrity</u> of old-growth forest ecosystems across the Tongass, to ensure viability of old-growth associated species. Elements of ecosystem integrity identified in the 2012 Planning Rule include ecosystem structure, function, composition, and connectivity. While the reserve system does appear to provide good representation of functional old-growth forest communities, with many forest types included in the reserve system (Haufler 2006), it was not designed to conserve ecosystem <u>diversity</u> beyond old-growth forests.

The full range of Non-Development LUDs on the Tongass (which are formally included in the Conservation Strategy's reserve system) protect a broad diversity of plant communities and ecosystems beyond old-growth forest. It is not clear, however, how comprehensive this protection is for plant communities other than forested habitats (e.g., muskeg, meadows, etc.) The 2012 Planning Rule requires maintenance or restoration of "the diversity of ecosystems and habitat types throughout the plan area."

Haufler (2006, p. 22) specifically recommended an evaluation of whether all 57 of the plant associations identified on the Tongass are sufficiently represented in the reserve network. There may be other ecosystem or habitat classification schemes in use that would provide additional insight into the range of diversity represented or lacking in the reserves. Such an evaluation now seems particularly warranted, if it has not already been done, given the Planning Rule's requirements related to conservation of ecosystem diversity.

Expansion of the scope of the Conservation Strategy to embrace the full diversity of habitats on the Tongass could help ensure conservation of species not directly associated with old-growth forests. Several amphibians, for example, are found on the mainland and many of the islands of Southeast Alaska (MacDonald and Cook 2007). All are tied to freshwater ponds, streams, or rivers for breeding, but the adults use a variety of habitats. Conservation concerns include habitat fragmentation and disease, with anecdotal reports of local population declines and extirpations (Olson 2009). Documentation of amphibian pathogens in Southeast Alaska, including chytrid fungus (*Batrachochytrium dendrobatidis*) (Hossack et al. 2020) has prompted concerns for some populations. A Conservation Strategy that addresses biodiversity beyond old-growth forest systems could help provide for the needs of amphibians and other species that are less dependent on old-growth forests.

The concepts of resilience, representation, and redundancy (Shaffer and Stein 2000) are widely recognized in the field of conservation biology as critical to effective habitat conservation, and are referred to in the directives of the Forest Service Handbook (Land Management Planning Handbook, 2015, Sec. 1909.12 Chapters 10 and 20). Collectively, the "3Rs" are key to implementation of the Agency's vision for ecosystem integrity, providing a basis for maintaining adaptive capacity to withstand stressors, diversity of plant and animal communities, and persistence of native species.

Resilience refers to the ability of a species or population to withstand perturbations, and relies largely on provision of adequate amounts of functional habitat. This is analogous to the integrity element required by the Planning Rule. Representation acknowledges that organisms exist across a spectrum of natural habitats and conditions, and that this diversity should be maintained to preserve the adaptive potential and range of natural ecosystem processes that have developed through periods of environmental volatility and stability over eons. The Planning Rule's ecosystem diversity requirements directly address representation. The third element, redundancy, recognizes that functional protection must be provided in multiple locations at appropriate scales to ensure that all populations of any species will not be impacted by a major perturbation event. We recommend that each of the plant associations (or other categories of ecosystems/habitats if alternative classification systems are used) on the Tongass be protected in multiple locations where possible and appropriate. This redundancy is especially important for rare communities, which may be particularly vulnerable to stochastic stressors.

Species Viability and Distribution

Language from the 1982 Planning Rule that required "viable" wildlife populations be "well-distributed" across the plan area was the basis for selection of the design species identified by the VPOP committee as they developed the Conservation Strategy in the 1990s. Some of the species were facing viability threats while others were not believed to be well distributed (Suring 1993).

The 2012 Planning Rule does not include the term “well-distributed” to define species vulnerability. Instead, it defines viable populations as those that “persist over the long term with <u>sufficient distribution to be resilient and adaptable to stressors and likely future environments</u>” (emphasis added).

Persistence is mandated for all native species in the plan area under the 2012 Planning Rule. Ecosystem-level plan components are expected to provide for that persistence, for most species. Species-specific plan components are required where ecosystem-level components alone are determined to be inadequate to maintain viability of federally listed endangered, threatened, proposed, or candidate species, and species with recognized viability issues (i.e., designated Species of Conservation Concern). In some cases, species-level plan components may also be necessary for species that are not federally listed or designated by the Forest Service as Species of Conservation Concern.

Persistence implies (or requires) resilience and adaptability, both of which rely on adequate distribution of populations. Species-level plan components may be necessary, in some cases, to provide for that distribution. Nothing in the 2012 Planning Rule precludes including such components for species that are not federally listed or designated as a Species of Conservation Concern to continue to persist over the long term with sufficient distribution.

In the case of the Tongass, which is naturally fragmented by its island archipelago geography (which naturally impacts species’ movements and distributions), ecosystem-level plan components may be adequate to provide for resilience and adaptability of the full range of biodiversity present on individual islands or island complexes. In some cases, however, species-level plan components may be necessary to conserve (for example) endemic forms, unique genetic lineages, or isolated populations, even if those subspecies, lineages, or populations are not facing eminent viability threats. The goal of these species-specific plan components would be to prevent stressors from rising to a level at which viability would become a concern. Where logging or other human-induced habitat alteration will be ongoing, species-level standards or guidelines may be particularly critical, and could explicitly address species distribution necessary to provide resilience and adaptability.

Endemism

Island ecosystems are well known for their incomplete faunas and high levels of endemism (Sawyer et al. 2018, Cook and MacDonald 2013, Losos and Ricklefs 2009, Quammen 1997). Both of these conditions are apparent on the Tongass, where the northern islands, for example, support brown bears but no black bears or wolves while the southern islands have both black bears and wolves; brown bears have only recently been expanding their distribution into the middle and southern islands. All three species are found along the full length of the immediately adjacent mainland (Cook and MacDonald 2013). As another example, both red squirrels (*Tamiasciurus hudsonicus*) and sooty grouse (*Dendragapus fuliginosus)*, which are common across much of the Forest, are missing from POW. There are many other known examples of incomplete and uneven faunas across the islands of the Tongass. Continued field work to document species occurrence across the archipelago remains important, as systematic surveys of biodiversity have occurred on only a small minority of the thousands of islands of Southeast Alaska (Cook and MacDonald 2013, Cook et al. 2006).

Long-term isolation of animal populations in Southeast Alaska, likely established by glacial refugia and post-glacial migrations, and now enforced by the presence of deep saltwater fjords, has led to development of many unique genetic lineages, subspecies, and species (e.g., Sawyer et al. 2019; Dawson et al. 2017, 2014, 2007; Cook and MacDonald 2013, Weckworth et al. 2011, Cook et al. 2006). Even among birds, which are generally less restricted by saltwater channels, endemic forms such as the POW spruce grouse have evolved (Dickerman and Gustafson 1996). This fine-scale genetic diversity on the Tongass is unique among the National Forests, and iconic on a global scale.

The unique biodiversity present on the Tongass requires careful management consideration. Risk assessment panels reviewing the draft Conservation Strategy prior to its adoption in the 1997 Forest Plan, determined that endemic mammals were the most sensitive of all wildlife species to landscape disturbances such as timber harvest (Swanston et al. 1996, p. 11). Protection of unique, isolated, or otherwise sensitive wildlife populations from threats such as logging, mining, human sprawl, tourism, hunting and trapping, and introductions of exotic and domesticated species will remain important (Cook and MacDonald 2013). Because species assemblages and genetic diversity within those assemblages vary across the many islands of Southeast Alaska, Cook et al. (2006) recommended that each island be considered an independent biological unit until managers develop a better understanding of connectivity among the many divergent populations. Smith and Flaherty (2023) reiterated this concern and recommendation. This suggests that persistence of many wildlife populations on the Tongass should be assessed and managed at the scale of islands and island groups, rather than at the scale of the entire Forest as envisioned by the 2012 Planning Rule due to the uniqueness of the Tongass with respect to the level of endemism supported across its many islands. No other National Forest in the system is comprised of an island archipelago at this scale with associated biodiversity and endemism. As a result, additional consideration may be needed to meet objectives for biodiversity in the 2012 Planning Rule and maintain distinct populations across the Tongass compared to other National Forests.

Smith and Flaherty (2023) provided an example of differential impacts of clearcut logging on two superficially similar species with limited dispersal capabilities - Wrangell Island vole (*Myodes gapperi wrangeli*), an endemic habitat specialist adapted to old-growth forest, and Keen's mouse (*Peromyscus keeni macrorhinus*), a widespread habitat generalist that competes directly with the vole and displaces the vole following logging. Management intended to protect the endemic vole, which is known only from Wrangell and Etolin islands, might avoid clearcuts on these two islands, for example, in favor of partial harvests or other logging systems that could maintain suitable habitat for the unique vole.

Even species with good dispersal capabilities may require special consideration where island biogeography limits availability or diversity of prey. Goshawks on POW, for example, have comparatively larger home ranges, higher adult mortality, and lower fledgling production than goshawks elsewhere in Southeast Alaska (Flatten et al. 2002, Titus et al. 2002), presumably because key prey species such as red squirrels, and sooty grouse are absent from POW and surrounding islands but common elsewhere in the region (Lewis et al. 2006, Lewis 2001). Forest management to address such circumstances could, for example, use timber harvest methods and young growth treatments on POW that favor POW spruce grouse and ptarmigan (two key prey species present on the island) while producing habitats that goshawks can successfully hunt (i.e., forest with open mid-story with small openings to allow for flight). Logging prescriptions might be different on islands where prey communities are more diverse. Similar situations may also exist for other predators, such as wolves.

Conservation of genetic diversity is complicated by incomplete information. Advances in molecular genetics have improved our understanding of the origins and current distribution of genetic diversity across several taxa in Southeast Alaska, yet many taxa have not been investigated. Among those that have, our knowledge of distribution among the thousands of islands of the archipelago remains incomplete. Much of the genetic diversity within the endemic subspecies and lineages remains hidden. A robust reserve system, offering secure habitat distributed across all the islands of the archipelago, remains our best bet for conserving this hidden diversity. Any replacement or modification of the Strategy should recognize this diversity and seek to conserve it.

The existing reserve system was designed specifically to provide undisturbed old-growth habitat on every island of the Tongass. Currently-available information suggests that additional protection and restoration of old-growth connectivity between small OGRs, among other adjustments, may be required to assure that the reserves function as intended (Smith and Flaherty 2023, Smith et al. 2011). But the reserve system provides a solid foundation intended to provide for a broad spectrum of biodiversity.

In addition to conservation of large blocks of suitable habitat linked by terrestrial corridors, Cook and MacDonald (2013) recommended identification and protection of sites that may facilitate connectivity between islands, reiterating a recommendation by Cook et al. (2006) that management plans should prioritize protection of sites that may facilitate connectivity among islands (not just within islands) by establishing logging (and other disturbance) buffers for suspected linkages and wildlife corridors for natural movement of organisms between islands. This approach could, for example, protect natural habitat conditions along both sides of narrow reaches of saltwater between islands, so that animals making the crossing reach suitable habitat rather than lands impacted by logging and roads. Opportunities to conserve suitable habitat, in addition to existing beach buffers, along narrow saltwater reaches could be identified as part of connectivity reviews done for climate change resilience or other goals.

We support Haufler's (2006) recommendation to develop population viability assessments conducted at the scale of individual islands or island groups, within identified endemism zones on the Tongass. For example, such assessments could be done for vulnerable endemics such as the POW flying squirrel within the POW island complex and Pacific marten on Kuiu Island, to ensure that habitat needs and anthropogenic threats are adequately addressed.

Monitoring of select endemic or isolated populations expected to be vulnerable to anthropogenic or climate-induced habitat modification, competition from invasive competitors, or novel pathogens should ideally be included as part of any updated Conservation Strategy, to assess attainment of goals related to maintenance of biological diversity (Cook and MacDonald 2013). There are currently few or no data available to establish baseline population levels (in absolute numbers or as relative index values) or population trends for wildlife on the Tongass, with few exceptions (wolves on POW are one such exception). A statistically-defensible monitoring program focused on endemic taxa potentially impacted by human-induced habitat modification or climate change could fulfill multiple needs, including informing an adaptive management program that seeks to address uncertainty.

We note that monitoring is a mandatory element of forest plans under the 2012 Planning Rule with emphasis on plan-level and broad-scale monitoring to inform adaptive management of ecological and watershed conditions and focal species (i.e., species with viability challenges). Although focal species have yet to be determined for the new Forest Plan, the 2012 Planning Rule does not preclude monitoring other species if they can serve as 'indicators' of ecosystem composition, structure, function and connectivity or a measure of biodiversity. For example, the northern flying squirrel may serve as a good indicator of landscape connectivity (Smith 2012).

There is a great deal of new scientific information available on the phylogenetics of many species across the Tongass. A current, comprehensive review of available literature and data on endemism and genetic diversity in Southeast Alaska would help frame the issues more clearly. Knowledge of where unique forms currently occur is useful for Forest planning. Analyses of where those unique populations may be most vulnerable would require additional data on threats, distribution, and (ideally) population demographics, but would be particularly relevant to development of an updated Conservation Strategy tailored to the unique conditions of the Tongass. A comprehensive review of the available genetics literature and synthesis of that information to evaluate vulnerability of specific populations is beyond the scope of this report, but we see this task as useful in development of a strategy for conserving the full range of biodiversity across the Tongass.

Best Available Scientific Information

The 2012 Planning Rule requires the Forest Service to use the "best available scientific information to inform the planning process" and to document how the information was used to inform the assessment, the plan decision, and the required monitoring program. The last comprehensive review of available scientific information relevant to the Conservation Strategy was done in 2006 (USFS 2008 Workshop Proceedings, Haufler 2006). The 2016 Forest Plan amendment was focused specifically on young-growth transition, and was prefaced by an expressed intent to maintain the integrity of the existing Conservation Strategy. Therefore, there was no comprehensive review of recent science related to the Conservation Strategy or its design species.

Relevant new information has been published on conservation planning and the biology of several species that inhabit the Tongass since the last comprehensive review in 2006. Some of this information is highlighted in our discussions above, and in the attached appendices. Much work has been done, for example, on genetic diversity for a variety of taxa, including several not discussed here. Important work on habitat use and dispersal capability has been published for a few key species, including wolves, flying squirrels, and marten. Work to document distribution and abundance of various species has continued, but likely at lower levels than in the recent past. We lack data that might be useful for detecting population trends or changes in distribution for all but a few species (e.g., wolves, mountain goats, and some waterfowl, marine mammals, and seabirds). Recent data on population demographics are particularly scarce or nonexistent for most species. Consequently, we are limited in our ability to detect wildlife population responses to management actions or environmental change.

We encourage interagency efforts to establish statistically defensible monitoring programs for species expected to be vulnerable to Forest management and climate change. If possible, monitoring should be designed to allow evaluation of population-level responses to a wide range of management activities, including habitat restoration efforts, commercial timber harvest, changes in human access (especially via roads), and game harvests, as well as long-term changes in climate. Strategic monitoring and associated research could establish baseline population indices useful for evaluating performance of the Forest Plan and the Conservation Strategy, and for providing essential feedback on adaptive management and responses to climate change.

The existing Conservation Strategy is based on a considerable foundation of scientific information and expertise, some of which may not be apparent from a reading of the various elements of the Strategy, which are spread throughout the Forest Plan. Modifications to the Strategy should only be considered if they are similarly supported by science.

Our review found scientific support for a few changes to Forest Plan Standards and Guidelines (see **New Information on Conservation Strategy Design Species**). We also found scientific support for a few potential alternatives to the basic structure of the Strategy that might be feasible for the Tongass, including reverse matrix designs (Schmiegelow et al. 2006) and watershed-based approaches (Lertzman and MacKinnon 2013, Schoen and Albert 2007).

Proposed changes to the basic structure of the Conservation Strategy should only be developed with a thorough understanding of accepted principles of conservation biology. Implementation of an alternative structure, such as a reverse matrix or watershed-based design, would require a great deal of analysis and review to ensure that it would accomplish the ambitious goals of conserving old-growth dependent and old-growth associated species, along with the full range of biodiversity required by the 2012 Planning Rule. Building in climate change resilience would require additional consideration. It is likely, though, that pieces of these scientifically-supported alternative designs could be used to strengthen specific elements of the existing Strategy without a major restructuring.

Substantial changes to the structure of the Conservation Strategy should not be considered without additional review of relevant science. Haufler's (2006) review could serve as a template to be updated, for example. We also recommend independent expert review of any substantial modification proposals. The 1997 Strategy was adopted after expert panels on several topics provided useful insight that improved the Strategy. Alternatives to the existing Strategy should be held to a similar level of scientific rigor and scrutiny. Such an effort would require substantial investments of time and funding by both the Forest Service and their agency and tribal partners. Retention of the basic structure of the existing Strategy, with updates to improve consistency with current scientific information and address specific vulnerabilities for identified species and populations, would likely require more modest investments.

Presentations at a scientific workshop, similar to the one held in 2006 (USFS 2008 Workshop Proceedings) focused on recent findings, could provide additional insight on conditions and processes specific to the Tongass, from people who have spent time in this unique place. Such settings tend to generate practical recommendations better suited to Southeast Alaska conditions than more conceptual information available from peer-reviewed, international journals. Both formats, though, have merit and neither is likely to provide a complete picture on its own.

Executive Order 14072 – Strengthening the Nation's Forests, Communities, and Local Economies

On April 22, 2022, President Biden signed Executive Order 14072, declaring it a policy of his administration to pursue science-based, sustainable forest and land management, and "conserve America's mature and old-growth forests on Federal lands". The Tongass's existing Conservation Strategy might well serve as a national example of how such conservation can be accomplished.

The order directs executive branch agencies to "manage forests on Federal lands, which include many mature and old-growth forests, to promote their continued health and resilience; retain and enhance carbon storage; conserve biodiversity; mitigate the risk of wildfires; enhance climate resilience; enable subsistence and cultural uses; provide outdoor recreational opportunities; and promote sustainable local economic development.” The Secretary of Agriculture, working through the U.S. Forest Service, is directed to “analyze the threats to mature and old-growth forests on Federal lands” and develop “conservation strategies that address threats to mature and old-growth forests on Federal Lands." Again, the Tongass is currently well-positioned to provide a longstanding example of a successful conservation strategy (potentially in need of updating to more explicitly address climate resilience or other emerging issues).

Conservation Strategy Options

Revision of the Forest Plan offers an opportunity to evaluate and adjust the Conservation Strategy to reflect current conditions, emerging issues, projections of future conditions, improved understanding of wildlife needs, and current Federal direction on conservation of biodiversity and other forest resources.

The Forest planning process is likely to evaluate a range of management alternatives, from forest-wide prohibitions on old-growth logging to increased intensity and extent of logging and other forms of resource development stimulated, in part, by relaxation of existing management constraints. Maintaining viability of the many unique wildlife populations across the islands of the Tongass would depend largely on how this development is managed. Here we discuss 3 options for the Conservation Strategy that could be considered: (1) maintenance of the existing Conservation Strategy, updated only as necessary to meet the requirements of the 2012 Planning Rule, (2) elimination of the Conservation Strategy (including old-growth reserves and associated, wildlife-related standards and guidelines), and (3) modification and update of the Conservation Strategy to address current, emerging, and anticipated future conditions.

A broad range of elements could be incorporated into any of these three options. The adequacy of any alternative strategy will depend largely on how resource development such as logging and road construction is managed. Forest Plan alternatives that propose to increase logging or road development, for example, will require higher levels of conservation protection than alternatives that propose to curtail logging of old-growth forest and limit development of new roads. Our recommendations reflect this relationship.

Option #1- Retain the Conservation Strategy As Is

Although we lack population monitoring data for most species (wolves on Prince of Wales Island are a notable exception), the existing Conservation Strategy appears to be protecting the vulnerable species for which it was designed. The U.S. Fish and Wildlife Service, for example, cited the Conservation Strategy as a factor mitigating threats to three of the design species: Queen Charlotte goshawk (72 FedReg 63123, see pp. 63130-63134), Alexander Archipelago wolf (81 FedReg 435, see pp. 449-450), POW flying squirrel (77 FedReg 52301, see pp 52304-52305) and one non-design, endemic subspecies, the POW spruce grouse (USFWS 2010, see p. 19) in their findings that listing as threatened or endangered was not warranted for any of the four species. It is likely that at least some of these petition findings would have been different, and that a list of “At Risk Species” for the Tongass would look very different today if the Conservation Strategy had never been implemented. We note that the U.S. Fish and Wildlife Service is currently evaluating a 2020 petition to list the Alexander Archipelago wolf as threatened or endangered with outcome pending.

Many aspects of the existing Conservation Strategy match up well with requirements of the 2012 Planning Rule for ecosystem-level and species-specific plan components. The Conservation Strategy, as is, also addresses key elements of Executive Order 14072 on Strengthening Our Nation's Forests, which emphasizes protection of mature and old-growth forests. Retaining the structure and content of the Conservation Strategy with updates only as necessary to match current formatting and content requirements would likely maximize efficiency while providing reasonable assurance that old-growth forest ecosystems, including their dependent and associated wildlife, will be conserved across the Tongass. The existing strategy would be part of a "no action" alternative evaluated during the Forest Plan revision. It could also be a logical element of one or more action alternatives.

There are some aspects of the Conservation Strategy, however, that could be enhanced to provide more holistic compliance with the 2012 Planning Rule and current scientific information. Perhaps most notably, the Strategy was not intended to provide for climate resilience. It is likely that the Tongass' OGR system, as currently configured, provides good climate resilience in many areas of the Forest. Confirming this will require additional assessment. Some key additions (discussed below, under **Modify/Update the Conservation Strategy**) would likely enhance climate resilience.

The Conservation Strategy was designed specifically to maintain the integrity of productive old-growth forest ecosystems. It was not designed to address the full diversity of ecosystems across the Tongass. It is likely that most and perhaps all plant associations (or other appropriate ecosystem classification categories) identified on the Tongass are well represented in the Conservation Strategy's reserve system. If analysis reveals that some ecosystems are not well represented at multiple locations in the reserve system, the Forest Plan revision process could likely address this to comply with 2012 Planning Rule requirements related to maintenance of ecosystem diversity.

Scientific studies from Southeast Alaska and adjacent coastal British Columbia have identified several potential modifications to species-specific Standards and Guidelines that could reduce impacts of human activity on old-growth-dependent species. These are discussed above (see **New Information on Conservation Strategy Design Species**) and in Appendix A.

Retaining the Conservation Strategy as is, without incorporating the latest scientific information, would be a missed opportunity unless factors such as climate resilience, ecosystem diversity, and updated species-specific protections are incorporated into the revised plan in other ways. At a minimum, the 2012 Planning Rule requires explanation of how the best available scientific information was used to inform the plan revision process.

Option #2- Eliminate the Conservation Strategy

A second option is elimination of a discrete Conservation Strategy, presumably in favor of more general guidance on how and where resource development could occur. Many Forest Plan variations could potentially be formulated with varying levels of restrictions on how programs and activities (e.g., timber, recreation, transportation, mining, hydropower, etc.) would operate, but there would presumably be no discrete reserves intended specifically for conservation of old-growth-dependent wildlife. Elimination of the Conservation Strategy also implies elimination of standards and guidelines intended to reduce impacts on the old-growth-dependent species that the Conservation Strategy was designed to protect.

Several developments in recent years have resulted in lower impacts to old-growth-associated wildlife than were anticipated when the Conservation Strategy was originally developed, which might be used to justify elimination or relaxation of the Conservation Strategy. For example:

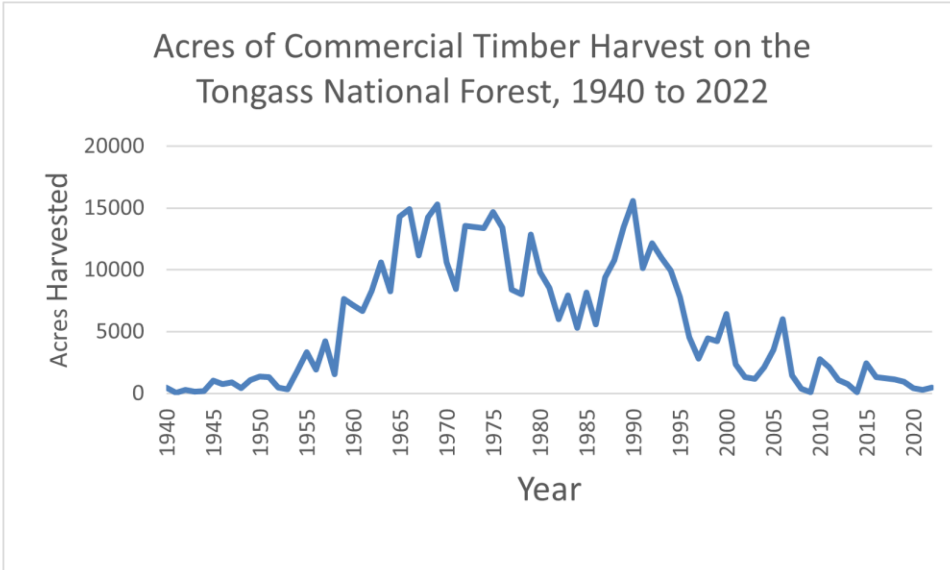
- Old-growth logging on the Tongass has declined substantially over the last several decades, due to a combination of economic and regulatory constraints. Industrial logging increased rapidly between the mid 1950s and 60s, to supply newly-built pulp and sawmills in the region. Harvests were variable but comparatively high through the mid 1990s, averaging over 400 million board feet from nearly 11,000 acres clearcut per year between 1965 and 1995. Since then, harvests have declined, averaging only 47 million board feet from less than 2,000 acres per year since the last pulp mill in the region closed in 1997 (internal Tongass data, see spreadsheet "TNF Timber Volume Harvest"). This history of high harvest levels between the 1960s and 1990s, followed by a decline to present conditions is illustrated in Figure 1, which shows acres logged on the Tongass since 1940, before industrial-scale logging began in the 1950s.

- The 2016 Forest Plan amendment focused on accelerating the transition to harvest of young-growth forests (i.e., stands that have regenerated following past logging or other disturbance) to supplement and ultimately replace harvest of old-growth forest. Restrictions on young-growth harvest in otherwise protected Old-Growth Reserves, Beach and Estuary Buffers, and Riparian Management Areas were relaxed and harvest of old-growth forest in watersheds identified as high priority for conservation was restricted (USFS 2016, ROD). The intent of these changes was to reduce harvest of old-growth forest.

- On July 15, 2021, the U.S. Department of Agriculture (USDA) announced a new Southeast Alaska Sustainability Strategy (SASS) to help support a diverse economy, enhance community resilience, and conserve natural resources. One of the four primary components of the strategy is ending large-scale, old-growth timber harvest on the Tongass and focusing resources to support forest restoration, recreation, climate resilience, and sustainable young-growth forest management. The other 3 components of SASS include restoring the 2001 Roadless Rule protections (see bullet below), engaging with tribal nations, and identifying short- and long-term opportunities for investments.

- The 2001 Roadless Rule has also limited timber harvest on the Tongass, although application of this rule has fluctuated between presidential administrations through a series of Federal rulemakings, court rulings, and executive actions. Most recently, on January 27, 2023, the Forest Service adopted a final rule reinstating the 2001 Roadless Rule, prohibiting timber harvest and road construction in Inventoried Roadless Areas on the Tongass (88 FR 5252, pp. 5252-5272). With the 2001 Roadless Rule in place, over 9.3 million acres of the 17-million-acre Tongass are off limits to timber harvest due to their location within Inventoried Roadless Areas.

Figure 1. Acres of commercial timber harvest on the Tongass National Forest between 1940 and 2022.



Despite recent declines in timber harvest, interest in developing Southeast Alaska's natural resources is likely to remain. We expect political pressure to vary as successive administrations focus on different programs and priorities. Current efforts, for example, include improving the economics of young-growth timber harvest, stimulating processing and secondary manufacturing, developing renewable energy sources, and expanding recreational opportunities. Future administrations could focus on expanding transportation options, mineral development, and timber harvest (including old-growth). Elimination of the Conservation Strategy now could leave many wildlife populations vulnerable to extirpation if old-growth harvests resume without an adequate strategy in place.

Depending on how resource development and other activities are constrained or otherwise managed, a Forest Plan without dedicated Old-Growth Reserves and species-level standards and guidelines may or may not adequately provide for ecosystem integrity and long-term persistence of the full range of biodiversity across the Tongass.

Extraction of natural resources such as timber and minerals, and development of infrastructure such as roads, buildings, and transmission lines have potential to put some wildlife populations at risk, especially populations with restricted distributions and limited ability to move between islands (Cook and MacDonald 2013). Species that require large tracts of habitat with minimal human disturbance are also particularly vulnerable.

The greatest impacts to wildlife habitat in Southeast Alaska since the arrival of Europeans have been from industrial-scale logging of old-growth forests. If old-growth logging continues, it must be managed to ensure that ecosystem integrity and diversity are conserved and persistence of the full diversity of native wildlife is maintained. Alternative strategies are certainly conceivable, but some combination of Forest Plan components (i.e., a "strategy") will be required to mitigate potential impacts to forest ecosystems and the native species they support.

Risks to old-growth-dependent wildlife will be dramatically reduced if harvest of old-growth forest is prohibited. Forest Plan alternatives that limit logging to existing second-growth stands will be more likely to provide for ecological sustainability. Large tracts of undisturbed habitat will, by default, remain intact if future logging is restricted to existing second-growth. The need for specifically-designated Old-Growth Reserves will be reduced. Management constraints for road construction, mining, and other human development will be required to maintain the integrity of specific resources such as remaining large patches of old-growth forest and landscape linkages, but this could potentially be handled through ecosystem-level plan components other than strict delineation of reserve boundaries.

Management of timber harvest to allow for wildlife occupancy and movement through the managed portion of the Forest will remain important, even if logging is restricted to second-growth forests. Some elements of the current Strategy intended to reduce impacts to wildlife, which are typical elements of modern forestry in many places, should be encouraged or required through Forest Plan guidance. For example, restrictions on harvest unit sizes, retention of forest structure within and between harvest units, and protection of sensitive sites such as nest stands, denning habitats, communal roosts, wintering areas, seasonal migration corridors, beach and estuary buffers, freshwater riparian zones, and brood-rearing habitats should be implemented where appropriate. Incorporation of plan components to provide such protection will likely be necessary to meet desired conditions, with or without a dedicated old-growth Conservation Strategy.

Given the political volatility of Tongass logging over the last few decades, any old-growth harvest prohibition might best be considered a temporary condition. Reestablishment of an adequate conservation strategy upon resumption of old-growth logging may not be feasible, given political and budget realities. Retention of a suitable strategy, therefore, may be a more prudent course to provide for long-term conservation of old-growth dependent wildlife, even if timber harvest is restricted to existing second-growth in the next Forest Plan.

Option #3- Modify/Update the Conservation Strategy

There are many possible ways to incorporate enhancements into an updated Conservation Strategy. The scope of the Strategy could certainly be expanded to more fully embrace requirements of the 2012 Planning Rule. For example, ecosystem diversity and climate resilience could both be explicitly addressed, and likely accommodated with some key modifications. Species-specific plan components could also be updated to better reflect current science. In any case, the existing Strategy provides a solid basis from which to begin as it is foundationally consistent with the 2012 Planning Rule in content, structure, and intent.

Expansion of the Strategy's scope carries a potential downside of diluting focus on (and protection of) productive old-growth forests. Risks associated with this dilution of focus depend largely on how timber harvest and other forms of resource development are managed. If old-growth logging is anticipated to continue or increase or uncertainties exist, continued focus on old-growth forest conservation is warranted. Forest Plan alternatives that prohibit or substantially curtail old-growth logging would likely be strengthened by a Conservation Strategy that addresses a broader suite of resources and ecosystem functions rather than focusing exclusively on old-growth forest.

A Strategy that conserves the complete range of ecosystem diversity will help ensure that all the necessary parts of this complex "machine" remain intact. Haufler (2006) recommended using plant associations to verify that ecosystem diversity is comprehensively represented within the reserve system. There may be other ecosystem classifications in use that would offer better resolution for the purposes of evaluating representation of ecosystem diversity. We stress that regardless of which ecosystem classification system is used, representation should be redundant (where possible), to account for stochastic disturbances, and forward-focused to account for projected changes attributable to climate change and natural succession.

The existing Conservation Strategy endeavors to address the needs of Southeast Alaska's unique diversity of endemic species and subspecies, genetic lineages, and isolated wildlife and plant populations through coarse filter protection of reserves connected by forested corridors. Timber harvest has been and remains prohibited on all islands smaller than 1,000 acres to protect vulnerable endemics that may be present (USFS 1997, ROD and Forest Plan).

An enhanced Strategy to address genetic diversity within native taxa could include identification and protection of potential movement corridors between islands (Cook and MacDonald 2013). Cooperative, interagency monitoring programs for vulnerable populations of endemic wildlife in places where threats are known or suspected could also be incorporated (Cook and MacDonald 2013) to ensure that goals for maintenance of biodiversity are achieved.

The Tongass has been identified as a globally important storehouse for sequestered carbon, an ecosystem service that could be enhanced by reducing harvest of mature and old-growth forest stands in the region (DellaSala et al. 2022, Leighty et al. 2006). Downscaled climate models have shown that forest communities in some areas of the Tongass are likely to remain relatively stable, in comparison to surrounding lands (DellaSala et al. 2018). Climate resilience could be enhanced through protection of these climate-stable areas and landscape linkages to facilitate climate-induced range shifts of plants and animals.

Recent research has identified a small number of potential improvements that could be made to species-specific elements of the existing Conservation Strategy. These are described above, with author citations, under **"New Information on Conservation Strategy Design Species**" and below in Appendix A. We recommend that these modifications be incorporated during the Forest Plan revision.

Queen Charlotte goshawk – Develop guidelines for management of post-fledging areas, to ensure adequate habitat around nest stands for young birds learning to fly and hunt.

Alexander Archipelago wolf - Expand protection of den sites and associated habitat to improve security and reduce disturbance of denning wolves. Manage surrounding forest to retain adequate old-growth in core denning areas.

Northern flying squirrel – Identify and protect corridors of productive mature or old-growth forest between each Small OGR and its neighboring OGRs and old-growth patches in adjacent non-development LUDs. This will facilitate immigration and improve the likelihood of persistence of flying squirrels in, and recolonization in the event of extirpation from, individual Small OGRs.

Marbled murrelet – Protect old-growth stands occupied by marbled murrelets, rather than only known nests (which are not routinely searched for, difficult to find, and rarely discovered).

An alternative to the current Conservation Strategy is implementation of a "reverse matrix" design, as described in Schmiegelow et al. (2006) and Pletscher (1994). With this design, lands in conservation status serve as the matrix. Management Areas (to use the language of the 2012 Planning Rule) that allow resource development would be carefully located and appropriately sized to avoid sensitive areas and maintain adequate landscape linkages. Protection of landscape-level habitat features such as remaining large patches of high-volume old-growth, connecting corridors, deer and mountain goat wintering areas, and seasonal migration corridors, for example, might be accomplished through placement of Management Areas away from such features. Finer-scale elements, such as nests, dens, and roosts would likely require establishment of plan components (Standards and Guidelines) that apply within the management areas. Such an approach may be worth considering, as an alternative to the existing Conservation Strategy.

Several elements of Schoen and Albert's (2007) Conservation Strategy for Southeast Alaska could be adapted to improve aspects of the existing Strategy. Old-growth stands within Albert and Schoen's (2007) Conservation Priority Watersheds are already explicitly protected from timber harvest in the 2016 Forest Plan (USFS 2016 ROD). Inclusion of these stands, or the entire watersheds in which they occur, where feasible, could add substantial ecological value to the Conservation Strategy. Second-growth stands in these watersheds could be identified as high priority for restoration work to re-establish uneven age distribution and other old-growth characteristics. Timber Production Watersheds might be useful for identifying suitable old-growth for harvest during transition to primarily or exclusively second-growth harvest. Management Areas for harvest of second-growth after full transition could also be located within Albert and Schoen's (2007) Timber Production Watersheds.

Recommendations

During the Forest Planning Process, several alternatives will likely be considered, potentially ranging from prohibiting all old-growth harvest to continuing old-growth harvest at various levels. Given this range of alternatives, our recommendations below are based on 1) an assumption that some level of management activities may affect old-growth forests and associated species, 2) our understanding of emerging stressors, and 3) consideration of scientific information produced since the last comprehensive review of the Conservation Strategy.

We recommend that the revised Forest Plan include a modified version of the existing Conservation Strategy that explicitly addresses the ecosystem diversity and climate resilience elements of the 2012 Planning Rule (Option #3 - Modify/Update the Conservation Strategy), as discussed above.

Modifications to address ecosystem diversity, for example, could include designation of additional reserves to ensure representation of each plant association (or other categories of ecosystems/habitats if alternative classification systems are used) in multiple locations where possible and appropriate. This redundancy is especially important for rare communities, which may be particularly vulnerable to stochastic stressors. Climate resilience could be incorporated by adding protection for lands projected to offer comparatively stable conditions (e.g., north-facing slopes) and elevational corridors to facilitate climate-induced migration of plants and animals. This expansion of scope should not come at the expense of old-growth conservation.

Species-specific plan components will likely be required in the revised Forest Plan, regardless of whether any Species of Conservation Concern or Focal Species are officially designated, to ensure viability and long-term persistence of all native wildlife. We recommend careful consideration of the existing Standards and Guidelines, which address species-specific needs that are not sufficiently covered by the existing reserve system and connecting corridors. Some of the existing standards and guidelines (i.e., those for goshawk, wolf, flying squirrel, and marbled murrelet) should be updated, as described elsewhere in this report, to reflect current science.

We recommend additional consideration of species for which conservation concerns have recently been identified (i.e., marbled murrelet, little brown bat, western screech-owl, and yellow-cedar) as well as select endemic and isolated populations expected to be vulnerable to climate-induced or other anthropogenic habitat modification, competition from invasive competitors, or novel pathogens. Additional evaluations and potential adjustments to the existing Strategy may be warranted to provide for conservation of these species.

Monitoring and adaptive management will be crucial, especially for species, lineages, and populations known or suspected to be sensitive to human-induced habitat alteration or climate change, and for species for which other conservation concerns have emerged. Uncertainty will remain an inherent element of species viability, especially in a changing environment. Monitoring will allow for informed evaluation of how well the revised Forest Plan provides for that viability. Adaptive management will allow managers to adjust as necessary to respond to new information. We recommend working closely with PNW Research Station scientists and other partners to develop statistically defensible monitoring programs to evaluate the effectiveness of the Conservation Strategy in achieving Forest Plan objectives and attaining desired conditions.

We recommend identification and protection of old-growth corridors between Small OGRs and adjacent reserves. (Current guidance requires connectivity only between adjacent Large and Medium OGRs.) Recent studies on the Tongass have identified issues with dispersal and metapopulation functionality for flying squirrels (a primary design species for Small OGRs). Habitat restoration may be required in some areas. We expect that protecting and improving connectivity for flying squirrels would provide habitat benefits for a variety of other species (including marten) that also use forest habitats within the managed matrix.

We recommend that all connecting corridors specified by the Conservation Strategy (i.e., beach, estuary, and riparian buffers, plus additional corridors identified in project-level connectivity analyses) be compiled and formally documented in a Forest-wide GIS layer. This database would be useful for evaluation of Forest Plan alternatives, and during project-level planning and analysis of future timber sales, transportation system additions, and other projects that propose to modify forest vegetation.

We recommend that criteria defining "Very Large" reserves, which are explained in the 1997 Forest Plan ROD but not explicitly described or required in the Forest Plan itself, be included in the revised Forest Plan. (We believe that this omission was an oversight.) Any proposals that would affect land designations should account for, and maintain, the "Very Large" reserves.

We encourage inclusion of the U.S. Fish and Wildlife Service and Alaska Department of Fish and Game (original partners in development of the Conservation Strategy) in discussions related to modification of the Strategy. Both agencies were involved in development of the Strategy and currently rely on it to conserve species for which they have responsibilities. Tribes also have an interest in conservation of wildlife associated with old-growth forest, and should be included in these discussions. (We note that Native corporations have fiduciary interests in maintaining profitability and do not generally speak for the tribes on matters related to wildlife conservation.)

We recommend retention of the Interagency Process (Appendix K of the Forest Plan) for projects with potential to affect the size or configuration of reserves (including any non-development LUDs). Plan components addressing land transfers/conveyances should include guidance alerting lands staff to procedural requirements (Appendix K) and offer an opportunity for interagency review/comment.

Lastly, we recommend compiling all elements of the Conservation Strategy into a discrete, stand-alone document. All relevant standards, guidelines, and direction, along with maps of the full reserve system, should be available in one focused document. Currently this information is dispersed throughout the Forest Plan and the corporate GIS database. In some cases, it is not clear which standards and guidelines are part of the Strategy and which are not. Similarly, it is not well known that non-development LUDs beyond Old-Growth Habitat are formally part of the reserve system. A complete compilation of the Strategy will be particularly useful for development, analysis, and comparison of Forest Plan alternatives during the revision process. This will also help with consistency and communications both with employees and partners.

Appendix C describes several additional evaluations that we believe will help clarify various issues during Assessment and Development phases of the Forest Plan revision.

Conclusions

The existing Conservation Strategy appears to be largely consistent with the 2012 Planning Rule. The Strategy includes both ecosystem-level and species-specific approaches that work in tandem: a reserve network linked by corridors that also provide important habitat (i.e., riparian, beach fringe, and estuary buffers) offers a broad approach to meet the habitat needs of most species. Fine-scale Standards and Guidelines address needs of species unmet by the reserve system alone. We conclude that the basic foundation of the Conservation Strategy is sound, and that the constituent elements of the Strategy will remain relevant for as long as human uses of the Tongass continue. With some modification to address climate change projections and new science related to conservation of affected species, we expect that the Conservation Strategy will continue to maintain the ecological integrity of the diverse natural communities of the Forest. We believe that the Strategy should be maintained (with minor modification) as the backbone of wildlife conservation on the Tongass, to provide for ecosystem diversity and allow for natural processes and disturbances in a manner that allows for sustainable human development.

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Appendix A – Summary and new information on original Conservation Strategy design species

Queen Charlotte Goshawk (*Accipiter gentilis laingi*)

The Queen Charlotte goshawk is a subspecies of the northern goshawk that nests and hunts in the mature and old-growth forests of coastal British Columbia and Southeast Alaska. Primary prey includes a variety of birds and small mammals, including grouse, ptarmigan, squirrels, hares, jays, thrushes, woodpeckers, crows, and similar-sized animals. Prey availability, and therefore diet, varies from island to island and along the mainland, across the range of the subspecies. Mature and old-growth forest are critical for supporting adequate populations of forest-dwelling prey in habitat that goshawks can effectively hunt (i.e., productive understory with open mid-story), with well-developed crown layers to support and shelter their large nests. Nesting pairs are territorial, with nest stands spaced somewhat uniformly across available habitat.

In 1994, the U.S. Fish and Wildlife Service was petitioned to list the subspecies under the *Endangered Species Act*. Following a series of petition findings and court actions, the bird was listed as Threatened in British Columbia (Fed. Reg. 77(148):45870-45893; Aug 1, 2012). Listing was deemed not warranted in Southeast Alaska due primarily to the comparatively greater habitat protections provided by the Conservation Strategy, which was explicitly cited and described in the Fish and Wildlife Service's findings (Fed. Reg. 72(216):63123-63140; November 8, 2007). The subspecies is also listed as Threatened under Canada's federal *Species at Risk Act*, Red-listed by the British Columbia Conservation Data Centre, and is an Identified Wildlife Species under the Forest and Range Practices Act (COSEWIC 2013). NatureServe lists the subspecies as 'Imperiled' (T2) rangewide and in Alaska (S2). There is no ranking for the Queen Charlotte goshawk with the International Union for Conservation of Nature (IUCN).

Recently available literature on the Queen Charlotte goshawk subspecies includes comprehensive reviews of species ecology and habitat management needs (Boyer 2020, Parks Canada Agency 2018, Vennesland 2018, McClaren et al. 2015, Smith 2013, CFCI 2012, USFWS 2007), foraging ecology and diet (Case 2021), and genetic diversity and differentiation (Kunz et al. 2019, Geraldo et al. 2019, Bayard de Volo 2013). The Northern Goshawk Habitat Recovery Implementation Group in British Columbia has produced a habitat and territory model for the subspecies in Canada that offers good insight into habitat needs (Smith and Sutherland 2008).

We note that many of these authors (including Parks Canada Agency 2018, McClaren et al. 2015, Smith 2013, CFCI 2012, USFWS 2007) recommend protection of "post fledging areas" of several hundred acres surrounding more rigorously protected nest stands, to provide forested habitat adjacent to the nest stand for fledgling goshawks learning to fly and hunt. Smith (2013) specifically evaluated post-fledging habitat on the Tongass and recommended modifications to existing standards and guidelines. Most authors suggest that logging may be allowed in post fledging areas, but must be designed to protect foraging habitat by, for example, limiting the timing of operations, size of openings, and methods of treatment. Currently there is no such guidance on the Tongass. Boyer (2020) and Doyle (2006) provided examples of treatments to improve second-growth in post fledging areas.

Alexander Archipelago Wolf (*Canis lupus ligoni*)

The Alexander Archipelago wolf (AA wolf) is a subspecies endemic to Southeast Alaska and coastal British Columbia. Sitka black-tailed deer are the wolf's primary prey across much of their range on the Tongass, where they inhabit the mainland and many but not all of the major island groups. On the mainland and some of the islands, alternative ungulate prey such as moose, mountain goat, or elk occur. Where ungulate diversity or populations are low, alternative prey species may include beaver, salmon, seals, sea lions, black bears, sea otters, and a variety of birds and other mammals (Roffler et al. 2021, USFWS 2015). The AA wolf is a habitat generalist although it avoids second-growth in the stem exclusion phase (i.e., greater than about 30 years old) (Roffler et al. 2018, Person and Brinkman 2013). Because of its reliance on Sitka black-tailed deer in many areas of Southeast Alaska, and the deer's reliance on old-growth forest during severe winter weather, conservation of old-growth is considered critical to maintenance of viable wolf populations (USFWS 2015, Person 2001). Harvest of wolves by trapping and hunting can also affect wolf populations. Where road densities are high, harvest mortality can reach unsustainable levels as trappers and hunters use roads to access many of an island's wolf pack territories (WTC 2017, USFWS 2015, Person and Brinkman 2013, Person and Logan 2012, Person and Russell 2008, Person et al. 1996).

The AA wolf has been the subject of 4 listing petitions to date, in 1993, 2011, 2015, and 2020. Threats identified by the petitioners have included loss of winter habitat (low elevation, old-growth forest) for their primary prey, Sitka black-tailed deer, and excessive harvest mortality facilitated by road systems built largely in support of timber harvest. The Fish and Wildlife Service determined that listing was not warranted for the 1993, 2011, and 2015 petitions citing, among other factors, habitat protections provided by the Tongass Forest Plan. Analyses for the 2020 petition are currently underway. NatureServe lists the subspecies as 'Vulnerable' (T3) and there is no ranking of this subspecies on IUCN.

Scientific information available since the last Forest Plan revision includes focused work on wolf diets (Roffler et al. 2021), habitat and den site selection (Roffler et al. 2018, Roffler and Gregovich 2018, Person and Brinkman 2013, Person and Russell 2009), and wolf harvest vulnerability (Wolf Technical Committee (WTC) 2017, Person and Brinkman 2013, Person and Logan 2012, Person and Russell 2008). Management of deer habitat has been addressed by WTC (2017), Gilbert (2015), Brinkman et al. (2011), Person et al. (2009), Nelson et al. (2008), Farmer and Kirchoff (2007), Farmer et al. (2006), and Schoen and Kirchoff (2007). Bennetsen (2020) provided a recent literature review for both wolves and deer related to young-growth management, and additional information on deer foraging ecology and models can be found in Hanley et al. (2012, 2014) and Shanley et al. (2021). Gilbert et al. (2022) developed a model to describe interactions among deer and wolf populations, habitat, climate, and humans. Genetic evaluations of wolf taxonomy and evolutionary history have been published by Pacheco et al. (2022), Zarn et al. (2019), Hendricks et al. (2019, 2018), Schweizer et al. (2016), Weckworth et al. (2015), Cronin et al. (2014), and Weckworth et al. (2011). Each of these topics are reviewed in USFWS (2015).

Recommendations provided in both Roffler and Gregovich (2018), WTC (2017), and Person and Russell (2009) are directly relevant to improving existing Standards and Guidelines intended to buffer denning wolves from human disturbance during sensitive pup-rearing periods, and to better conserve critical denning habitat on the Tongass. The importance of large reserves to minimize overharvest of wolves is highlighted by Person and Logan (2012), Person and Russell (2008), and Wolf Technical Committee (WTC, 2017).

<u>Northern flying squirrel (*Glaucomys sabrinus*)</u>

There are two subspecies of northern flying squirrels in Southeast Alaska: the Alaska Coast flying squirrel (*G. s. zaphaeus*) of the mainland and adjacent islands (such as Mitkof, Etolin, Wrangell, and Revillagigedo islands) and the Prince of Wales (POW) flying squirrel (*G. s. griseifrons*) from 11 islands within the POW Complex (Bidlack and Cook 2001). Flying squirrels are known to associate with several elements of old-growth forest habitat and play a key ecological role in the forest ecosystem as a prey species and dispersal vector for mycorrhizal fungi which have a symbiotic relationship with dominant conifers and are essential for forest development (Flaherty et al. 2010). Flying squirrels rely on large trees and snags for denning, multilayered forest canopies, and prefer a well-developed shrub layer for protection while foraging on the ground. Flying squirrels in Southeast Alaska tend to exhibit more of a generalist lifestyle, occupying a variety of forested habitats with densities often increasing with forest complexity (Smith et al. 2005). Although they were identified as a MIS, it has been argued that they are not an ideal indicator for old-growth habitat, but rather an indicator of landscape connectivity (Smith 2012, Shanely et al. 2013). Their diet consists of vegetation, truffles and other fungi, lichens, and insects (Pyare et al. 2002, Flaherty et al. 2010).

In 2011 there was a petition to list the POW flying squirrel as threatened or endangered. The subsequent 90 day finding concluded that there was not substantial information indicating that listing may be warranted. This finding largely relied on the protections in place under the Conservation Strategy (Fed.Reg 77(168):52301-52308, August 29, 2012). IUCN status of the northern flying squirrel is listed as 'Least Concern' and stable with no ranking for the POW subspecies. Similarly, NatureServe lists the northern flying squirrel as globally 'Secure' (G5), the POW subspecies as 'Apparently Secure' (T4), and does not have a ranking for the Alaska Coast flying squirrel, which is presumably secure.

Most of the new information since the last Conservation Strategy review is from research on POW. This includes work on home range size, fine-scale movements, dispersal, foraging, and energetic costs in a fragmented forest (Flaherty et al. 2008, Flaherty et al. 2010). Flaherty's research suggests that there are increased energetic demands associated with traversing clearcuts and squirrels are not likely to venture into these areas. In addition, they found that food resources for squirrels were more prevalent in old-growth forests compared to second-growth and clearcuts. Limited food resources for squirrels in managed habitats may influence foraging success and dispersal. Pyare et al. (2010) studied den use and selection in fragmented landscapes and found dens in both snags and live trees. Flying squirrels selected for the largest diameter trees (mostly western hemlock) in higher-volume forests with lower levels of fragmentation. Shanley et al. (2013) looked at local and landscape scale habitat selection based on composition and structure and found that flying squirrels selected for large old-growth patches and higher structural connectivity at a local scale but not at the landscape scale. However, Trapp et al. (2019) found that landscapes with greater connectivity exhibited longer flying squirrel dispersal distances, more sinuous dispersal paths, and a greater total area of landscape utilization. Landscape connectivity is a critical feature that largely determines distribution and persistence of flying squirrels (Smith 2012). Smith and Person (2007) estimated persistence of flying squirrel populations in small, isolated habitat reserves composed of old-growth upland rainforest and mixed-conifer peatlands on the Tongass. Their results indicated that mixed-conifer peatland habitat was unlikely to sustain populations and that viability of flying squirrel populations in small habitat reserves depended on the amount of upland old-growth within that reserve. Moreover, they concluded that small isolated reserves would not likely support a persistent population in the absence of immigration and emphasized the importance of dispersal between small reserves to ensure persistence of metapopulations of flying squirrels (Smith and Person

2007). The contribution of small OGRs in the conservation of flying squirrels depends on the degree of isolation and functional connectivity with other large, medium, or small reserves. Smith and Person (2007) suggest that conservation planning that explicitly considers quality and configuration of OGRs in a modified landscape is essential to ensure functional metapopulations of flying squirrels.

Smith et al. (2011) combined empirical data on movement of dispersing juvenile flying squirrels through various habitats on POW with population modeling of flying squirrels in Southeast Alaska to estimate the number of immigrants required for populations to persist for 25 and 100 years in hypothetical small OGRs with 400 to 1600 acres of productive old-growth forest habitat. (Small OGRs across the POW complex currently provide about 300 to over 3,500 acres of productive old-growth according to the Tongass' internal OGR Tracking Table.) They found that small reserves would likely sustain populations of flying squirrels for at least 25 years with immigration of 1 disperser every 1 to 5 years, depending on the amount of productive old growth habitat available. Persistence over 100 years would require much greater rates of immigration, ranging from 10 to 162 dispersers per year, suggesting that extirpations are likely, especially in smaller reserves. Successful recolonization would likely require arrival of at least 6 immigrants per year to insure reestablishment of a breeding population.

Local extirpations followed by recolonization by dispersers are a defining feature of functional metapopulations. Habitat connectivity that provides for immigration and recolonization from source populations is critical. Smith et al.'s (2011) modeling suggested that less than half of the small OGRs on POW are close enough together to allow for successful dispersal through managed matrix lands. They recommended spacing reserves no more than about 1 km (0.6 miles) apart to facilitate successful dispersal between reserves, increasing the amount of productive old-growth in small OGRs to reduce reliance on immigration, protection of designated corridors of suitable old-growth forest habitat where such opportunities remain, and treatment of young-growth to accelerate development important old-growth characteristics (greater height and open mid-story to allow gliding).

The range of the southern flying squirrel (*Glaucomys volans*) has been expanding northward likely due to changes in climate. This species is an intense competitor of northern flying squirrels and vector of a pathological nematode (Weigl 2007). In areas where this expansion has happened there are subsequent declines of northern flying squirrels as well as hybridization (Weigl 2007, Garroway et al. 2010).

<u>Marten (*Martes americana and Martes caurina*)</u>

American marten (*M. americana*) and Pacific marten (*M. caurina*) are both native to Southeast Alaska. American marten were introduced to some islands in the 1930-1950's (POW, Chichagof, and Baranof). The Pacific marten only occurs on Kuiu and Admiralty Islands though historically occurred more broadly across Southeast Alaska and may have been negatively impacted by the American marten introductions (Dawson et al. 2017). Marten were identified as MIS due to their close association with old forests, vulnerability to logging activities and habitat fragmentation, and their importance as a furbearer. Mature and structurally complex coniferous forests provide optimal habitat for marten with important components being those that often occur in old-growth habitat such as overstory canopy cover, snags, fallen logs, stumps, and abundant large trees for denning and resting. The diet of marten varies seasonally but they mostly rely on small rodents (voles, squirrels, mice), berries, and intertidal resources (e.g., salmon, bivalves). Areas with high canopy cover connecting mature forests increase the likelihood of dispersal and connection between metapopulations (Flynn et al. 2004).

NatureServe lists Pacific marten as 'Apparently Secure' (G4) globally with no status in Alaska, and no ranking on IUCN. American marten is listed as 'Least Concern' but decreasing on IUCN and a NatureServe ranking of globally 'Secure' (G5) and 'Secure' (S5) in Alaska. Pacific marten populations in the southern portion of their range are federally listed as threatened in Oregon and California (*M. caurina humboldtensis,* Coastal Distinct Population Segment).

Recent literature on marten includes research on habitat selection (Flynn and Shumacher 2016), dispersal distances using non-invasive isotopic labeling (Pauli et al 2012), foraging ecology (Manlick et al. 2019), population dynamics (Flynn and Schumacher 2009), genetics and endemism (Collela et al. 2018, Collela et al. 2019, Collela et al. 2021), colonization history and distribution (Pauli et al. 2015 and Dawson et al. 2017). A habitat selection study on Chichagof Island from, validated selection for structurally complex, old-growth forest habitats (Flynn and Schumacher 2016). Marten showed greatest affinity for old-growth in the winter and summer. During the fall, habitat use varied, but the study confirmed general avoidance of non-forested or open habitat (Flynn and Schumacher 2016). On Kuiu Island, important predictors of marten habitat at landscape scales included lower elevation, closed canopy old-growth forest in areas with higher densities of salmon streams near the coast (Koch 2016). On POW, Pauli (2010 thesis) indicated that marten populations were large and well-connected despite substantial fragmentation of habitat and trapping. Juveniles dispersed from areas with fewer marten and limited suitable habitat to areas with higher marten densities and more contiguous forest. Pauli (2010) found that proximity of high-volume forest patches was positively correlated with connectivity of marten populations and even small, fragmented patches of forest may have conservation value for forest carnivores. Martens were most abundant in old-growth stands compared to managed stands (Ben-David et al. 2014).

Concerns have emerged for isolated populations of Pacific marten, now considered a distinct species limited, in Southeast Alaska, to Kuiu Island (where it hybridizes with American marten) and Admiralty Island (where genetic diversity is low) (Collella et al. 2021, Collela et al. 2019, Collela et al. 2018, Dawson et al. 2017, Cook and MacDonald 2013, MacDonald and Cook 2007). Genetic evidence suggests that where the two marten species hybridize, as shown on Kuiu Island, asymmetrical gene flow results in slow removal of Pacific marten genetics, ultimately leading to genetic swamping and extirpation of Pacific marten (Collela et al. 2021, Collela et al. 2019, Dawson et al. 2017).

A likely emerging threat to marten is the recent fisher colonization in Southeast Alaska (Kupferman et al. 2022). Where there is range overlap, fishers are a dominant competitor that suppress marten populations (Pauli et al. 2022 and Manlick et al. 2017).

<u>Prince of Wales River Otter</u> <u>(*Lutra canadensis mira*)</u>

POW River otter is a subspecies of the northern river otter found only on the islands and mainland throughout Southeast Alaska and western British Columbia. The river otter was selected as an MIS because of its association with coastal and freshwater aquatic environments and adjacent upland habitats. They use forested habitat on the Tongass for resting and pupping averaging 0.5 miles from beach shorelines. Predominant vegetation at den sites in Southeast Alaska is uneven-aged old-growth forest on well drained sites near streams (Woolington 1984). Burrows often consistent of roots of large conifer trees and decaying snags. POW river otters tend to use streams as travel corridors between den sites and foraging areas on the coast. Their diet mainly consists of fish and other aquatic animals in intertidal areas. NatureServe lists the POW river otter as a 'Vulnerable' (T3) subspecies. POW river otters do not have a listed IUCN status. We found no new science on this subspecies. During NEPA analysis, wildlife and subsistence biologists often cite the Conservation Strategy or Forest Plan standards and guidelines as sufficient to protect river otter habitat with important elements being beach and estuary fringe buffers and riparian management areas.

Brown Bear (*Ursus arctos*)

Brown bears are an iconic species in Southeast Alaska, where they play an important role in maintaining the ecological balance of the region. The species was selected as an MIS on the Tongass and occurs on Admiralty, Baranof, and Chichagof Islands and on the coastal mainland. Populations of brown bears on northern islands of Southeast Alaska are effectively isolated from the mainland. Inter-island movement is limited although it likely occurs between Baranof and Chichagof islands. Brown bears use a variety of habitat types but tend to concentrate along salmon streams and associated riparian forest in the summer (Suring et al. 1993). They often select for habitat mosaics that contain riparian old-growth forests. Denning habitat includes both low elevation old-growth forest where they use large tree roots for den sites and cave dens in alpine or subalpine settings. Riparian old-growth forest was found to have the highest habitat capability for supporting brown bear populations (selection relative to availability) (Suring et al. 1993). Brown bears are omnivorous but predominantly rely on salmon, berries, grasses, sedges, cow parsnip, ground squirrels, carrion, and roots.

Alaska remains the last stronghold of brown bears in North America with an IUCN ranking of 'Least Concern' and NatureServe status of 'Apparently Secure' (G4) globally and 'Apparently Secure' (S4) in the State. Southeast Alaska has some of the highest brown bear densities in the world. However, brown bears can be vulnerable due to their low reproductive rates, sensitivity to human disturbance and development (i.e., roads providing access for hunting), and high reliance on salmon in coastal areas.

Recently available information on brown bears is from the Alaska Department of Fish and Game and include collaring studies related to resource and habitat selection, spatial use and movement patterns, home range sizes, and population estimation in Yakutat. Additional bear research focused on diet and the role of bears in the food web (Shakeri et al. 2018, Harrer and Levi 2018) and impacts of humans on bear foraging (Wheat and Wilmers 2016). Flynn et al. (2007) studied the differences in habitat selection of male and female brown bears in altered versus less altered watersheds on Chichagof Island. They found that bears, especially females, spent more time farther from salmon spawning streams; and female bears were more abundant and consumed more salmon in less altered watersheds. Based on spatial use patterns adjacent to salmon streams, Flynn et al. (2007) recommended retention of at least 500 ft no-cut buffers along streams with spawning salmon and larger buffers and/or increased habitat protections where bear populations are a management objective.

Mountain Goat (*Oreamnos americanus*)

Mountain goats naturally occur only on the mainland in Southeast Alaska and possibly Baranof Island, with an augmentation transplant of additional goats to Baranof in 1923. They have been introduced to Revillagigedo Island and Chichagof, but the Chichagof population died off. Goats in coastal areas exhibit altitudinal migrations from alpine summer ranges to winter ranges at or below tree line, typically in old-growth forest habitats (ADF&G website). Key forest habitat characteristics for mountain goats include structurally complex mature forests near steep terrain, as well as travel corridors between seasonal sites.

Mountain goat diet consists of conifers, lichen, moss, and shrubs in forested habitat and forbs and graminoids in alpine/subalpine areas (Bennetsen 2020).

The mountain goat population in Southeast Alaska is fairly robust, with an IUCN ranking of 'Least Concern' and NatureServe ranking of 'Apparently Secure' (S4) in the State. Mountain goat populations in other areas of North America are either imperiled or vulnerable except in Alberta and Montana.

Recent literature on mountain goats is predominantly from ADF&G's collaring studies that provided data on movement patterns, habitat use, environmental stressors, reproduction and survival (White et al. 2011, 2012, 2017, 2018), genetics and colonization history (Shafer et al. 2010, 2011, 2012), space use and range fidelity (Shakeri et al. 2021) and environmental and human stressors on goats (Martchenko et al. 2021). Mountain goats are sensitive to climate variables including amount of snowfall in winter and heat stress in the summer, both of which can reduce mountain goat survival (White et al. 2011). White et al. (2018) predicted that projected increases in summer temperature had stronger negative effects on mountain goat populations than the potential positive effects of reduced winter snowfall, with implications of concerns over species persistence in the future. Shakeri et al. 2021 demonstrated mountain goats exhibited a strong degree of seasonal range fidelity, with space use expanding in the summer and constricted during the winter.

<u>Pacific Great Blue Heron (*Ardea herodias fannini)*</u> (note that the Pacific Great Blue Heron is referred to as the Northwestern Great Blue Heron in Suring 1993).

The Pacific great blue heron is a regional endemic subspecies with low population numbers (Campbell et al 1990). Total population size is unknown, however. The subspecies is listed as 'Apparently Secure' (T4), The NatureServe Global Status was last reviewed 4/6/2016. There is not an IUCN ranking of Pacific Great Blue Heron. The subspecies is vulnerable to disturbance from land management activities, that include logging and mining (Schenck and Suring 1993). It resides along the Pacific coast from southeastern Alaska (Yakutat Bay) south to Washington state. Non-breeders range north to Cook Inlet, Alaska and east to the interior of central and southern British Columbia (Gabrielson and Lincoln 1959, Tobis pers. com. 1992). (NatureServe). The subspecies nests colonially in tall Sitka spruce, western red cedar, western hemlock, pine, red alder and black cottonwood (Campbell et al. 1990). Isolation from disturbance appears to be an important factor in nest site selection. In Alaska, Northwestern great blue herons (same subspecies (*A.h.fannini))* may be particularly sensitive to disturbance because of heightened susceptibility to weather and predation losses (Schenck and Suring 1993). Globally, the herons are also susceptible to pollution of foraging areas, particularly estuaries, and exclusion from wetland areas by development. An increase in bald eagles (*Haliaeetus leucocephalus*) since the 1980's has increased predation at rookeries.

The Pacific great blue heron was assessed as Special Concern in 1997 and again in 2008 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) due to a small population size, declining productivity, and threats related to bald eagle predation, habitat loss, and human disturbance. The species was listed on Schedule 1 of the *Species at Risk Act* (SARA) in 2010. In Canada, this subspecies is distributed along the coast of British Columbia with a relatively small population that is concentrated at a few breeding colonies in southern British Columbia. There is evidence of declines in productivity and it is unclear whether the population is stable or declining. Threats from eagle predation, habitat loss and human disturbance are ongoing, particularly in the southern part of the range where concentrations of birds are highest (Environment Canada, 2016).

In Canada, this subspecies is distributed along the coast of British Columbia with a relatively small population that is concentrated at a few breeding colonies in southern British Columbia. There is evidence of declines in productivity and it is unclear whether the population is stable or declining. Threats from eagle predation, habitat loss and human disturbance are ongoing, particularly in the southern part of the range where concentrations of birds are highest. The Pacific great blue heron is darker plumaged, smaller in size and has a smaller clutch size than continental herons (relevant to reproductive rate). Declines and other issues with productivity and population size are thought to primarily be due to bald eagle predation, human disturbance and destruction of nesting and foraging habitat. The species is listed as Special Concern (a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats) in BC, Canada.

Although predation by a strongly recovering bald eagle population was thought to have contributed to the decline of great blue herons, Jones et al., 2013, found that, in their study area in British Columbia, Pacific great blue herons in colonies close to a bald eagle nest experienced higher reproductive success than those far from bald eagle nests. Breeding colonies close to bald eagle nests were large enough that the occasional losses of chicks to the resident pair were outweighed by the higher reproductive success. They hypothesized that *A*. *h*. *fannini* in the Pacific northwest changed their nesting habits during the 1990s in response to the continued growth of the bald eagle population. Breeding colonies, even large long-established colonies and even in the midst of chick-rearing, began to be abandoned in the face of persistent predatory behavior by bald eagles. Initially, it appeared that great blue herons took up nesting individually or in small groups, but by the time of their study (2005, 2006), most pairs in the study area nested in just a few large colonies, each of which was co-located (<200 m) with a resident pair of bald eagles (COSEWIC 2008).

Appendix B- Species with Emerging Conservation Concerns

<u>Marbled Murrelet (*Brachyramphus marmoratus*)</u>

The marbled murrelet is a small seabird that typically nests on moss-covered boughs in the canopy of large-diameter trees within low-elevation (<800 m) stands of structurally complex, coastal old-growth forest (Burger 2004, DeGange 1996, Hamer & Nelson 1995, Nelson & Newman 2009). Marbled murrelets spend most of their lives at sea but travel inland up to 50 miles to nest (Nelson & Newman 2009, Piatt et al. 2007). Because of this nesting preference, the species range largely parallels that of the north temperate rainforest, from northern California, through Oregon, Washington, and British Columbia, to Southeast and Southcentral Alaska (Nelson 1997). In Southeast Alaska, marbled murrelets appear to use a wider range of habitat types for nesting than in the Pacific Northwest and British Columbia. On some treeless islands in Southeast Alaska marbled murrelets lay eggs on bare talus slopes in mountainous areas (Nelson & Newman 2009, Piatt et al. 2007). Marbled Murrelets often forage in pairs within a mile of the shore; the joint effort appears to help with safety from predators and efficiency in catching prey.

Because of its unique association with old-growth forests, and declining population trend, the marbled murrelet is a species of conservation concern at statewide, national, and international levels (BirdLife International 2023, Kirchhoff & Padula 2010). The marbled murrelet is currently listed in the Lower 48 states as a threatened species under the Endangered Species Act, IUCN rank is 'Endangered' and is ranked by NatureServe as 'Vulnerable' both globally and in Alaska (G3, S3). Southern populations appear to be declining primarily because of diminishing old-growth nesting habitat and increased predation on eggs and chicks due to logging (Peery and Henry 2010, Peery et al 2004, Andrén 1994). Marbled murrelets also experience direct mortality as by-catch in nearshore drift gill nets (Carter et al. 1995) and reduced survival and productivity from declines in key forage fish species from ocean warming and acidification (Peery et al 2004). Similar pressures exist in Southeast Alaska, although old-growth forest in Southeast Alaska is still relatively abundant, and marbled murrelets in Alaska may have a lesser dependence on old-growth trees for nesting than birds in the Lower 48 (Barbaree et al. 2014).

Repeated surveys have established that Southeast Alaska provides important habitat for marbled murrelets. Roughly half of all marbled murrelets in Alaska in 2006 lived in Southeast (Piatt et al. 2007). Annual abundance surveys in Glacier Bay National Park indicate that dense concentrations of marbled murrelets (~63,000 birds) during early July constitute a significant fraction of the global population (Hoekman 2019).

Despite the relatively high density of marbled murrelets in Southeast Alaska compared to other parts of the range, a 2007 status review of marbled murrelets in Alaska and British Columbia found that marbled murrelet numbers in Southeast Alaska declined from approximately 687,000 birds in 1994 to 144,000 in 2006, a 79 percent decline. The decline was steeper in Southeast than in other parts of Alaska, but declines were noted across the state (Piatt et al. 2007, pp. 46). Population declines were attributed to combined and cumulative effects of human activities (including logging, gillnet bycatch, oil pollution) and natural factors such as ocean regime shifts or predation. Declines were also recorded in 2016 by ADF&G in Tracy and Endicott Arms of Southeast Alaska: about half as many marbled murrelets were recorded in July 2016 (Nesvacil et al. 2018) as in July 2002 (Kissling et al. 2011), although annual variation in bias arising from uncertain identification may contribute to variability in abundance estimates from year to year.

Other recent studies of marbled murrelets in Alaska have focused primarily on marine space use, movements, foraging behaviors, and disturbance by vessels (Barbaree et al., 2015; Bertram et al., 2016; Haynes et al., 2008, 2010; Haynes & Nelson, 2011; Pontius & Kirchhoff, 2009; Schoen et al., 2013); however, one recent study investigated the nesting ecology of marbled murrelets in Southeast Alaska (Barbaree et al., 2014). Conservation needs for marbled murrelets include protection of important nesting habitat from clearcut logging, and increased monitoring of population trends, especially in southern Southeast Alaska where clearcut logging is more intensive. Tongass Forest Plan standards and guidelines pertaining to marbled murrelets currently include a 600-foot radius no-cut buffer zone around identified nests (USFS 2016), although scientists recommended that this standard be modified to protect occupied stands rather than identified nests, which are rarely discovered (USFS 2008 Workshop Proceedings}. Gaining a better understanding of prey fish response to warming oceans could also allow managers to better prepare for marbled murrelet conservation needs in a changing climate (Norris et al. 2007).

<u>Little Brown Bat (*Myotis lucifugus*)</u>

The little brown bat is one of seven species of bats that has been documented in Southeast Alaska. It has a widespread range in North America from Alaska-Canada boreal forests south through most of the contiguous United States into central Mexico. It is suspected that little brown bats in Southeast Alaska hibernate in caves associated with karst systems, rootwad cavities, and rock crevices in the winter, and they roost and form maternity colonies (made up of 2 - 100+ individuals) in trees, artificial structures, under rocks, and in piles of wood in the summer and fall. Little brown bats tend to select for mature forested habitats compared to second-growth forest (Parker et al. 1996, Tessler et al. 2014, Alaska Center for Conservation Science 2017). Little brown bats emerge from hibernation in the spring and summer, and individuals may swarm around caves before mating in the fall. Foraging activities vary depending on vegetation density, and studies have found higher foraging activity from bats in intact forest patches and along the patch edges, with less activity in clear-cut areas (Patriquin & Barclay 2003) or young-growth forests (see Bennetsen 2020). The diet consists of a wide variety of insects, which may have allowed the broad geographic distribution of the species (Kaupas & Barclay 2018).

The little brown bat is currently being considered for listing as a threatened or endangered species across its range under the Endangered Species Act. The US Fish and Wildlife Service is currently conducting a status assessment to inform the listing determination. The finding is expected in 2024. This species was once very abundant but has experienced severe declines due to white-nose syndrome (WNS), a novel fungal disease. It is listed as ‘Endangered’ by the IUCN and ‘Vulnerable’ (G3) globally and ‘Vulnerable’ in the State (S3). Little brown bats have experienced more than a 90% decline in population numbers where WNS has been detected (Bat Conservation International 2018). The fungus responsible for WNS, *Pseudogymnoascus destructans*, arrived in New York in 2006 and has spread from this epicenter each year, with WNS now confirmed in 38 states and eight Canadian provinces. As of 3 April 2023, white-nose syndrome was confirmed in British Columbia. WNS is moving rapidly, and while it has not yet been detected in Alaska, its arrival in the state seems likely in the near future.

Recent studies of little brown bat in Alaska and Canada have focused primarily in boreal forest habitats (Shively & Barboza 2017, Thomas & Jung 2019, Thomas et al. 2019, Jochum et al. 2021, Snively et al.

2021, Thomas et al. 2021, Slough et al. 2022). Comparatively little research has occurred in the temperate rainforests of Southeast Alaska, coastal British Columbia, and the Pacific Northwest. However, ADF&G has established a network of year-round acoustic monitoring stations across Southeast Alaska to learn more about their seasonal activity patterns across the region (Woodford, 2022). The Forest Service has collaborated on this effort since 2015. These acoustic monitoring data along with radiotelemetry data revealed that little brown bats near Juneau hibernate in a dispersed manner, close to summering areas, which may slow the spread of WNS and reduce impacts in Southeast Alaska populations should it arrive in Alaska (Blejwas et al. 2021). Two recent studies have also documented cumulative impacts of climate (temperature and precipitation), disease, and nutritional stress on little brown bats in the northwestern portion of their range (Hranac et al. 2021, Davy et al. 2022). Further research is needed to better understand little brown bat populations in Southeast Alaska and how they respond to habitat loss and other factors (Boland et al. 2009).

<u>Western Screech-owl (*Megascops kennicottii kennicottii*)</u>

The western screech-owl is a small, nocturnal owl of coniferous and deciduous forests and woodlands. In Southeast Alaska, where it is a rare year-round resident (Heinl 2010), it is found primarily at lower elevations and is often associated with riparian habitats, especially along larger streams.

Lewis and Kissling (2009) tracked 10 radio-tagged screech-owls on Mitkof Island in central Southeast Alaska during 2005 – 2006 to evaluate habitat use and home range. They found that roosts and nests were closer to large streams than random points, suggesting preferential use of riparian and floodplain habitats, likely due to more abundant prey and nesting cavities along streams. Nests were in natural cavities of dead snags or dead portions of live trees, often surrounded by dense patches of smaller trees. Lewis and Kissling (2009) and Kissling and Lewis (2009) recommended continued protection of valley-bottom forests and riparian zones to assure presence of large snags with natural cavities, given the paucity of primary cavity excavators (woodpeckers) in Southeast Alaska, to provide adequate nest sites.

Diet in Southeast Alaska includes primarily small mammals (shrews, lemmings, voles, and mice) and invertebrates (beetles, caterpillars, other insects, worms, and spiders) (Kissling et al. 2010a, 2009a). Birds are rarely taken (Kissling et al. 2010a, 2009a).

Concerns over impacts to screech-owls due to habitat loss and competitive exclusion by barred owls (*Strix varia*) have led to federal listing of the western screech-owls as “Threatened” in adjacent British Columbia under the Species at Risk Act (COSEWIC 2012, Elliot 2006). Similar concerns have been noted for populations elsewhere (Acker 2012, Cannings and Angell 2001, Hardy et al. 1999). Kissling et al. (2009c) documented apparent displacement of western screech-owls in southern Southeast Alaska by barred owls (*Strix varia*), as the distribution and occupancy rate of barred owls expanded, particularly on the mainland, and distribution of screech-owls narrowed between historic (1986-1992) and recent (2005-2008) surveys.

Competition from barred owls for prey and nest sites, hybridization, and suspected direct predation have been implicated in declines of spotted owls *(Strix occidentalis*)*,* screech-owls, and other species in the Pacific northwest, as barred owls have expanded their range across the region (Hausleitner 2015, Acker 21012, Kelly et al. 2003, Pearson and Livezey 2003, Olson et al. 2005). Similar dynamics are apparently occurring in Southeast Alaska as the barred owl expands its range northerly (Kissling et al. 2009c).

Vehicle strikes have been identified as a potentially significant mortality source, as screech-owls apparently forage along the forest edges provided by roads (Hausleitner et al. 2015, Kissling and Lewis 2009). Kissling and Lewis (2009) suggested that evaluation of owl use along busy roads in select towns might identify areas where motorists could be alerted to the presence of owls with signs and reduced speed limits to minimize vehicle strikes.

Kissling et al. (2010, 2009b) and Kissling and Lewis (2009) developed survey techniques for owls in Southeast Alaska that may be useful for a monitoring program designed to evaluate population trends and distributional shifts in response to environmental changes and management activities.

Proudfoot et al (2007) evaluated phylogenetic relationships among four related species of owls, and found strong support for differentiation of western screech-owls from eastern (*M. otus*) and whiskered (*M. Trichopsis*) screech-owls and flammulated owls (*Otus flammeolus*). Their evaluation of purported western screech-owl subspecies supported differentiation of coastal *M. k. kennicotti* from the more interior M. k. mcfarlanei of southern British Columbia, Idaho, and Montana, likely due to geographic separation provided by the Cascade Mountains. Neraas et al. (2009) evaluated genetic divergence of western screech-owls from Southeast Alaska using markers from two mitochondrial DNA sites. They found no evidence of geographic structuring, as birds from Southeast Alaska shared haplotypes with birds from California and Washington. Efforts to distinguish gender from nuclear DNA were unsuccessful.

Management actions suggested by Kissling and Lewis (2009) included expansion of riparian zone protections to provide nesting and foraging habitat. They also recommended retention of patches of legacy forest structure in timber harvest units to provide nesting and roosting structure for owls and a more intensive investigation of genetic structure among owl populations across Southeast Alaska.

Yellow-Cedar (*Callitropsis nootkatesis*)

Yellow-cedar is a slow-growing, long-lived tree that occurs from Prince William Sound in southern Alaska to northern California. Isolated populations occur in Eastern Oregon and the Selkirk Mountains of southeastern British Columbia. The species reaches its greatest density and largest size in the coastal temperate rainforests of Southeast Alaska and British Columbia, where it is valued as a commercial timber species because its wood is strong and rot resistant. Growth is more shrub-like near alpine timberline and in boggy sites at lower elevations (Hennon et al. 2016). IUCN lists this species as 'Least Concern', with a NatureServe ranking of 'Apparently Secure' both globally and in Alaska (G4, S4).

Dead and dying stands have been documented throughout Southeast Alaska and in the northern portion of coastal British Columbia. This phenomenon is termed "yellow-cedar decline". The primary cause of death has been identified as freeze injury to the roots, which occurs when hard freezes coincide with periods of no snow cover (which would otherwise insulate the ground). Freeze damage can accumulate over years, weakening individual trees and eventually causing mortality. Freeze-weakened trees may also have elevated susceptibility to pathogens and insect infestations (Hennon et al. 2016, Hennon et al 2012).

Hard freeze events during periods with no snow have become increasingly common at lower elevations in Southeast Alaska and at various elevations in British Columbia as mean winter temperatures shift to above Buma et al.'s (2017) "snow-rain threshold", which they defined as >0 °C mean winter temperature. These freeze events cause the highest levels of mortality among trees growing in wet, poorly drained sites, where the trees typically have shallow roots. Stands on better-drained sites, where trees grow deeper roots, and on higher or north-facing sites that retain more snow through the winter, are less affected (Hennon et al. 2016, D'Amore and Hennon 2006). On Haida Gwaii, an island group off the northern coast of British Columbia, though, Comeau and Davis (2022) documented divergent responses among trees at each of their 15 study sites (all of which had wet soils). Some trees at each of the sites had increased growth rates as others declined. The authors suggested that in addition to climate, poorly understood factors such as microsite conditions, pathogens, and genetics may drive vulnerability at the level of individual trees.

In their 2016 climate adaptation strategy for yellow-cedar, Hennon et al. (2016) suggested that some northern populations are currently maladapted to their local environment because of climate change. Buma et al. (2017) produced high-resolution projections of suitable yellow-cedar habitat through the end of the 21st century and concluded that approximately 50% of areas with currently suitable climate are expected to warm beyond the snow-rain threshold that appears to trigger decline. Hennon et al. (2016) suggested that harvest of dead and dying yellow-cedar in areas now considered unsuitable would be preferable to harvest of healthy trees in areas expected to provide more stable or otherwise suitable conditions in the future. This suggests that conservation of sites projected to remain or become suitable habitat may be warranted.

Buma et al (2017) pointed out that very little (<1–9%, depending on latitude) of the area expected to remain suitable in the future (i.e., climatic refugia) is in currently protected landscapes. Several authors have suggested that adjustments may be needed to improve conservation of areas likely to provide suitable habitat for yellow-cedar (e.g., DellaSala et al. 2018, Buma et al. 2017, Hennon et al 2017, Oakes et al. 2015).

Active management to favor yellow-cedar on suitable sites in the managed matrix, through planting, thinning, and selective harvest of competing species, is expected to help conserve yellow-cedar in some areas (Hennon et al. 2017). Forest planners considering how to address climate change resilience on the Tongass should also consider how protected areas could contribute to yellow-cedar conservation. We suggest that protected area designations (e.g., OGRs) could be extended or otherwise modified to increase representation of climate refugia, as modeled by DellaSala et al. (2018), Buma et al. (2017), and likely others.

Appendix C. Suggested Evaluations for the Forest Plan Assessment

Our review has identified knowledge gaps about implementation and effectiveness of several aspects of the existing and prior Forest Plans, and how well the Conservation Strategy is positioned to support climate change resilience. As part of the analyses that will be conducted during the upcoming Forest Plan revision, we recommend the following evaluations, most of which are discussed in the body of this document. Many of these evaluations could inform implementation of actions recommended above, in our "Recommendations" section.

Implementation of the forest legacy structure standards, 1997 to present. The 1997 Forest Plan established standards and guidelines for retaining forest structure within some harvest units to help maintain goshawk and marten habitat in the matrix between reserves. These standards and guidelines were replaced in 2008 and modified in 2016. It would be useful to know how these standards have been interpreted and implemented, and their efficacy of meeting desired conditions before duplicating or modifying them in a revised Forest Plan.

Review of endemism and genetic diversity. We recommend conducting a more comprehensive review of available literature and data on endemism and genetic diversity across Southeast Alaska for as many taxa as possible. Knowledge of where unique forms currently occur, and where they may be vulnerable, would directly inform development of an updated Conservation Strategy tailored to the unique conditions of the Tongass.

Evaluate adequacy of corridors for metapopulation functions and climate-induced migrations. Conduct a spatially explicit evaluation of connecting corridors between existing OGRs and old-growth forest patches within other non-development LUDS as designated in the current Conservation Strategy, and consider their adequacy to support wildlife dispersal and climate-induced migrations (including upslope and northerly migration) and maintenance of species expected to be affected by climate change (e.g. mountain goats).

Assess the potential for climate refugia. Identify locations likely to provide suitable habitats to replace those projected to be impacted by climate change. Consider protection for areas likely to offer comparatively greater habitat stability. Incorporate core habitats of diverse taxa in addition to biodiversity hotspots, to maximize reserve system resilience.

Evaluate representation of ecosystem diversity within the reserve system (Haufler 2006, p. 22). Use plant associations or other classification schemes to evaluate whether the existing reserves protect the full diversity of ecosystems across the Tongass. Such an evaluation now seems particularly warranted, if it has not already been done, given the Planning Rule's requirements related to conservation of ecosystem diversity. We recommended that regardless of which ecosystem classification system is used, representation should be redundant (where possible), to account for stochastic disturbances, and forward-focused to account for projected changes attributable to climate change and natural succession. (We note that plant associations don't always translate to habitat types for wildlife.)

Develop population viability assessments for discrete, vulnerable populations. Consider Haufler's (2006) recommendation to develop population viability assessments at the scale of individual islands or island groups, within identified endemism zones on the Tongass. For example, such assessments could be done for endemics (similar to Smith and Person's (2007) assessment of POW flying squirrel) or other species with identified conservation challenges (e.g. Pacific marten on Kuiu Island), to ensure that habitat needs and anthropogenic threats are adequately addressed.

Identify key areas for young-growth transition. If the Forest Plan Revision process considers continued transition from old-growth harvest to young-growth, we recommend identifying key areas to support future old-growth harvest. Criteria could include:

- Least important for maintaining ecosystem integrity and diversity (broadly represented, abundant redundancy, etc.). “Timber Production Watersheds” identified by Albert and Schoen (2007) meet this standard.
- Not critical for climate adaptation/species migration
- Potentially at risk of loss to climate change or other factors, regardless of management efforts
- Outside existing Small OGRs and OGR corridors
- Outside “Conservation Priority Watersheds” identified by Albert and Schoen (2007)

Elements of the Tongass Old-Growth Conservation Strategy

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Contents

Introduction

In 1997, the U.S. Forest Service adopted a revised Land and Resources Management Plan ("Forest Plan" or "Plan") for the Tongass National Forest ("Tongass") in Southeast Alaska that included a comprehensive strategy intended to provide for long-term viability of old-growth associated wildlife, well-distributed across Southeast Alaska. This strategy, referred to as the Tongass Old-Growth Conservation Strategy ("Conservation Strategy" or "Strategy"), was retained with minor modifications through 2008 and 2016 amendments of the Forest Plan.

The Strategy includes a network of habitat reserves linked by corridors of old-growth forest and a collection of Standards and Guidelines that provide additional protection for vulnerable wildlife species. Elements of the Strategy are dispersed thoughout the Forest Plan. This report presents all elements of the Conservation Strategy as it exists in the current Forest Plan (USFS 2016 Plan). Notes are included to describe the origin and intent of each element, its location in the Forest Plan, and complete text of the element.

This annotated compilation of the various elements of the Conservation Strategy, isolated from the remainder of the Forest Plan, is intended to clarify which lands and Forest Plan components are formally part of the Conservation Strategy. The intent is to help inform development, analysis, and comparison of Forest Plan alternatives, and to facilitate communication consistency with employees, partners, and the public during the upcoming Forest Plan revision.

The compilation begins with a brief summary of the Strategy's origin, followed by documentation of the reserve system, connecting corridors, and species-specific Standards and Guidelines. Conservation Strategy elements or supporting information quoted directly from Forest Plans, Records of Decision (RODs), or environmental analyses (FEISs) are indented and reproduced in Times New Roman font, to distinguish them from background discussion and annotations, which are presented in Calibri font.

Origin of the Conservation Strategy

The Conservation Strategy was initially developed in the 1990s by a team of wildlife biologists representing three agencies (U.S. Forest Service [USFS], Alaska Department of Fish and Game [ADF&G], and U.S. Fish and Wildlife Service [USFWS]). This interagency team, known as the "Interagency Viable Population Committee" or "VPOP", screened 356 vertebrate species that occur in Southeast Alaska and identified eight species associated with old-growth forest habitats for which there were viability and/or distribution concerns. These species, which served as design species for the strategy, included:

- Alexander Archipelago wolf (*Canis lupus ligoni*)
- brown bear *(Ursus arctos*)
- American marten *(Martes americana*)
- river otter (*Lutra canadensis mira*)
- mountain goat *(Oreamnos americanus)*
- northern flying squirrel (*Glaucomys sabrinus*)
- northern goshawk (*Accipiter gentilis laingi*),
- great blue heron *(Ardea herodias fannini*),

The VPOP committee's proposed strategy (Suring et al. 1993, pp. 25-36) included a network of Large, Medium, and Small habitat reserves connected by forested corridors, and species-specific management guidelines to provide additional protection in the managed "matrix" lands outside the reserves for species with needs that would not be fully met by the reserve system alone (Suring et al. 1993). The reserve system was developed as a coarse filter element to meet the needs of species requiring forested tracts of various sizes and was intended to provide umbrella habitat protection for a broad diversity of species beyond the eight old-growth associated species that were used to guide design of the system. Species-specific standards were added as fine-filter elements to provide additional protection deemed necessary to maintain viability and distribution of six of the eight original design species (i.e., all except marten and flying squirrel).

When designing the reserve system, the committee relied first on areas already protected from logging and other development through congressional action (e.g., Wilderness, National Monuments, etc.), lands administratively classified as not suitable for timber harvest, and lands with operability or access constraints that made them difficult to log. Dedicated "Habitat Conservation Areas" (HCAs) were delineated outside the non-development Land Use Designations ("LUDs") to provide the desired size, spacing, and composition (e.g., amount of productive old-growth forest, salmon spawning streams, etc.). Connectivity between adjacent reserves was provided through protected corridors of old-growth habitat. Marine and estuary beach fringe forest and freshwater riparian buffers were identified as the primary corridors, with additional corridors to be designated as necessary during project-level environmental analyses.

Following a scientific peer review (Kiester and Eckhardt 1994) and NEPA analysis of several variations of the draft Strategy (USFS 1997 FEIS), a revised version of the Strategy was adopted as an integral part of the 1997 Forest Plan (USFS 1997 ROD, pp. 6-7). Elements of the Strategy were dispersed throughout the Forest Plan and included a reserve system of non-development LUDs and mapped Old Growth Reserves ("OGRs" or "Reserves"), forested corridors connecting adjacent Large and Medium OGRs, Standards and Guidelines for various species and species groups, and relevant Appendices providing background and guidance (USFS 1997 Plan).

Reserve System

Origin and Intent

The original reserve system was developed by the VPOP committee to “Maintain sufficient habitat to ensure that species which require large tracts of old-growth forest have a high likelihood of continued existence throughout their current range in southeast Alaska” (Suring et al. 1993, p. 25). The proposed strategy included specific criteria for size, spacing, and composition of Large, Medium, and Small reserves (Suring et al. 1993, pp. 26-29 and p. 57).

Large reserves were designed to provide enough habitat to support populations of sufficient size to be resistant to most stochastic events and provide source populations to recolonize adjacent Large and Medium reserves that may become vacant. Large tracts of habitat dominated by old-growth forest were intended to ensure that populations of marten, goshawks, and brown bears would be secure, and produce enough marten and goshawks to recolonize vacant Medium reserves within these species' dispersal ranges. The Large reserves were also intended to provide habitat adequate to reduce the risk of local extinction of goshawks to a level lower than in more fragmented habitats, and to allow for production of young goshawks that would disperse to other suitable habitats. Because of minimal road access within the tracts, Large reserves were also intended to provide important refugia for wolves and brown bears. They were sized to support at least 5 female brown bears, 25 female marten during winters of poor prey, and 8 pairs of goshawks (Suring et al. 1993, pp. 26-27).

Medium reserves were intended to provide habitat for small, local populations that may be prone to frequent, local extinctions, but located close enough to the Large reserves or to other Medium reserves for recolonization to occur. They were sized to support at least 5 female marten during winters of poor prey, and 2 pairs of goshawks (Suring et al. 1993, p. 28).

Small reserves were intended to provide temporary functional habitat for animals dispersing between Large and Medium reserves and to ensure that species of concern (including the 8 design species listed above) would have a relatively high likelihood of occurring in each 10,000+ acre watershed. Small reserves were designed to contribute to the landscape matrix between Large and Medium reserves, help reduce risk of mortality to dispersers, and enhance population stability. They were sized to support at least at least 1 female marten during winters of poor prey and 20 to 40 flying squirrels within each major watershed (~10,000 acres) (Suring et al. 1993, pp. 28-29).

To the extent possible, the VPOP Committee sited reserves in congressionally designated conservation lands such as Wilderness Areas and National Monuments, other administratively-designated non-development lands, and forest lands considered unsuitable or otherwise difficult to harvest, to minimize the impact of the reserve system on lands available for timber harvest (Suring et al. 1993, p. 23).

1997 Forest Plan OGR Criteria

A modified version of Suring et al.'s (1993) reserve system was adopted as part of the 1997 Forest Plan. The ROD that formally adopted the 1997 Forest Plan described three distinct elements of the reserve system:

> The Forest Plan's reserve system is composed of three elements:
> 1. All non-development LUD's, including Wilderness, Legislated LUD II, Wild River, Remote and Semi-remote Recreation, Research Natural Area, Municipal Watershed, and other LUD's that essentially maintain the integrity of the old-growth ecosystem;
> 2. 38 large (40,000-acre minimum), 112 medium (10,000-acre minimum), and a network of 237 small (approximately 1,600 acres) mapped Habitat Conservation Areas (HCA's), allocated in part to the Old-Growth LUD and in part overlapping with other LUD's; and
> 3. Full protection of all islands smaller than 1,000 acres.
>
> (USFS 1997 ROD, p. 7)

Size, spacing, and composition criteria for Large, Medium, and Small reserves were detailed in Appendix K of the Forest Plan (USFS 1997 Plan, Appendix K). These design criteria were not repeated in subsequent (2008 and 2016) Forest Plan amendments, but both of the amendments referred to the criteria in their Forest-wide Goals and Objectives sections, and in some of the Forest-wide Standards and Guidelines. The 1997 Appendix K criteria are therefore included here as foundational to the reserve system:

Appendix K
Old-growth Habitat Reserve Criteria

Introduction:
These criteria serve as guidelines for further evaluating the design of reserves at the project level as described in the Old-growth Habitat Land Use Designation Standards and Guidelines (Wildlife section). Consider first, in any modification of mapped reserves, "non-development" Land Use Designations that maintain the integrity of the old-growth forest ecosystem and contribute to a Forest-wide system of reserves (e.g., Wilderness, Monument, LUD II, Remote and Semi-remote Recreation, Wild River, Municipal Watersheds, etc.). Where "non-development" Land Use Designations do not fulfill size, spacing, and composition criteria of the Forest-wide system of old-growth habitat reserves, add or modify old-growth reserves to meet criteria.

Rules Applicable to all Reserves:

A. Spacing should generally consider the four cardinal directions.

B. Reserves should be more circular rather than linear in shape to maximize the amount of interior (secure from the effects of forest edge) forest habitat.

C. Minimize to the extent feasible, the amount of early seral habitat and roads within mapped reserves.

D. Consider site-specific factors in placing reserves to help meet multiple biodiversity or wildlife habitat objectives. Factors include, but are not limited to:
   1. Important deer winter range to maintain important deer habitat capability to meet public demand for use of the deer resource (see Wildlife Forest-wide Standards and Guidelines.)
   2. Known or suspected goshawk nesting habitat (see TES Forest-wide Standard and Guidelines.)
   3. Known or suspected marbled murrelet nesting habitat (see TES Forest-wide Standard and Guidelines.)
   4. The largest remaining blocks of contiguous old growth within a watershed. 5. Rare features such as underrepresented forest plant associations or stands with some of the Forest's highest volume timber stands.

Basic Criteria for Allocating Reserves:

A. **Large Reserves:** a contiguous landscape of approximately 40,000 acres, of which at least 20,000 acres must be productive old growth forest. At least 10,000 acres of the productive old growth forest (over 8,000 board feet per acre) component should be in the high volume class strata (greater than 25,000 board feet per acre). Large reserves shall not be greater than 20 miles apart, edge to edge, across the entire forest. Landscapes within the range of brown bears should include at least 1 Class I anadromous fish stream.

B. **Medium Reserves:** a contiguous landscape of approximately 10,000 acres of which at least 5,000 acres must be productive old-growth forest. At least 2,500 acres of the productive old growth forest component should be in the high volume class strata. Medium reserves shall not be greater than 8 miles from the nearest Large or Medium reserve across the entire forest.

C. **Small Reserves:** a contiguous landscape of at least 16% of the area of each Value Comparison Unit (VCU), and 50% of that area shall be productive old-growth forest.

Specific Design Criteria for Small Reserves:

Small reserves are required in all VCU's except as noted below. When needed, small reserves shall be 16% of the area of a VCU and at least 50% of that size shall be productive old growth forest. The preferred biological objective is for each reserve to contain at least 800 acres of contiguous productive old-growth forest, but may contain a minimum of 400 acres of productive old-growth forest.

A. Additional criteria for assessing the need for and designing of small reserves:
   1. VCU's that have been separated (as denoted by decimal extensions, e.g., 597.1 and 597.2)may be combined for computation purposes.
   2. In very large VCU's that that contain relatively little old growth and the computational rule requires an amount of old growth that exceeds 50% of the existing old growth in the VCU, map a reserve of at least 800 acres of productive old growth.
   3. Small reserves are not required:
      a) In VCU's that already contain sufficient acres (16%/50% calculation) of productive old growth forest in a non-development Land Use Designation (LUD).
      b) In VCU's with less than 800 acres of productive old-growth forest.

B. Mapping of old growth computational allocation:
   1. In VCU's that are partially allocated to a non-development LUD, compare the computed acreage required to the acres of productive old growth in the non-development LUD. If productive old growth acres within the non-development LUD exceed the computed acres for the small reserve, no further allocation is necessary in that VCU. If the non-development LUD acres are less than the area necessary for a small reserve, first use the productive old growth acres in the existing non-development LUD to establish a small reserve and then add additional acres of productive old growth to achieve the required small reserve size and composition.
   2. In very large VCU's, the allocated old growth may be mapped in separate reserves as long as each reserve has a minimum of 800 acres of productive old growth. However, larger contiguous reserves are preferred to fragmented smaller reserves.
   3. In VCU's that are separated by saltwater channels, reserves may be separated but attempt to retain 800 acres of productive old growth in each.
   4. Where VCU boundaries do not match watershed or ecological boundaries, up to 30% of the allocated old growth acres in a VCU may be mapped in an adjacent VCU if the resulting reserve achieves old growth reserve objectives. The resulting small reserve in both VCU's must be contiguous.
   5. In VCU's with a computational allocation of less than 800 acres of productive old growth forest, attempt to design the reserve contiguous with old growth acres in a non-development LUD in an adjacent VCU to establish a larger contiguous reserve. Do not map isolated reserves with less than 400 acres of productive old growth.
   6. Attempt to avoid existing roads, clearcut units, and log transfer facilities within small reserves.
   7. Attempt to identify and map contiguous blocks of productive old growth forest. Old growth forest that constitutes scattered fragments of unsuitable timberland does not contribute to meeting small reserve design. Including riparian, beach and estuary habitats as contributing elements to contiguous old growth reserve design is acceptable.

C. In designing small reserves, include consideration of landscape linkages between larger reserves.

(USFS 1997 Plan, Appendix K)

2016 Forest-wide Goals and Objectives

The Forest-wide reserve system was retained, along with other elements of the Tongass Old-growth Conservation Strategy, through both the 2008 and 2016 amendments of the Forest Plan. The reserve system was specifically included among objectives listed in the 2016 Forest Plan to accomplish Forest-wide goals (Chapter 2) for Biodiversity:

> Goal: Maintain ecosystems capable of supporting the full range of native and desired nonnative species and ecological processes. Maintain a mix of representative habitats at different spatial and temporal scales.
>
> Objectives: Maintain a Forest-wide system of old-growth and other Forest habitats (includes reserves, nondevelopment LUDs, and beach, estuary, and riparian corridors) to sustain old-growth associated species and resources.
>
> a) Ensure that the reserve system meets the minimum size, spacing, and composition criteria described in Appendix K.
>
> (USFS 2016 Plan, p. 2-3)

Note that Appendix K of neither the 2008 or 2016 Forest Plan amendments included size, spacing, or composition criteria for Large or Medium OGRs, as it did in the 1997 Plan. Element a) of the Objective quoted above must, therefore refer to Appendix K of the 1997 Forest Plan, for projects affecting Large or Medium reserves.

Also note that "nondevelopment LUDs" are listed along with "reserves" and "corridors" as elements of the "Forest-wide system".

LUD Management Prescriptions

The reserve system incorporates many different non-development LUDs to provide adequate habitat for old-growth-associated wildlife across the Forest. As quoted above in the 1997 Forest Plan ROD (p. 7) and the 2016 Goals and Objectives (p. 2-3), the 2008 Final Environmental Impact Statement (USFS 2008 FEIS) Appendix D confirmed that the reserve system specifically included "all" non-development LUDs:

> The OGRs include a system of large, medium, and small Habitat Conservation Areas (HCAs) allocated to the Old-Growth Habitat LUD, and full protection of all islands less than 1,000 acres in size. <u>The reserve network also includes all other non-development LUDs</u>. These include Wilderness, National Monument, Legislated LUD II, Wild River, Remote and Semi-Remote Recreation, Research Natural Area, Municipal Watershed, <u>and all other LUDs that essentially maintain the integrity of the old-growth ecosystem.</u>
> (emphasis added) (USFS 2008 FEIS App. D, p. D-2)

Management Prescriptions, which define the limits of allowable activities for each LUD, are provided in Chapter 3 of the Forest Plan. Commercial old-growth timber harvest is allowed in four "development" LUDs totaling approximately 3.6 million acres. Old-growth forest land is classified as "not suitable for timber production" in all other LUDs, although various forms of salvage, personal use, and specialty product timber harvest is allowed in some of these "non-development" LUDs. Collectively, the non-development LUDs constitute the full reserve system, which totals approximately 13.4 million acres (USFS 2016 Plan, p. 3-2).

The Old-Growth Habitat LUD, which is used to identify and define management of OGRs established within the matrix of development lands, covers 1.2 million acres (USFS 2016 Plan, p. 3-2). Management Prescriptions for this LUD are specified on pp. 3-58 to 3-63 of the 2016 Forest Plan and are reproduced here because they were specifically designed as an element of the Conservation Strategy. Full text of the Management Prescriptions for other non-development LUDs is not included, but <u>all other non-development LUDs are also considered part of the reserve system</u>. The Old-Growth Habitat LUD represents only a subset of the reserve system (as documented above).

OLD-GROWTH HABITAT LUD

Goals

Maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources.

Manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based upon site capability. Use old growth definitions as outlined in Ecological Definitions for Old-growth Forest Types in Southeast Alaska (R10-TP-28).

Objectives

Provide old-growth forest habitats, in combination with other LUDs, to maintain viable populations of native and desired non-native fish and wildlife species and subspecies that may be closely associated with old-growth forests.

Contribute to the habitat capability of fish and wildlife resources to support sustainable human subsistence and recreational uses.

Maintain components of flora and fauna biodiversity and ecological processes associated with old-growth forests.

Allow existing natural or previously harvested early seral conifer stands to evolve naturally to old-growth forest habitats or apply silvicultural treatments to accelerate forest succession to achieve old-growth forest structural features. Consider practices such as thinning, release and weeding, pruning, and fertilization to promote accelerated development of old-growth characteristics.

To the extent feasible, limit roads, facilities, and authorized uses to those compatible with old-growth forest habitat management objectives.

Desired Condition

All forested areas within this LUD have attained old-growth forest characteristics. A diversity of old-growth habitat types and associated species and subspecies and ecological processes are represented.

Apply the following Forest-wide Standards and Guidelines located in Chapter 4:

Category	Section	Subsections
Air	AIR	All
Beach and Estuary Fringe	BEACH	All
Facilities	FAC	All
Fire	FIRE	All
Fish	FISH	All
Forest Health	HEALTH	All
Heritage Resources/Sacred Sites	HSS	All
Invasive Species	INV	All
Karst and Cave Resources	KC	All
Lands	LAND	All
Minerals and Geology	MG	All

Plants	PLA	All
Recreation and Tourism	REC	All
Riparian	RIP1	All
	RIP2	All
Rural Community Assistance	RUR	All
Scenery	SCENE	All
Soil and Water	SW	All
Subsistence	SUB	All
Timber	TIM	All
Trails	TRAI	All
Transportation	TRAN	All
Wetlands	WET	All
Wildlife	WILD1	I-III; V-XIX
	WILD2,3,4	All

Apply the following Plan Content located in Chapter 5:

Category	Section	Plan Component
Young-growth Direction	All	All except DC-YG-05, and S-YGSCENE-01
Renewable Energy Direction	All	All except S-RE-LAND-01 and S-RE-TRAN-01
Transportation Systems Corridors Direction	All	All except S-TSC-LAND-01
Forest-wide Plan Components	All	All

Apply the following LUD Standards and Guidelines:

FACILITIES
Facilities Improvements: FAC2 and FAC3
A. Allow administrative and recreational facilities when compatible with LUD objectives.
FIRE
Fire Suppression: FIRE1 *Suppression Action*
A. Suppress wildfires using the suppression option identified in the Alaska Interagency Wildland Fire Management Plan.
B. Suppression tactics are limited only by the standards for this LUD, such as soil and watershed concerns.
Fuel Improvements: FIRE2 *Prescribed Fire*
A. Allow management-ignited prescribed fire only where its use maintains old-growth characteristics.
B. As a general management practice, do not use prescribed natural fire. (Consult FSM 5142.)
FISH
Fish Habitat Planning: FISH2
A. Emphasize the protection and restoration of fish habitat, fish production, and aquatic biodiversity. Enhancement projects that may change the natural distribution of fish species within a watershed are consistent with LUD objectives.
FOREST HEALTH
Forest Health: HEALTH1
A. Insect and disease management measures consistent with this LUD may be implemented to protect the old-growth forest component and adjacent resources.
Forest Insect and Disease Survey and Inventory: HEALTH2
A. Survey and inventory visible outbreaks.
HERITAGE
Heritage Resource Activities: HSS1 *Inventory/Evaluation*

A. Develop priorities and schedule management activities to implement heritage resource inventory, evaluation, protection, and interpretation.
   1. Identify, classify, and evaluate known heritage resources.
   2. Identify heritage properties to be nominated to the National Register of Historic Places.
   3. Identify heritage properties that require stabilization or other protective measures.
   4. Identify opportunities for interpretation of heritage resources for public education and enjoyment.

KARST AND CAVES

Cave Management Program: KC2

A. Identify opportunities for interpretation of caves for public education and enjoyment. Interpretation may occur inside or outside of this LUD.

LANDS

Special Use Administration (Non-Recreation): LAND2

A. Permit only improvements (such as tent platforms, fish weirs, minor waterlines, minor powerlines, etc.) that are compatible with LUD objectives.

MINERALS AND GEOLOGY

Minerals and Geology Resource Preparation: MG1*Resource Preparation*

A. Prepare geologic, paleontologic, and historic mining interpretations, where appropriate.

Minerals and Geology Administration: MG2 *Forest Lands Open to Mineral Entry*

A. Forest lands within this LUD are open to mineral entry.
B. Assure prospectors and claimants their right of ingress and egress granted under the General Mining Law of 1872, Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and Forest Service Mining Regulations 36 CFR 228.
C. Permit reasonable access to mining claims, leases, and material sites and authorization of orderly mineral resource development with the provisions of an approved Plan of Operations in accordance with Forest Service Mineral Regulations 36 CFR 228 and FSM 2800.

RECREATION AND TOURISM

Recreation Use Administration: REC3

Recreation Management and Operations

A. Manage recreation and tourism use to meet LUD objectives for fish and wildlife resources and habitat.
   1. Design and locate recreation-related structures to be compatible with habitat needs of old-growth associated species.
B. Generally provide for Semi-Primitive ROS settings, recognizing that more developed settings may be present due to authorized activities, existing use patterns, and activities in adjacent LUDs.
C. Designation of motorized routes for off-highway vehicles is generally not allowed. Designation may only occur where documented local traditional use has occurred and the route does not degrade water quality or flow.

Recreation Special Uses

A. Minor recreation and tourism developments may be compatible with the LUD objectives depending on the scope, purpose, and magnitude of the proposal. Proposals will be evaluated on a case-by-case basis. Refer to the Recreation and Tourism Forest-wide Standards and Guidelines.

SCENERY

Scenery Operations: SCENE1

A. Apply Forest-wide Standards and Guidelines for High Scenic Integrity Objective. Design activities to not be visually evident to the casual observer.
B. Exceptions for small areas of non-conforming developments, such as recreational developments, transportation developments, log transfer facilities, and mining development, may be considered on a case-bycase basis. Use designs and materials that are compatible with forms, colors, and textures found in the characteristic landscape.

SOIL AND WATER

Watershed Resource Improvements: SW4

A. Undertake watershed improvements only where deteriorated soil and hydrologic conditions create a threat to the goals and objectives for which the old-growth habitat is managed. Rehabilitation or stabilization projects will seek to enable the area to retain its natural appearance.

TIMBER

Timber Resource Planning: TIM4

A. Old-growth forest land is classified as not suitable for timber production.
B. Beach log salvage is compatible with this LUD.
C. Avoid Old-growth Habitat areas when other feasible locations for personal use sawtimber, firewood, and Christmas tree cutting are available. If personal (free) use timber harvest is allowed, personal use permit requirements must satisfy LUD objectives (refer to Chapter 4, Personal Use Program, Section TIM4). Personal use timber harvest will be regulated and its cumulative effects monitored in LUDs that are unsuitable for timber harvest to ensure that the LUD objectives are fulfilled.
D. Harvest of bridge stringer logs is allowed.

Timber Sale Preparation: TIM5

A. Salvage of dead or down material is permitted but is limited to roadside windfall and hazard trees immediately adjacent to existing permanent roads and catastrophic windthrow events or large insect or disease outbreaks (generally exceeding 100 acres). Limited standing undamaged timber (up to 20 percent of total salvage) may be removed only for safety reasons or for feasibility of salvage operations. Salvage sales must be compatible with LUD objectives as determined through the environmental analysis process. Stands once salvaged will be managed to achieve old-growth habitat characteristics. During the environmental analysis, consider the scale of the affected area salvaged. If reserve design criteria are no longer met, adjust reserve locations to better meet reserve size, spacing, and composition criteria if lands are available (see Wildlife Habitat Planning, section B below, and Appendix K).

TRANSPORTATION

Transportation Operations: TRAN

A. New Road construction is generally inconsistent with Old-growth Habitat LUD objectives, but new roads may be constructed if no feasible alternative is available.
   1. Perform integrated logging system and transportation analysis (including Access and Travel management planning) to determine if other feasible routes avoiding this LUD exist during the project environmental analysis process. If no feasible alternative routes exist, locate, design, and construct roads in a manner that minimizes adverse impact to fish and wildlife resources to the extent feasible, and will be compatible with LUD objectives. Keep clearing widths to the minimum feasible. Consider enforcement costs of road closures in the integrated logging system and transportation analysis.
   2. If reserve design criteria are no longer met, adjust reserve locations to meet reserve size, spacing, and composition criteria if lands are available (see Wildlife Habitat Planning, section B below, and Appendix K).
   3. For timber salvage, use logging systems that do not require additional permanent road construction.
B. Manage existing roads to meet LUD objectives.
   1. In Old-growth Habitat LUDs with existing roads, develop or update road management objectives to meet LUD objectives (see Wildlife [brown bear and wolf] and Transportation Forest-wide Standards and Guidelines). Use of existing roads may continue pending the update of the access and travel management plan.
   2. Road management objectives may include temporary or permanent road closures, and may be specific to individual road specification types (e.g., keep mainlines open, close arterial and spur).
   3. Road maintenance and reconstruction may be permitted if consistent with road management objectives.
C. Sites for log transfer facilities are generally not appropriate in this LUD. If no other feasible alternative sites exist, locate, design, construct, and manage these facilities in a manner that will be compatible with LUD objectives. Consider the Log Transfer Facility Guidelines (Appendix G) when making the selection for the facility.

WILDLIFE

Wildlife Habitat Planning: WILD1

A. Maintain contiguous blocks of old-growth forest habitat in a forest-wide system of old-growth reserves to support viable and well-distributed populations of old-growth associated species and subspecies.
B. A system of large, medium, and small old-growth habitat reserves has been identified and mapped in the Forest Plan as part of the Old-growth Habitat Conservation Strategy. The mapped large and medium reserves generally achieve reserve strategy objectives, and few major modifications are

anticipated. The small mapped reserves have received differing levels of ground-truthing and integration of site-specific information in their design. During project-level environmental analysis, for projects areas that include or are adjacent to mapped old-growth habitat reserves, the size, spacing, and habitat composition of mapped reserves may be further evaluated (consult Appendix K).

1. Adjust reserves not meeting the minimum criteria to meet or exceed the minimum criteria.
2. Reserve location, composition, and size may otherwise also be adjusted. Alternative reserves must provide comparable achievement of the Old-growth Habitat LUD goals and objectives. Determination as to comparability must consider the criteria listed in Appendix K.
3. Adjustments to individual reserves described in 1 and 2 above are not expected to require a significant plan.

(USFS 2016 Plan, pp. 3-58 to 3-63)

Chapter 5 of the 2016 Forest Plan identifies lands within the Old-growth Habitat LUD as suitable for young-growth timber production, unless they do not meet suitability requirements of Appendix A (USFS 2016 Plan, p. 5-2, SUIT-YG-01). This plan component does not contribute to functionality of the OGRs and should not be considered part of the Conservation Strategy. LUD standards WILD1 and WILD2 (included in the Management Prescription reproduced immediately above) both allow treatment of early seral forest stands to accelerate attainment of old-growth characteristics, which is compatible with OGR functionality, and part of the Strategy.

Note that Wildlife Habitat Planning Guideline (WILD1) refers to the OGR criteria of Appendix K. The 2016 version of Appendix K includes size and composition criteria for Small OGRs, but not for Large and Medium OGRs, as it did in 1997. Criteria for Large and Medium OGRs can be found in the 1997 Forest Plan Appendix K.

Riparian Forest-wide Standards and Guidelines also contain guidance relevant to OGRs, in the Riparian Planning Standard for Wildlife Resources:

Riparian Planning: RIP2

II. General Standards and Guidelines by Activity

F. Wildlife Resources

1. Integrate RMAs into any modifications to the design and location of small old-growth reserves. (Consult the Old-growth Habitat LUD and Appendix K.)

(USFS 2016 Plan, p. 4-51)

Islands Smaller Than 1,000 Acres

A third element of the reserve system, after OGRs and other non-development LUDs, is protection of islands smaller than 1,000 acres (USFS 1997 ROD, p. 7). Timber harvest was prohibited on these smaller islands in the 1997 Forest Plan, to reduce potential risks to endemic taxa:

Endemic Mammals. Special management consideration has been given to potentially endemic taxa. A PNW reviewer identified a concern for small island endemic taxa, which may be more susceptible to local extinction. The Other Mammal Assessment Panel which assessed risk to viability for these species also expressed concerns relative to endemic taxa. In response to these concerns, the Forest Plan classifies all islands smaller than 1,000 acres as unsuitable for timber harvest.

(USFS 1997 ROD, p. 35)

This commitment was confirmed in the 2008 Forest Plan FEIS, with additional clarification:

> ***Small Islands:*** The Tongass Forest Plan protects all islands less than 1,000 acres from additional harvest of old-growth forest. These areas are mapped as non-development LUDs, typically Semi-Remote Recreation. (USFS 2008 FEIS App D, p. D-7)

The 2016 Forest Plan retained the protection provided for smaller islands:

> Based on principles of conservation, a network of large, medium, and small sized OGRs allocated to the Old-Growth Habitat LUD plus all small islands less than 1,000 acres remain intact.
> (USFS 2016 ROD, p. 21)

There are no Forest Plan components that directly address islands smaller than 1,000 acres. Instead, as explained in the 2008 FEIS Appendix quoted above, protection of smaller islands was provided by their non-development LUD classification, which is "typically Semi-Remote Recreation" (USFS 2008 FEIS App D, p. D-7). These smaller islands, therefore, may be considered a subset of the "all other non-development LUDs" element of the reserve system.

Presentation of this element separately from the other non-development LUDs helps to underscore the potential sensitivity of biota on these smaller islands, where vulnerable populations may have few or no dispersal options or immigration/recolonization opportunities. Habitat modifications or other disturbances in such settings may have much higher impacts to resident wildlife than similar projects in areas with larger populations and better habitat connectivity that allows for dispersal and immigration.

Modification of Reserves

Appendix K of both the 2008 and 2016 Forest Plans focused on procedures for reviewing and modifying OGRs when necessary, for projects with potential to impact integrity of individual reserves or the collective reserve system. The procedures described in Appendix K (reproduced below) are a refined version of an interagency review process initially described in a guidance document titled "Tongass National Forest Land and Resource Plan Implementation Policy Clarification" (TPIT 1998). This guidance addressed a wide range of issues associated with implementation of the 1997 Forest Plan, including several aspects of the Conservation Strategy.

The interagency review process described in the 1998 clarification guidance was implemented and further developed between 1998 and 2008, when interagency OGR reviews were routinely conducted for each proposed timber sale, and during a 2006-2007 interagency effort to finalize Small OGR locations across the entire Forest (USFS 2008 FEIS Appendix D, p. D-28). The 2008 Forest Plan adopted final locations for 224 of the 237 Small OGRs, so project-level reviews of the Small OGRs are no longer required for most projects. Proposed projects that would affect any of the 13 Value Comparison Units (VCUs) with Small OGRs that were not finalized, and projects that would have new impacts on otherwise finalized OGRs (e.g., land conveyances, salvage or young-growth harvest, new powerline or mine construction, etc.) still require an interagency OGR review. Design criteria for Large and Medium OGRs (which still apply) are not included in the 2016 Appendix K but can be found in the 2008 FEIS Appendix D and the 1997 Forest Plan Appendix K (see above).

Because all non-development LUDs are part of the reserve system (as established above), any projects that affect non-development LUDs (not just Old-growth Habitat LUD) should be reviewed using the procedures described in Appendix K, to ensure that size, spacing, composition, and connectivity criteria of the reserve system continue to be met. The impending Forest Plan revision may offer an opportunity to clarify this point.

Appendix K

Old-growth Habitat Reserve Modification Procedures

Introduction

This appendix describes criteria for changing the boundaries of old-growth reserves (OGRs) at the project level as described in the Old-growth Habitat Land Use Designation (LUD) Standards and Guidelines (Wildlife section). For a complete review of the Conservation Strategy, including assumptions for the design of the OGR system, refer to Appendix N of the 1997 Final EIS and Appendix D of the 2008 Final EIS.

Significant modifications to OGRs (e.g., in the case of a land exchange) require consideration of other factors outside the scope of this appendix. Factors include connectivity, size, and shape of the reserve, as well as basic assumptions behind the location of the reserves. Some activities (i.e., major land conveyance or substantial timber harvest in non-development LUDs) could significantly affect the integrity of the Conservation Strategy. In this case, an overall review of the effects on the Conservation Strategy would be necessary. These activities are anticipated to be infrequent events.

Review of OGRs

During the 2008 Amendment process, the USDA Forest Service, U.S. Fish and Wildlife Service (USFWS), and Alaska Department of Fish and Game (ADF&G) reviewed all of the small OGRs and a few of the medium and large OGRs.

These were reviewed primarily because under the 1997 Forest Plan, small OGRs were not adequately mapped, so it was necessary to review and designate them at the project level. Medium and large OGR locations were finalized in the 1997 Forest Plan and brought forward. The location of the majority of the small OGRs was completed during the 2008 Forest Plan review; therefore, project-level reviews are not necessary, except as outlined below.

Minor modifications to any OGR boundary as a result of imprecise mapping are considered an administrative change. The changes will not be considered changes in the Forest Plan and may be completed without project level or other review provided that changes meet OGR goals and objectives. Changes should only be completed to follow physical and other recognizable on-the-ground features or defined boundaries (e.g., roads, streams, LUD, watersheds). Under limited circumstances, a line officer may decide to modify the size and location of an OGR. Modifications of OGRs, other than minor as described above, will require the completion of a project level review. This review may be necessary if:

A. The project occurs in VCUs 1930, 2010, 5371, 5620, 6100, 6140, 6150, 6160, 6170, 6320, 6710, 6750, and 6760. A project-level review is required because critical site-specific information for these small and medium OGRs was not available for the 2008 Forest Plan review. Th s review requires an assessment of landscape connectivity (refer to Appendix D of the Final EIS). Once a review and approval through the NEPA process is complete, no further review for these OGRs is necessary.
B. The project proposes young-growth harvest in the Old-growth Habitat LUD.
C. Site-specific information for a small OGR indicates that the OGR habitat criteria are not met in the mapped location.
D. Actions are proposed within the OGR that will reduce the integrity of the old-growth habitat in the OGR.
E. The OGR will be affected by a land conveyance, power line, mine, or other project that was not considered in the Forest Plan. An overall review of the Conservation Strategy is not necessary for a modification to an individual small OGR, but it could be necessary for modifications to medium and large OGRs, or if a proposal affects multiple OGRs. If an overall review is deemed unnecessary by the

line officer for modification to medium and large OGRs, documentation of the rationale will be done through the NEPA process.

Project-Level Review

Project-level reviews will ensure that OGRs meet Forest Plan OGR criteria while addressing forest-wide multiple use goals and objectives. There are two levels of review included in the project-level review:

1) the interagency review, and
2) the decision process.

Step 1, Interagency Review Process—The purpose of an interagency review is to identify the biologically preferred location for the OGR. An interagency team of USDA Forest Service, USFWS, and ADF&G biologists will jointly evaluate the location and habitat composition of the OGR by reviewing all the large productive old growth blocks within a Value Comparison Unit (VCU). The interagency review team will develop a proposal for the OGR that meets the criteria of this appendix and document why other proposals were not recommended. The review will include the following steps:

A. Review the purpose and rationale for current location of the Forest Plan OGR as documented in the current Tongass Old Growth database.

B. Assess whether the purpose and rationale for the location of the OGR has changed.
C. Use the design criteria to define the biologically preferred location for the OGR.
D. Document this proposal as the interagency proposed OGR in the Tongass Old Growth database and in an Interagency OGR Review report.

Step 2, Decision Process—Line officers will incorporate the interagency review team OGR recommendation in the NEPA process, considering the best biological location for the OGR while balancing other considerations. The interagency team will work with the decision maker to develop alternate proposals, if necessary to meet other Forest Plan objectives. The implemented OGR must meet the minimum criteria as described below. The Decision process will include the following steps:

A. Attempt to develop a viable project that avoids conflicts with the biologically preferred OGR. At a minimum, the biologically preferred OGR will be considered in an alternative in the NEPA document.
B. Where modifications to the biologically preferred OGR are required to meet Forest-wide multiple use goals and objectives: 1. Follow the management prescriptions as defined for the Old-growth Habitat LUD; and 2. Document the rationale for modifications to the biologically preferred OGR.
C. Changes to the OGR LUD require a NEPA analysis and a Forest Plan amendment.
D. Analyze the amount of land suitable for timber production impacted by the change in OGR.
E. Add the updated information (including the rationale for the final location) to the Tongass Old Growth database.

Criteria for Small OGRs

A. Review Appendix D of the Final EIS, which includes the assumptions for the design of the old-growth reserve system.
B. Small reserves are a contiguous landscape of at least 16 percent of the National Forest System land area of each VCU and at least 50 percent of the small reserve, should be productive old growth. The size and location of small OGRs will consider the following:

1. OGRs shall contain a minimum of 400 acres of productive old-growth forest. Do not map isolated reserves with less than 400 acres of productive old growth.
2. The preferred biological objective is for each reserve to contain at least 800 acres of productive old-growth forest.
3. In VCUs that are partially allocated to a Non-development LUD, compare the computed acreage required to the acres of productive old growth in the Non-development LUD. If the Non-development LUD acres are less than the area necessary for a small reserve, first use the productive old growth acres in the existing Non-development LUD to establish a small reserve, and then add additional acres of productive old growth to achieve the required small reserve size and composition.

4. In VCUs that are separated by saltwater channels, reserves may be separated, but attempt to retain 800 acres of productive old growth in each.
5. In very large VCUs, generally larger than 10,000 acres, the allocated old growth may be mapped in separate reserves as long as each reserve has a minimum of 800 acres of productive old growth. However, larger contiguous reserves are preferred to multiple smaller reserves.
6. In very large VCUs that contain relatively little productive old growth and the computational rule requires an amount of productive old growth that exceeds 50 percent of the existing productive old growth in the VCU, map a reserve of at least 400 acres of productive old growth.
7. Where VCU boundaries do not match watershed or ecological boundaries, up to 30 percent of the allocated old growth acres in a VCU may be mapped in an adjacent VCU if the resulting reserve achieves old-growth reserve objectives. The resulting small reserve in both VCUs must be contiguous. Total acreage is attributed to the VCU with 70 percent of the OGR.
8. OGR boundaries should follow recognizable features that are identifiable on the ground. Features should be permanent and easily identifiable. Features may include but are not limited to streams, roads, distinctive ridges and ridge-tops, watershed boundaries, and v-notches.

(USFS 2016 Plan, App. K)

Tongass OGR Tracking Table

Direction in the 1997 Forest Plan required review of Small OGRs during project-level analyses, because the Small OGR locations had not been adequately reviewed prior to adoption of the Forest Plan. The VPOP committee had mapped proposed locations for Large and Medium OGRs and those locations had been reviewed and refined by the interagency (USFS, ADF&G, and USFWS) review team developing the Conservation Strategy for the Forest Plan. Proposed locations for Small OGRs were mapped by USFS staff but the interagency team did not have adequate time to review the Small OGRs. Project-level reviews of Small OGRs were therefore required under Management Prescription WILD122-B for the Old-Growth Habitat LUD (USFS 1997 Plan, pp. 3-80 to 3-81).

Between 1997 and 2007, Small OGRs were reviewed during environmental analysis of 23 timber sales and one mine, and many of the OGRs were modified by the project RODs (USFS 2008 FEIS App D, pp. D-17 to D-18). In 2006 and 2007, in preparation for the 2008 Forest Plan amendment, an interagency team reviewed the history, location, and composition of each of the 237 Small OGRs and identified biologically preferred locations for each OGR. The interagency team subsequently worked with Ranger District staff to adjust proposed OGR locations to accommodate additional multiple-use objectives. The Forest Supervisor reviewed the District-level proposals, and further modified some of the proposed locations (USFS 2008 FEIS App D, p. D-28). Modifications made during Ranger District and Forest Supervisor reviews generally compromised the reserves to facilitate road access or timber harvest opportunities.

Statistics on composition and notes on locations and issues for each of the reserves were documented for each of these iterations in a large spreadsheet, known as the “OGR Tracking Table”. The Tracking Table is part of the administrative record for the 2008 Forest Plan process, and is not technically an element of the Conservation Strategy proper. It remains, however, an important source of background information on each of the Small OGRs. It is currently located on the Forest Service computer system at:
T:\FS\Reference\GIS\r10_tnf\Data\FP2008\FP_old_growth_reserves\Tables

Connecting Corridors

Origin and Intent

The original VPOP Conservation Strategy proposal recommended that corridors of old-growth forest habitat be provided to increase the likelihood of successful dispersal of the species of concern throughout the landscape. Specifically, the committee recommended maintenance of beach buffers at least 500 ft wide wherever the coastline was forested and old-growth riparian buffers at least 100 ft on each side of streams to aid in the dispersal of old-growth associated species. They recognized that additional biological corridors might need to be designated during project level analyses to assure sufficient movement of old-growth associated species between reserves. They specified that breaks in old-growth travel corridors should not exceed 65 feet to ensure that flying squirrels could glide across the openings (Suring et al. 1993, p. 30).

The PNW peer review of VPOP's proposed strategy recommended wider connecting corridors, particularly for marten (Keister and Eckhardt 1994). The Forest Plan adopted in 1997 included 1,000-foot buffers along all marine and estuary shorelines, and riparian management standards and guidelines to provide connecting corridors and sustain old growth riparian habitat. The new Forest Plan also provided specific direction to provide additional connectivity where project-level analysis indicated that beach fringe and riparian buffers were not sufficient to meet objectives for connectivity (USFS 1997 ROD, p. 7). These elements were retained in the amended 2008 and 2016 Forest Plans.

The primary elements of connectivity are contained in the Standards and Guidelines of Chapter 4 in the 2016 Forest Plan, for Beach and Estuary Fringe, and Riparian. Additional guidance on project-level reviews to ensure adequate connectivity is contained in Chapter 4, Forest-wide Standards and Guidelines for Wildlife, in Wildlife Habitat Planning: WILD1, for Landscape Connectivity. These sections are essential elements of the Conservation Strategy and are reproduced below.

Beach and Estuary Fringe Standards and Guidelines

Management Objectives for Beach and Estuary Fringe (USFS 2016 Plan, pp. 4-4 to 4-5) include maintenance of the ecological integrity of beach and estuary fringe forested habitat to provide sustained natural habitat conditions for wildlife, plants, fish, recreation, heritage, scenery, wilderness, and other resources. One of the primary roles identified in the Management Objectives is to provide a relatively continuous forested corridor linking terrestrial landscapes. Protection of 1,000-foot buffers as habitat and as corridors is a focus of the Standards and Guidelines for Beach and Estuary Fringe. The full plan component is reproduced below:

BEACH and ESTUARY FRINGE

Beach and Estuary Description: BEACH1

I. Objectives and Identification

A. Management objectives of the beach and estuary fringe habitat.

1. To maintain the ecological integrity of beach and estuary fringe forested habitat to provide sustained natural habitat conditions and requirements for wildlife, plants, fish, recreation, heritage, scenery, wilderness, and other resources.

2. To provide a relatively continuous forested corridor linking terrestrial landscapes.
3. To provide a variety of recreation opportunities, typically of a Primitive or Semi-Primitive nature and retain the scenic quality.
4. To maintain an approximate 1,000-foot-wide beach fringe of mostly unmodified forest to provide important habitats, corridors, and connectivity of habitat for eagles, goshawks, deer, marten, otter, bear, and other wildlife species associated with the maritime-influenced habitat. Old-growth forests are managed for near-natural habitat conditions (including natural disturbances) with little evidence of human-induced influence on the ecosystem.
5. To maintain an approximate 1,000-foot-wide estuary fringe of mostly undisturbed forest that contributes to maintenance of the ecological integrity of the biologically rich tidal and intertidal estuary zone. Habitats for shorebirds, waterfowl, bald eagles, goshawks and other marine-associated species are emphasized. Old-growth conifer stands, grasslands, wetlands, and other natural habitats associated with estuary areas above the mean high tide line are managed for near-natural habitat conditions with little evidence of human-induced disturbance.

B. Beach fringe identification.

1. The beach fringe is an area of approximately 1,000 feet slope distance inland from mean high tide around all marine coastline.

C. Estuary fringe identification.

1. The estuary fringe is an area of approximately 1,000 feet slope distance around all identified estuaries. Estuaries are ecological systems at the mouths of streams where fresh and saltwater mix, and where salt marshes and intertidal mudflats are present. The landward extent of an estuary is the limit of salt-tolerant vegetation (not including the tidally influenced stream or river channel incised into the forested uplands), and the seaward extent is a stream's delta at mean low water.

Beach and Estuary Management: BEACH2

I. Management

A. Management is governed by the Land Use Designation (LUD) in which the beach or estuary area is located. Some LUDs (such as Wilderness and some of the Natural Setting LUDs) highly restrict development. Where the LUD allows development (e.g., moderate and intensive Development LUDs), the standards and guidelines discussed below will apply.

1. Allow facility developments that require in-water access (e.g., docks, floats, or boat ramps).
   a) Locate facilities more than 300 feet from the mouths of intertidal channels of known Class I anadromous fish streams, or tidal or subtidal beds of aquatic vegetation to avoid significant impairment.
   b) Avoid filling of intertidal and subtidal areas to the extent feasible.
2. Permit reasonable access to mining claims in accordance with the provisions of an approved Plan of Operations. Assure prospectors and claimants their right of ingress and egress granted under the General Mining Law of 1872, Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and National Forest Mining Regulations at 36 CFR 228.
   a) Take advantage of topographic and vegetative screening when locating drill rigs, pumps, roads, rock quarries, structures, and marine transfer facilities.
   b) Consider timing restrictions to minerals activities to avoid adverse impacts to fish and wildlife resources during critical periods.
3. Emphasize natural recreation settings and continue to provide the spectrum of outdoor recreation and tourism opportunities.
   a) Where feasible, schedule activities to avoid change to the existing Recreation Opportunity Spectrum (ROS) class in marine recreation settings. Emphasize the more primitive ROS class when activities are considered in the Wilderness or Wilderness Monument LUD.
   b) In locations where scheduled activities change the recreation setting(s), manage the new setting(s) in accordance with the appropriate ROS guidelines with emphasis on marine-related recreation activities.
   c) Design and locate recreation-related structures (e.g., recreation cabins, lodges, and wildlife viewing structures) to be compatible with beach and estuary fringe objectives.
   d) Manage off-highway vehicle (OHV) use as documented in the Travel Management Plan.
   e) Manage recreation and tourism use to maintain fish, wildlife, and rare plant habitats.
4. Allow subsistence and other personal use of timber in accordance with ANILCA, Title VIII, and other standards and guidelines (e.g., the 330-foot buffer around bald eagle nests). Personal use is generally

inconsistent with beach and is only allowed when the accessibility of other lands suitable for timber production are not feasible, such as when the eligible permittee lives in an unroaded area with no feasible access to designated "suitable timber" lands suitable for timber production, and when the LUD objectives can be met." Personal use timber harvest will be regulated and its cumulative effects monitored in LUDs that are not suitable for timber production to ensure that the LUD objectives are fulfilled.

5. Beach log salvage is permitted.
6. (See Forest-wide plan components in Chapter 5)
7. (See Forest-wide plan components in Chapter 5)
8. Road construction is discouraged in the beach and estuary fringes. Where feasible alternatives are not available, road corridors may be designated.
   a) Provide or maintain recreation or community access where needed as identified through project analysis.
9. Log transfer facilities may be constructed.
   a) Use the Alaska Timber Task Force Siting Guidelines (see Appendix G and the log transfer facility standards and guidelines in the Transportation Forest-wide Standards and Guidelines section).
10. Wildlife habitat restoration of young-growth conifer stands is encouraged to accelerate development of advanced seral stand structure. Treatments may include thinning of young stands, release, pruning, and fertilization.
11. Other authorized activities (e.g., powerlines, fish camps) may be allowed in the beach and estuary fringe where feasible alternative locations are not available.

(USFS 2016 Plan, pp. 4-4 to 4-5)

Standards BEACH2 I.A.6. and BEACH2 I.A.7. above refer to Forest-wide plan components in Chapter 5, which describe management intended to accelerate transition away from old-growth harvest by expanding opportunities to harvest of young growth, promote development of renewable energy, and manage the transportation system. These Forest Plan components are not essential to the connectivity function of the beach and estuary fringe (and potentially counter to it, depending on how they are applied) and <u>should not be considered part of the Conservation Strategy</u>. Standard I.A.10. above encourages treatment of young growth in the Beach and Estuary Fringe to restore advanced seral stand structure. Such treatment contributes to the connectivity function and <u>is</u> an element of the Strategy.

Riparian Standards and Guidelines

Riparian Forest-wide Standards and Guidelines (USFS 2016 Plan, pp. 4-48 to 4-52) address conservation of riparian areas to provide for continued productivity of a broad range of aquatic and terrestrial species and resources. Wildlife travel corridors are explicitly included as one value to be considered in the Riparian Planning Standard (RIP2) for Wildlife Resources (p. 4-51). This guideline directs staff to:

> "Use riparian corridors in the design of wildlife travel corridors to provide horizontal connectivity between watersheds, and vertical connectivity between lowland and alpine areas."

(USFS 2016 Plan, p. 4-51)

In practice, riparian corridors tend to connect patches of old-growth forest to beach and estuary buffers, which provide most of the horizontal old-growth connectivity between watersheds on the Tongass.

The entire set of Riparian Standards and Guidelines are reproduced below. Portions particularly relevant to the Conservation Strategy include sections on identification and designation of Riparian Management Areas (RMAs), which serve as old-growth corridors in the Conservation

Strategy. These RMAs are designated only where timber sales or other proposed projects have prompted environmental analysis requiring RMA identification. Where no RMAs have been designated, connectivity is provided by natural conditions, except where impacts predating the 1997 Forest Plan exist.

RIPARIAN

Forest-wide Standards and Guidelines

Riparian area: RIP1

I. Definition

A. Riparian areas encompass the zone of interaction between aquatic and terrestrial environments associated with streamsides, lakeshores, and floodplains, and display distinctive ecological conditions characterized by high species diversity, wildlife value, and resource productivity.

II. Objectives

A. Maintain riparian areas in mostly natural conditions for fish, other aquatic life, old-growth and riparian-associated plant and wildlife species, water-related recreation, and to provide for ecosystem processes, including important aquatic and land interactions. For further direction, refer to the Fish, Wildlife, Recreation and Tourism, Beach and Estuary Fringe, and Soil and Water Forest-wide Standards and Guidelines, as well as the Riparian Standards and Guidelines criteria for each process group contained in Appendix D. The following is a list of objectives pertaining to riparian areas. (Consult Forest Service Manual [FSM] 2526.)

1. Protect riparian habitat.
2. Manage riparian areas for short- and long-term biodiversity and productivity.
3. Maintain natural streambank and stream channel processes.
4. Maintain natural and beneficial quantities of large woody debris over the short and long term.
5. Protect water quality by providing for the beneficial uses of riparian areas. (Consult Best Management Practices [BMPs], Chapter 10 of the Soil and Water Conservation Handbook, FSH 2509.22.)
6. Maintain or restore the natural range and frequency of aquatic habitat conditions on the Tongass National Forest to sustain the diversity and production of fish and other freshwater organisms.
7. Consider the management of both terrestrial and aquatic resources when managing riparian areas. Consider the effects of terrestrial and aquatic processes on aquatic and riparian resources.
8. In watersheds with intermingled land ownership, cooperate with the other landowners in striving to achieve healthy riparian areas.
9. Design and coordinate road management activities to provide for the needs of wildlife and provide passage of fish at road crossings. (Consult the Fish Forest-wide Standards and Guidelines and the Aquatic Habitat Management Handbook, Forest Service Handbook [FSH] 2090.21.)
10. Evaluate the effect of management (including windthrow) of adjacent areas on riparian habitats.
11. Coordinate and consult with state and federal agencies on riparian management issues, as appropriate.
12. Coordinate and consult with Alaska Department of Environmental Conservation (ADEC) regarding management of public water systems source watersheds.

Riparian Planning: RIP2

I. Project Planning

A. Identify and delineate Riparian Management Areas (RMAs) for each project where ground disturbance will occur or resources will be extracted. RMAs are areas of special concern to fish, other aquatic resources, and wildlife. They are generally delineated as identified in the Process Group direction in the Riparian Forest-wide Standards and Guidelines. Riparian areas are differentiated from adjacent reserve areas, such as wildlife reserves or areas managed to provide reasonable assurance of windfirmness.

B. Complete a watershed analysis before making site-specific adjustments to Process Group Standards and Guidelines (see Appendix D). Riparian guidelines may be adjusted only if the stream process group objectives can be met. Consult Appendix C of the Forest Plan for direction on adjusting riparian guidelines.

C. On those projects and activities that are in, or influence, RMAs, ensure interdisciplinary involvement and consideration of riparian resources in project planning and in the environmental analysis process.

1. The location and design of wildlife habitat reserves and mitigation measures should be closely integrated with the design and layout of RMAs.

2. Logging engineers and aquatic specialists should conduct joint reviews of preliminary harvest unit designs to ensure that site-specific stream protection measures meet riparian objectives, as well as logging system feasibility and timber harvest economic objectives.

D. Ensure that permit holders, contractors, and/or purchasers understand RMAs and riparian management objectives.

E. Evaluate RMA windthrow risk when locating and designing adjacent management activities (Reasonable Assurance of Windfirmness [RAW] Guidelines: Landwehr 2007 and subsequent versions). Minimize accelerated windthrow in RMA buffers. In situations where a high risk of blowdown factors is present, indicating a high windthrow risk, a RAW buffer should be prescribed. In situations where multiple low risk factors are present and high risk factors are minimal, a RAW zone addition to riparian buffers is not warranted. Where high-value aquatic resources (such as a Class I stream or drinking water supplies) are at-risk, use of a wider buffer may be warranted even when the risk of windthrow is judged to be low or moderate. The RAW zone is not necessarily a no-harvest zone; partial harvest may be appropriate in RAW buffers depending on site-specific conditions. (Consult BMP 12.6a of the Soil and Water Conservation Handbook—FSH 2509.22 and the Process Group Standards and Guidelines.)

II. General Standards and Guidelines by Activity

A. Special use administration(Non-Recreation)

1. Permit activities, consistent with other special use direction, that do not significantly reduce the capability of RMAs to 1) maintain or improve associated fish or wildlife habitat, or 2) protect water quality for beneficial uses.

B. Minerals and Geology Administration, Plan of Operations

1. Use state-of-the-art techniques for developing minerals to reduce impacts to riparian resources to the extent feasible. Include mitigation measures that are compatible with the scale of proposed development and commensurate with potential resource impacts.
2. Apply appropriate Transportation Forest-wide Standards and Guidelines to the location, construction, and maintenance of mining roads affecting riparian areas.
3. Manage mineral exploration and development activities to be compatible with the Process group goals and objectives for RMAs.
4. Manage mineral activities to maintain the present and continued productivity of anadromous fish and other foodfish habitat to the maximum extent feasible. (Consult the Alaska National Interest Land Conservation Act of 1980, Section 505 [a].) Plan of Operations for mining must comply with Clean Water Act, Sections 401, 402, 404, as applicable. (Consult FSM 2817.23a.)
5. Apply timing restrictions to instream construction and other minerals activities to protect fisheries habitat and mitigate adverse sedimentation, and to avoid critical wildlife mating, hatching, and migrating periods.
6. Minimize the effects of mineral development and related land disturbance activities on the beneficial uses of water by applying BMPs.
7. Locate material sites and marine transfer facilities outside RMAs if reasonable alternatives exist.
8. Ensure that disturbed areas are revegetated in accordance with project plans.
9. Approve reclamation plans in which mineral activities

C. Recreation Use Administration

1. Locate, design, and operate only those recreation projects that are necessary to accommodate public use of the water and shoreline areas (i.e., boat or floatplane docks, launching ramps, and associated access roads and trails). Where feasible, locate parking, campgrounds, sanitation, and other recreation facilities outside the RMAs to avoid adverse effects on water quality and riparian function.
2. For existing facilities, consider relocating the facility outside of the RMA. Consideration should be based on current and anticipated effects on riparian values, desired recreation experience, public issues, application of BMPs to minimize the effects of recreation facilities on the beneficial uses of water and costs of relocating the facility.

D. Watershed Resource Planning

1. Manage activities to meet state water quality standards and protect aquatic and terrestrial riparian habitats, channel and streambanks, and provide for flood plain stability.
   a) Identify soil and water quality requirements for project-level activities.
   b) Apply BMPs to minimize the effects of land disturbing activities on the beneficial uses of water.
   c) Determine flood plain values and plan to avoid, where possible, the long- and short-term adverse impacts to soil and water resources associated with the occupancy and modification of flood plains.

d) Complete a watershed analysis before making project-level, site-specific adjustments to Process Group Standards and Guidelines. Adjustments to the guidelines may be made only if the objectives of the process group(s) can be met. Consult Appendix C of the Forest Plan for direction on watershed analysis. The intensity and scope of watershed analysis will vary according to the issues of concern.

E. Timber Resources

1. No commercial timber harvest is allowed within 100 feet horizontal distance either side of Class I streams and Class II streams that flow directly into a Class I stream. (Consult the Tongass Timber Reform Act.)
   a) Included in the definition of Class II streams flowing directly into a Class I stream are all Class II tributaries of a Class II stream that flow into a Class I stream without an intervening Class III segment. Mandatory minimum 100-foot buffers will not apply to
      1) a Class II stream that flows directly into the ocean or joins a Class I stream only at lower than mean high tide; and
      2) a Class II tributary stream segment that flows into a Class III stream that in turn flows into a Class I stream.
   b) The 100-foot measure is a horizontal distance measure from the bankfull margins.
2. Protect RMAs, in accordance with the intent of the Alaska Anadromous Fish Habitat Assessment (1995), through application of the direction contained in Process Group Standards and Guidelines (Appendix D). Apply additional BMPs (National Core BMP Technical Guide FS-990a and Alaska Region Soil and Water Conservation Handbook FSH 2509.22) to minimize the effects of timber harvest and related land disturbance activities on beneficial uses of water. In situations where multiple high risk factors are present, indicating a high windthrow risk, a Reasonable Assurance of Windfirmness (RAW) zone adjacent to the RMA buffer should be established (see RAW Guidelines: Landwehr 2007 and subsequent versions).
3. Avoid RMAs when other feasible locations for personal use wood cutting are available. If personal (free) use timber harvest in RMAs is allowed, free use permit requirements must satisfy process group objectives (refer to Personal Use Program, section TIM4). Personal use timber harvest will be regulated and its cumulative effects monitored in LUDs that are not suitable for timber production to ensure that the LUD objectives are fulfilled.
4. Provide protection to fish and wildlife during critical periods of their life cycles by applying seasonal restrictions on timber harvest and road use activities, to the extent feasible. 5. When stream crossings are required to harvest timber, assess the environmental effects of road crossings versus yarding corridors, and select the action of least environmental impact where practicable.
6. Streamcourse protection plans (consult BMP 13.16) are required for harvesting activities within the required minimum 100-foot buffers designated in E (1) above.

a) Provide thorough documentation of RMA design and BMP mitigation provision on timber sale unit cards and maps. "As-laid-out" (or phase II) unit cards are a useful tool for facilitating application of RMA and streamcourse protection during sale administration, and for monitoring compliance with and implementation of Riparian Forest-wide Standards and Guidelines.

7. Allow no commercial timber salvage within 100 feet in width on each side of Class I streams or on those Class II streams that flow directly into Class I streams. In addition, allow no timber salvage in RMAs defined for each process group, with the following exception: salvage could be allowed, with Line Officer approval, following watershed analysis if the salvage activity is needed to meet or further riparian management objectives for the process group (see Appendix C for guidance on watershed analysis). RMA salvage timber will not contribute toward the Projected Timber Sale Quantity (PTSQ).
8. Plan timber harvest settings that cross or are immediately adjacent to streamcourses (Class I, II, III, and IV Channels) so as to avoid adverse impacts to RMAs, and soil and water resources. (Consult FSH 2409.18 and FSH 2509.22.)
9. Stream process group-specific standards and guidelines for timber harvest are presented in Appendix D, along with descriptions of each process group and channel type. The standards and guidelines (except for the minimum 100-foot buffers required by TTRA) may be adjusted for a project on a site-specific basis following completion of a watershed analysis. Adjustments to the standards and guidelines may be made only if the objectives of the process group(s) can be met. Consult Appendix C for direction on watershed analysis.

F. Wildlife Resources

1. Integrate RMAs into any modifications to the design and location of small old-growth reserves. (Consult the Old-growth Habitat LUD and Appendix K.)
2. Use riparian corridors in the design of wildlife travel corridors to provide horizontal connectivity between watersheds, and vertical connectivity between lowland and alpine areas.
3. Consider wildlife needs in the design and management of RMAs. Give special emphasis to habitats of riparian associated species, for example, designated brown bear feeding areas. (See Wildlife Forest-wide Standards and Guidelines.)

G. Transportation Systems

1. Use road closures, maintenance, and other measures to keep road-surface and road-side erosion at low or near background levels. Ensure long-term fish passage through structures at road crossings on Class I and II streams as described in Process Group direction and the Fish Standards and Guidelines. Use BMPs (National Core BMP Technical Guide FS-990a and Alaska Region Soil and Water Conservation Handbook FSH 2509.22 [BMP 14-20]) to control effects of transportation systems on water quality and fish habitat. Also refer to the Alaska Forest Practices Act (11 AAC 95.320) for road closure requirements.

(USFS 2016 Plan, pp. 4-48 to 4-52)

Chapter 5 of the 2016 Forest Plan includes elements relevant to management of riparian areas intended to accelerate transition away from old-growth harvest by expanding opportunities to harvest of young growth, facilitate development of renewable energy generation, and manage transportation systems. These Forest Plan components are not essential to the connectivity function of riparian management areas and potentially counter to it depending on how they are applied. These plan components <u>should not be considered part of the Conservation Strategy</u>.

Connectivity Analyses

Landscape connectivity reviews are required during environmental analysis of "projects proposing to harvest timber, construct roads, or otherwise significantly alter vegetative cover… to determine whether forest connectivity exists among old-growth blocks in large and medium reserves and natural setting LUDs" (USFS 2016 Plan, p. 4-87). Where existing (beach and riparian) corridors do not provide sufficient connectivity between blocks of old-growth in OGRs and other non-development LUDs, additional corridors are to be designated. This direction has been included in each of the three Forest Plans approved since 1997. Clarification on how these reviews are to be conducted, with lists of reserves requiring additional connectivity, was provided by TPIT (1998, pp. 14-15).   It is not known how many additional corridors have been recommended or approved since the Conservation Strategy was adopted in 1997.

The Standards and Guidelines from Chapter 4 of the Forest Plan that describe the required landscape connectivity analyses are reproduced below.

WILDLIFE
Forest-wide Standards and Guidelines
Wildlife Habitat Planning: WILD1w

VI. Landscape Connectivity

A. Design projects to maintain landscape connectivity.

1. The objective is to maintain corridors of old-growth forest among large and medium old- growth reserves (Appendix K) and other forested Non-development LUDs at the landscape scale.
2. During the environmental analysis for projects proposing to harvest timber, construct roads, or otherwise significantly alter vegetative cover, conduct an analysis at the landscape scale to identify

blocks of contiguous old-growth forest habitat within large and medium reserves and other Non-development LUDs to determine whether forest connectivity exists among old-growth blocks in large and medium reserves and natural setting LUDs. Consider existing features of the old-growth strategy such as the beach fringe, small old-growth reserves, riparian buffers, or other lands not suitable for timber production as contributing to maintaining connectivity among large and medium Old-growth Habitat reserves and Non-development LUDs. Use the following parameters to determine if a large or medium reserve is connected:

a) only one connection is needed;
b) the beach fringe serves as a connector; and
c) the connection does not have to be the shortest distance between reserves.

Where these features do not provide sufficient productive old-growth forest connectivity to meet the objective in 1 above, provide stands, where they exist, of productive old-growth forest or other forest that provides adequate wildlife habitat values (i.e., older young growth that provides adequate snow intercept for deer). Designed corridors should be of sufficient width to minimize edge effect and provide interior forest conditions. Consider elevation, natural movement corridors, length of corridor, tree heights, adjacent landscapes, and windthrow susceptibility in corridor design.

B. Forest-wide, within the beach fringe, riparian buffers, and other lands not suitable for timber production, consider designing young-growth treatments to accelerate old-growth characteristics in order to increase connectivity for wildlife.

(USFS 2016 Plan, p. 4-87)

(Note that the second to last sentence of element A.2. begins with the word “Designed”. The word “Designated” might be a better choice here.)

Tongass GIS Layers:

Spatial elements of the Conservation Strategy include reserves (Old-growth Habitat and other non-development LUDs) and corridors (beach, estuary, and riparian buffers). Each of these elements are delineated in forest-level default geodatabases, which is the authoritative dataset used for Forest management purposes. Changes and updates to the default database to reflect modifications adopted in project-level RODs are done by Tongass GIS staff with administrator role privileges.

The GIS dataset on LUDs is found at:
Database Connections\r10_tnf_default_as_s_r10_tnf.sde\S_R10_TNF.LUD\S_R10_TNF.LandUseDesignation

Beach and estuary fringe buffers, which provide a critical element of connectivity between adjacent reserves and non-development LUDs, are delineated in:
Database Connections\r10_tnf_default_as_s_r10_tnf.sde\S_R10_TNF.Planning\S_R10_TNF.BeachBuffersMaxHW

Datasets showing Riparian Management Areas (RMAs), which provide another critical element of old-growth connectivity, are found at:
Database Connections\r10_tnf_default_as_s_r10_tnf.sde\S_R10_TNF.RiparianMgtArea\S_R10_TNF.RMA

These data files showing locations of designated reserves and corridors should be considered essential elements of the Conservation Strategy.

RMAs have only been delineated where environmental analyses have been done for proposed timber sales or other projects. The RMA data, therefore, provides an incomplete picture of riparian corridors that exist between adjacent reserves. A more comprehensive view could be developed through a query of streams and forest cover, to show the full extent of existing riparian old-growth connectivity.

Tongass GIS staff does not maintain a GIS file showing the full system of corridors including beach, estuary, and riparian buffers, along with additional corridors designated following project-level connectivity reviews.

Connecting corridors have reportedly been designated in some project-level RODs, but have apparently not been consolidated in any way. All of these project-level corridors should be identified through a systematic review of landscape connectivity analyses and RODs associated with timber sales and other major projects since 1997, and delineated in a discrete GIS shapefile. Such a data layer would be an important element of the Conservation Strategy.

Criteria on composition of OGRs include minimum acreages of productive old-growth forest. Corridors are intended to link patches of old-growth and must be composed of productive old-growth or, where that is not available, mature second growth. Identification and evaluation of the reserve and corridor system, therefore, relies on accurate data on location of forest cover. Productive old growth is queried from the Tongass NF Size-Density feature class, found at:
Database Connections\r10_tnf_default_as_s_r10_tnf.sde\S_R10_TNF.SizeDensity\S_R10_TNF.Size_Density

The Size-Density dataset is not considered part of the Conservation Strategy, but is an important tool for evaluation or modification of the Strategy.

Species Specific Standards and Guidelines

Origin and Intent

The original VPOP proposal included Standards and Guidelines for management of forest resources to ensure existence of viable, well-distributed populations of species with identified conservation concerns that could not be adequately addressed by the Reserve System alone (Suring et al. 1993, pp. 32 to 36). Direction was provided for six of the original eight design species: great blue heron, northern goshawk, gray wolf, brown bear, river otter, and mountain goat. Peer reviews and subsequent expert panel reviews recommended modifications and additional constraints for several of the species considered by Suring et al. (1993). Standards were added to address risks to endemic terrestrial mammals (USFS 1997 ROD, p. 31 and 35). The 2008 Forest Plan amendment included modifications to the goshawk, marten, wolf, and endemic terrestrial mammal Standards and Guidelines. These modifications were retained in the amended 2016 Forest Plan.

The Standards and Guidelines reproduced below are from the Wildlife Section of Chapter 4, Standards and Guidelines (USFS 2016 Plan, pp. 4-85 to 4-97). Several additional Standards and Guidelines are included in the Wildlife section that were not initially developed by the VPOP committee or in response to subsequent reviews of the Conservation Strategy and so are not included here as elements of the Strategy.

Brown Bear (Habitat Management)

IX. Bear Habitat Management

A. Continue to implement strategies, in cooperation with the Alaska Department of Environmental Conservation, ADF&G, cities, and boroughs, that prevent habituation of bears to human foods/garbage and reduce chances of human/bear incidents. Strategies that can be used to reduce human/bear incidents include the following:

1. Phasing out and rehabilitating any remaining open garbage sites on National Forest System land. Establish timetables for phase out and rehabilitation in cooperation with appropriate state agencies. (Consult Lands Forest-wide Standards and Guidelines on sanitary landfills.)
2. Requiring incinerators and/or other bear-proof garbage disposal methods at work camps, recreation sites, administrative and research facilities, and special use authorizations in bear habitats.
3. Where feasible, locating seasonal and permanent work camps, recreation facilities, mineral exploration and operational facilities, LTFs, where allowed by the LUD, more than one mile from sites of important seasonal bear concentrations to reduce chances of human/bear confrontations.
4. On Forest Service-approved projects and special use authorizations in brown bear habitat, minimizing adverse impacts to the habitat and seeking to reduce human/bear conflicts. Specific plans could include seasonal restrictions on activities and other measures determined on a case-by-case basis.
5. Maintaining an aggressive public education program on bear behavior to reduce the number of human/bear incidents.
6. Requiring storage of human food in ways to make it unavailable to bears to reduce habituation of bears and reduce human/bear incidents.

B. During project planning, evaluate the need for additional protection of important brown bear foraging sites (e.g., waterfalls used as fishing sites) in addition to the buffers already provided by the Riparian and Beach and Estuary Fringe Forest-wide Standards and Guidelines, and the Old-growth Habitat and other Non-development LUDs. Consult with the ADF&G in identifying and managing important brown bear foraging sites. Establish forested buffers, where available, of approximately 500 feet from the stream at sites where, based upon the evaluation, additional protective measures are needed to provide cover among brown bears while feeding, or between brown bears and humans. This may be especially important on Class I anadromous fish streams within the Moderate Gradient/Mixed Control and Flood Plain Process Groups (see Appendix D) where a large amount of bear feeding activity on salmon occurs. Consider the combination of bear foraging behavior, stream channel types, and adjacent landform to help identify probable important feeding sites.

C. Manage human/bear interactions to limit brown bear mortality from both illegal kills and defense of life and property. Work with the ADF&G to develop and implement a bear management program that considers both access management and season and bag limits to manage bear mortality rates within sustainable levels.

D. Manage road use where concentrations of brown bear occur to minimize human/bear interactions and to help ensure the long-term productivity of brown bears. To meet this direction, develop and implement road management objectives through an interdisciplinary process. (Consult Transportation Forest-wide Standards and Guidelines.)

E. Cooperate with the state to develop sites for safe public bear viewing opportunities.

(USFS 2016 Plan, pp. 4-88 to 4-89)

Great Blue Heron (Nest Protection)

XIII. Heron and Raptor Nest Protection

A. Provide for the protection of raptor (hawk and owl) nesting habitat and great blue heron rookeries.

1. Conduct project-level inventories to identify heron rookeries and raptor nesting habitat using the most recent inventory protocols.
2. Protect active rookeries and raptor nests. Active nests will be protected with a forested 600-foot windfirm buffer, where available. Road construction through the buffer is discouraged. Prevent disturbance during the active nesting season (generally March 1 to July 31).
3. Protection measures for the site may be removed if the nest is inactive after two consecutive years of monitoring.
4. Bald eagle nest protection standards are outlined in WILD1 Section VIII.

5. Northern goshawk and osprey nest protection standards are included under Threatened, Endangered, and Sensitive species Forest-wide Standards and Guidelines for wildlife (WILD4 Section II).

(USFS 2016 Plan, p. 4-90)

Gray Wolf (Alexander Archipelago Wolf subspecies)

XIV. Alexander Archipelago Wolf

A. Implement a Forest-wide program, in cooperation with ADF&G and USFWS, to assist in maintaining long-term sustainable wolf populations.

1. Where wolf mortality concerns have been identified, develop and implement a Wolf Habitat Management Program in conjunction with ADF&G. To assist in managing legal and illegal wolf mortality rates to within sustainable levels, integrate the Wolf Habitat Management Program (including road access management) with season and harvest limit proposals submitted to federal and state boards.
   a) Participate in interagency monitoring of wolf populations on the Forest.
   b) Where wolf population data suggest that mortality exceeds sustainable levels, work with ADF&G and USFWS to identify probable sources of mortality. Examine the relationship among wolf mortality, human access, and hunter/trapper harvest. Conduct analyses for smaller islands (e.g., Mitkof Island), portions of larger islands, or among multiple wildlife analysis areas (WAAs).
   c) Where road access and associated human-caused mortality has been determined, through an interagency analysis, to be a significant contributing factor to locally unsustainable wolf mortality, incorporate this information into Travel Management planning and hunting/trapping regulatory planning. The objective is to reduce mortality risk and a range of options to reduce this risk should be considered. In these landscapes, both open and total road density should be considered. Total road densities of 0.7 to 1.0 mile per square mile or less may be necessary. Options shall likely include a combination of Travel Management regulations, establishing road closures, and promulgating hunting and trapping regulations to ensure locally viable wolf populations. Local knowledge of habitat conditions, spatial locations of roads, and other factors need to be considered by the interagency analysis rather than solely relying upon road densities. Road management objectives would be developed and implemented through an interdisciplinary Access and Travel Management or comparable process. (See Transportation Forest-wide Standards and Guidelines.) Suggested wolf hunting and trapping changes would be developed and forwarded to the Federal Subsistence Board and the Alaska Board of Game.
2. Provide, where possible, sufficient deer habitat capability to first maintain sustainable wolf populations, and then to consider meeting estimated human deer harvest demands. This is generally considered to equate to the habitat capability to support 18 deer per square mile (using habitat capability model outputs) in biogeographic provinces where deer are the primary prey of wolves. Use the most recent version of the interagency deer habitat capability model and field validation of local deer habitat conditions to assess deer habitat, unless alternate analysis tools are developed. Local knowledge of habitat conditions, spatial location of habitat, and other factors need to be considered by the biologist rather than solely relying upon model outputs.
3. Design management activities to avoid abandonment of wolf dens.
   a) Maintain a 1,200-foot forested buffer, where available, around known active wolf dens. Road construction within the buffer is discouraged and alternative routes should be identified where feasible. No road construction is permitted within 600 feet of a den unless site-specific analysis indicates that local landform or other factors will alleviate potential adverse disturbance.
   b) If a den is monitored for two consecutive years and found to be inactive, buffers described in a), above, are no longer required. However, in the spring, prior to implementing on-the-ground management activities (timber harvest or road construction), check each known inactive den site to see if it has become active.

(USFS 2016 Plan, p. 4-91)

American Marten (also applies to Pacific Marten)

XVIII. American Marten

A. Implement a Forest-wide program, in cooperation with ADF&G, to assist in maintaining long-term sustainable marten populations.

1. Where marten mortality concerns have been identified through interagency analysis, cooperate with ADF&G to assist in managing marten mortality rates to within sustainable levels. Both access management and hunter/trapper harvest regulations administered by the ADF&G shall be considered.

a) Participate in interagency monitoring of marten populations on the Forest.

b) Where marten harvest data suggest that mortality exceeds sustainable levels, work with ADF&G to identify probable sources of mortality. In an interagency analysis, examine the relationship between hunter/trapper marten harvest and human access.

c) Where road access and associated human-caused mortality has been determined, through this analysis to be the substantial contributing factor to unsustainable marten mortality, incorporate this information into Travel Management planning with the objective of reducing mortality risk. Local knowledge of habitat conditions, spatial location of roads, and other factors need to be considered by the biologist rather than solely relying upon road densities. Road management objectives would be developed and implemented through an interdisciplinary Access and Travel Management process or comparable process. (Consult Transportation Forest-wide Standards and Guidelines.)

(USFS 2016 Plan, pp. 4-92 to 4-93)

Endemic Terrestrial Mammals

XIX. Endemic Terrestrial Mammals

A. The objective is to maintain habitat to support viable populations and improve knowledge of habitat relationships of rare or endemic terrestrial mammals that may represent unique populations with restricted ranges.

1. Use existing information on the distribution of endemic mammals to assess projectlevel effects. If existing information is lacking, surveys for endemic mammals may be necessary prior to any project that proposes to substantially alter vegetative cover (e.g., road construction, timber harvest, etc.). Surveys are necessary only where information is lacking to assess project-level effects.

a) Survey islands smaller than 50,000 acres in total size (e.g., Heceta Island and smaller) that have productive old-growth forest on lands suitable for timber production. Conduct surveys on larger islands if there is a high likelihood that endemic taxa are present and a high likelihood that they would be affected by the proposed project.

b) The extent and rigor of surveys will be commensurate with the degree of existing and proposed forest fragmentation, and potential risk to endemic mammals that may be present.

c) Surveys should emphasize small (voles, mice, and shrews) and medium sized (ermine and squirrels) endemic mammals with limited dispersal capabilities that may exist within the project area.

d) Use the most recent inventory protocols for surveys.

2. Assess the impacts of the proposed project relative to the distinctiveness of the taxa, population status, degree of isolation, island size, and habitat associations relative to the proposed management activity.

3. Where distinct taxa are located, design projects to provide for their long-term persistence on the island.

B. Consider habitat needs of endemic mammals in design of thinning treatments.

(USFS 2016 Plan, p. 4-93)

Northern Goshawk (includes Queen Charlotte goshawk subspecies)

Threatened, Endangered, and Sensitive Wildlife Species: WILD4

II. Sensitive Species

A. Northern Goshawk (including the Queen Charlotte goshawk subspecies).

1. Preserve nesting habitat around all goshawk nest sites. Protection measures may be removed from probable nest stands if, after two consecutive years of monitoring, there is no further evidence of confirmed or probable nesting.

a) Consider the following evidence for determining confirmed nest sites:

(1) A goshawk observed on or near a nest;

(2) Nestlings or branchers (young not able to fly) observed on or near a nest;

(3) Goshawk feathers or eggs obtained from the nest;

(4) One or more nest structures indicative of goshawk were found with goshawk prey remains, but without positive identified goshawk on the nest and without positive identified feathers from nest;

b) Consider the following evidence for determining probable nest sites:

(1) Aggressive, territorial breeding season adults vocalizing or attacking an observer (without locating a nest); or

(2) Adults observed during the breeding season in a territory and recently fledged young were observed (without locating a nest).

c) Nesting Habitat: Maintain an area of not less than 100 acres of productive old-growth (POG) forest if it exists, or the largest diameter young-growth forest if sufficient POG is not adjacent to the nest, generally centered over the nest tree or probable nest site to provide for prey handling areas, perches, roosts, alternate nests, hiding cover, and foraging opportunities for young goshawks. Vegetative structure should include, where available, multi-layered, closed (over 60 percent) canopy stands, a relatively open understory, with large trees (usually 20+ inches diameter at breast height) and low ground vegetation.

d) Management: No commercial timber harvest is permitted Existing roads may be maintained. New road construction is permitted if no other reasonable roading alternatives outside the mapped nesting habitat exist. Permit no continuous disturbance likely to result in nest abandonment within the surrounding 600 feet from March 15 to August 15. Activity restrictions are removed for active nests that become inactive or unsuccessful. Other management activities that maintain the integrity of the forest stand structure are consistent with the objectives for this area. Activities such as cabin, trail, or campground construction should be consistent if designed with minimal vegetative manipulation.

e) Consider surrounding landscapes when managing for goshawk nest sites. Plans for an alternate nest management strategy to c) and d) above may be implemented if the rationale is documented.

f) Conduct inventories to determine the presence of nesting goshawks for proposed projects that affect goshawk habitat. Use the most current inventory protocols developed in cooperation with state and federal agencies.

(USFS 2016 Plan, pp. 4-95 to 4-96)

Habitat-Feature Standards and Guidelines

Legacy Forest Structure

In 2008, Standards and Guidelines that had previously required retention of forest structure in timber harvest units to provide habitat for goshawk and marten were replaced with a Legacy Forest Structure Standard and Guideline that applied only to harvest units larger than 20 acres (rather than two acres as required in the 1997 Forest Plan) over a larger portion of the Forest. This modification was retained in the 2016 Forest Plan (USFS 2016 Plan, pp. 4-86 to 4-87).

IV. *Legacy Forest Structure*

A. Objectives

The intent of the Legacy Standard and Guideline is to ensure that sufficient residual trees, snags, and clumps of trees remain in timber harvest units within value comparison units (VCUs) that have had concentrated past timber harvest activity and are at risk for not providing the full range of matrix functions (as shown in Section D), in order to meet the intent of the conservation strategy while providing flexibility to address on-the-ground implementation issues.

B. Legacy Standard

In harvest units greater than 20 acres within VCUs identified in Section D, leave 30 percent of the entire unit (based on area) in legacy forest structure. For the purpose of this standard, the unit is defined as the original Logging System/Transportation Analysis (LSTA) boundary prior to field verification. Legacy forest structure should remain indefinitely after harvest and shall be tracked through the life of the next stand. Salvage logging of legacy trees is generally prohibited unless the rationale is clearly documented and the effects are clearly neutral or an improvement.

C. Distribution and Composition of Legacy Forest Structure

Legacy forest structure should be arranged primarily in clumps. The intent of leaving legacy forest structure is to provide structure within the opening; therefore, clumps should be left well inside the unit, compatible with logging system capabilities. Clumps may be placed along the external yarding boundaries within harvest units in situations where cable logging systems make leaving residual trees in other parts of the unit impractical due to operational or safety considerations. Structure left within units for other resources counts towards the 30 percent, provided it meets the old growth stand characteristics below. Mapped TTRA stream buffers do not count toward the 30 percent. Legacy forest structure shall be representative of the existing old-growth stand characteristics, including age, size class, species composition, and structural components. Clumps and dispersed retention trees should include some of the largest, oldest live trees, decadent or leaning trees, and hard snags occurring in the unit.

D. VCUs where the Legacy Standard Applies

This standard is to be applied in VCUs where 33 percent or more of the productive old growth has been harvested from 1954 to 2005, or VCUs where less than 33 percent has been harvested but more than 67 percent of the productive old growth is projected to be harvested by the end of the Forest Plan planning horizon (see glossary). In 2008, there were 49 VCUs in this category; they are listed below by Ranger District:

Craig Ranger District 6100, 6200, 6210, 6240
Hoonah Ranger District None
Juneau Ranger District None
Ketchikan/Misty Ranger District 7360, 7380, 7560
Petersburg Ranger District None
Thorne Bay Ranger District 5320, 5350, 5371, 5380, 5390, 5440, 5450,
5460, 5500, 5542, 5550, 5560, 5570, 5580,
5590, 5600, 5610, 5620, 5700, 5710, 5720,
5790, 5810, 5830, 5840, 5850, 5860, 5871,
5872, 5880, 5900, 5972
Wrangell Ranger District 4550, 4570
Sitka Ranger District 2930, 2990, 3070, 3120, 3130
Yakutat Ranger District 3620, 3640, 3670

Legacy Standards and Guidelines do not apply in other VCUs because they contain enough old-growth forest to provide habitat for old-growth associated species. See Appendix D in the 2008 FEIS. VCUs should be verified during project-specific planning and analysis to see if Legacy Standards and Guidelines apply based on the criteria above.

(USFS 2016 Plan, pp. 4-86 to 4-87)

Reserve Tree/Cavity-Nesting Habitat

The Reserve Tree/Cavity-Nesting Habitat Standards and Guidelines (USFS 2016 Plan, p. 4-87) were originally included in the 1997 Forest Plan to provide for a wide range of cavity-dependent species. Language was added to element A in 2008 acknowledging that the (then new) legacy forest structure standard and guideline considered snags and replacement snag needs, and that retention in corridors and reserves would also provide snags.

V. Reserve Tree/Cavity-Nesting Habitat

A. Provide habitat for cavity-nesting wildlife species. The legacy forest structure standard and guideline considers snags and replacement snag needs for those VCUs at risk for not providing sufficient snags within the watershed. Other VCUs will have snags retained within the development LUDs because habitat will be maintained in riparian buffers, the beach fringe, old-growth habitat reserves, and other Non-development LUDs within the VCU.

1. Retain reserve trees in all LUDs.
   a) Retain reserve trees (which may be soft or hard snags) with a reasonable assurance of windfirmness, while meeting management objectives and considering safety needs for people and equipment. Use the Reserve Tree Selection Guidelines (R10-MB-215) for guidance.
   b) Reserve trees do not need to be evenly distributed; clumped distributions are preferred.
   c) Favor saving reserve trees away from roads to reduce loss from firewood gathering activity.
   d) After timber harvest in an area, remaining reserve trees may be designated as wildlife trees and marked to make them illegal for cutting.
   e) Retain live trees for future reserve tree recruitment.

(USFS 2016 Plan, p. 4-87)

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