# BIOLOGICAL EVALUATION FOR WILDLIFE AND FISH

## Tongass National Forest Plan Amendment

**SIGNATURE**

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## INTRODUCTION

This Biological Evaluation (BE) analyzes programmatic effects of proposed alternatives for amending the Tongass National Forest Land and Resources Management Plan (2008 Forest Plan) on federally-listed and sensitive wildlife and fish species and critical habitat that occur within the Tongass National Forest (Tongass). Programmatic effects assessed here include those from changes to management direction provided in the Forest Plan. Additional National Environmental Policy Act (NEPA) compliance and assessment will be required for all future actions or projects that result from this programmatic direction.

The Washington Office Forest Service Manual (FSM, 2670-2671, 9/23/05) defines a biological evaluation as a documented Forest Service (FS) review of FS programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed and sensitive species. Washington Office FSM 2672.24b-2676.17c (7/24/2009) further defines the objectives of a BE as 1) to ensure that FS actions do not contribute to loss of viability of any native or desired non-native plant or animal species or contribute to trends toward federal listing of any species, 2) to comply with the requirements of the Endangered Species Act (ESA) that actions of federal agencies not jeopardize federally-listed species or adversely modify their critical habitat, and 3) to provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process. This BE addresses federally-listed and FS sensitive (hereon TES) wildlife and fish species and critical habitat. TES plant species are addressed in a separate BE. A separate Biological Assessment will also be developed to evaluate effects of the selected alternative on federally-listed species and critical habitat, and to engage in consultations with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) in compliance with Section 7 of the ESA.

## DESCRIPTION OF THE ALTERNATIVES

The proposed Forest Plan Amendment includes proposed changes to the 2008 Forest Plan to accomplish the transition to young-growth management as directed in the Secretary of Agriculture, Thomas Vilsack's Memorandum 1044-009: "*Addressing Sustainable Forestry in Southeast Alaska*" (USDA 2013). The Final Environmental Impact Statement (FEIS) for the Forest Plan Amendment evaluates which lands will be available for timber harvest, especially young-growth timber stands, and changes or additions to management direction needed to promote and speed the transition to young-growth management while maintaining a viable timber industry in southeast Alaska. The FEIS also describes and analyzes proposed changes related to renewable energy development, and other changes suggested in the five-year review of the 2008 Forest Plan and internal and external scoping, as warranted. The scope of the analysis is limited to these proposed changes.

The FEIS analyzes in detail four alternatives for amending the 2008 Forest Plan in addition to the No-Action Alternative. Key elements of the five alternatives are shown in Table 1, but see Chapter 2 of the FEIS for a complete description of the alternatives, and see the Environmental Effects Section of this BE for key differences between the alternatives as they relate to TES wildlife and fish species. The alternatives are designed to provide a range of reasonable ways to address the purpose and need of this amendment, that is, to transition to a predominantly young-growth based industry and reduce old-growth harvest within the next 15 years. The alternatives are designed to correspond with current demand projections and produce a projected timber-sale quantity of about 46 million board feet (MMBF) per year during the next 15 years, with old growth making up a decreasing percentage of the total. Old growth volume would continue to decrease until it reaches about 5 MMBF per year upon which it would remain at that level to support small- and micro-sale timber operators.

Table 1 summarizes key elements of the alternatives proposed for the Forest Plan Amendment. Alternative 1 is the No-Action Alternative, under which current management direction of the 2008 Forest Plan would continue to be followed. With Alternative 1, areas currently designated as unsuitable for timber harvest in the 2008 Forest Plan, such as the 1000-foot no-cut buffer along the beach and estuary fringe, Riparian Management Areas (RMAs), special interest areas that protect high vulnerability karst from development, scenic areas within Remote and Semi-Remote Recreation land use designations (LUDs), and the Old Growth Habitat LUD would continue to receive existing protections from commercial young-growth harvest. Continued non-commercial uses, harvest access and other exceptions, and young-growth restoration treatments would still be allowed as per the 2008 Forest Plan. Alternative 1 would continue to follow the Timber Sale Program Adaptive Management Strategy Phases 1, 2, and 3 (hereon Phases 1, 2, and 3) according to the 2008 Forest Plan for old-growth and young-growth harvest and would result in the largest amount of predicted old-growth harvest over time.

The Proposed Action, Alternative 2, was developed to maximize the percentage of volume coming from young growth as early as possible, while minimizing effects on the old-growth conservation strategy and other resources. Alternative 2 is therefore the most aggressive of the alternatives in harvesting young growth, and includes clearcutting young growth in beach and estuary fringe, Old Growth Habitat LUDs, and scenic areas in Remote and Semi-Remote Recreation LUDs. At the beach and estuary fringe, Alternative 2 would protect a 1000-foot corridor immediately inland of the harvest and as close to the shoreline as possible. Alternative 2 also allows commercial thinning of up to 33% of basal area of young growth in RMAs outside of the 100-foot protective buffer imposed by the Tongass Timber Reform Act (TTRA; 1990). It additionally allows commercial thinning of young growth within high vulnerability karst. Alternative 2 follows Phases 1, 2, and 3 for old-growth harvest, but can enter Phases 2 and 3 for young-growth harvest without meeting adaptive management harvest-volume thresholds for those phases. Along with Alternative 3, Alternative 2 would result in the smallest amount of predicted old-growth harvest (Alternative 2 is slightly lower for all old growth combined; Alternative 3 is slightly lower for high-volume and large-tree productive old growth).

Alternative 3 is similar to Alternative 2 in areas in which young-growth harvest will be allowed, except that it only allows commercial thinning of young growth within the beach and estuary fringe (no clearcutting), it does not allow any young-growth harvest within RMAs, and it relaxes scenic integrity objectives (SIOs) for young growth by one level only (instead of all to Very Low as in Alternative 2). Alternative 3 also differs from Alternative 2 in that it follows Phase 1 only for old-growth harvest, but it can similarly enter Phases 2 and 3 for young-growth harvest without meeting the adaptive management harvest-volume thresholds for those phases.

Alternative 4 is similar to Alternative 1 in areas in which young-growth harvest will be prohibited, except that it allows commercial thinning of young growth in both beach and estuary fringe and high vulnerability karst. It also differs from Alternative 1 in that it follows only Phase 1 for young-growth and old-growth harvest, leading to an intermediary amount of predicted old-growth harvest over time.

Alternative 5 is the Preferred Alternative and is based on recommendations from the Tongass Advisory Committee. Alternative 5 allows young-growth harvest within the Old Growth Habitat LUD, RMAs outside of TTRA buffers, and in beach and estuary fringe outside of a 200-foot shore-side buffer, but within these areas, the following specifications must be met: a) young-growth harvest openings may be up to 10 acres in size maximum, b) total young-growth harvest may include up to 35% of acres of the original harvested stand (or up to 35% basal area if thinning), c) harvest is limited to a one-time only entry and to the first 15 years unless best available science shows that additional entries are both

warranted and meet the LUD objectives. Alternative 5 relaxes SIOs to Very Low for young growth in Development LUDs only. Alternative 5 follows Phase 1 only for old-growth harvest and it can enter Phases 2 and 3 for young-growth harvest without meeting the adaptive management harvest-volume thresholds for those phases. Alternative 5 does not harvest old growth within The Nature Conservancy (TNC) / Audubon Conservation Priority Areas and the Tongass 77 watersheds (corresponding VCUs). Young growth harvest would be allowed. The Forest Plan identifies 16 "high value fish watersheds" (a subset of the Tongass 77) in which young growth harvest may be allowed only after an internal scientific review in collaboration with forest stakeholders to determine likely effects to fish and wildlife habitat (see draft Forest Plan, Chapter 5). Alternative 5 results in a similar and intermediary amount of predicted old-growth harvest over time to that under Alternative 4.

There are also key differences between the alternatives based on how they deal with inventoried roadless areas (IRAs) that were designated as unsuitable for timber harvest and road construction in the Roadless Area Conservation Rule (2001 Roadless Rule; 36 CFR 294 Subpart B), exempted from this protection in the Tongass Roadless Rule Exemption in 2003, and alternately reinstated to, exempted from, and most recently reinstated to this protection in court findings in 2011, 2014 and 2015, respectively. Alternatives 1, 4, and 5 include the application of the 2001 Roadless Rule and no harvest or additional road development would occur within IRAs. Under Alternative 2, roadless areas that were roaded before the 2001 Roadless Rule or during the Tongass exemption period (hereon roaded IRAs) would become suitable for additional harvest and road development. Alternative 2 would allow a mixture of old growth and young-growth harvest and some additional road development within roaded IRAs. Alternative 3 would consider the Tongass as exempt from the 2001 Roadless Rule, allowing old- and young-growth harvest and road development within all IRAs. Because timber harvest and road development are currently inconsistent with the 2001 Roadless Rule, it is important to note that any harvest or road development within IRAs under Alternatives 2 or 3 would be deferred until these actions are legal, which would require a change in the 2001 Roadless Rule or reinstatement of the Tongass Roadless Rule Exemption.

Another key element of the action alternatives relates to increased flexibility in siting development of renewable energy facilities and infrastructure. Alternatives 2, 3, 4, and 5 propose to replace the Transportation and Utility System LUD in the 2008 Forest Plan, with a series of renewable energy and Transportation System Corridor plan components to provide management direction, including desired conditions, objectives, suitability of lands, and standards and guidelines. Currently, renewable-energy-site selection requires substantial documentation as to why projects could not be developed in allowable areas ("window" categories) instead of areas designated for avoidance, which applies to most lands on the Tongass. Proposed changes under the action alternatives would allow renewable-energy projects to be developed on any FS lands without requiring this justification, as long as all other standards and guidelines, regulations, and laws are met. The action alternatives would also reduce SIOs for renewable-energy siting; SIOs would be relaxed to Very Low for renewable-energy sites under Alternative 2 and would be Low under Alternatives 3, 4, and 5. In conclusion, Alternative 1 would not allow increased permissiveness, while all action alternatives would increase permissiveness, with Alternative 2 being the most permissive in renewable-energy siting.

**Table 1. Key elements of Alternatives for the proposed Forest Plan Amendment. YG = young growth. OG = old growth. TTRA = Tongass Timber Reform Act imposed 100-foot buffer within Riparian Management Areas (RMAs). IRAs = Inventoried Roadless Areas. Roaded IRAs = IRAs roaded before the 2001 Roadless Rule or during the Tongass exemption period. SIOs = Scenic Integrity Objectives. BA = basal area.**

| Component | Alternative 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Timber Sale Program Adaptive Management Strategy Phases | 2008 Forest Plan = Phases 1, 2, and 3 for OG and YG | 2008 Forest Plan for OG; can enter Phases 2 and 3 for YG without meeting harvest-volume thresholds | Phase 1 only for OG; can enter Phases 2 and 3 for YG without meeting harvest-volume thresholds | Phase 1 only for YG and OG | Phase 1 only for OG; can enter Phases 2 and 3 for YG without meeting harvest-volume thresholds |
| Inventoried Roadless Areas | No | OG and YG harvest within roaded IRAs[1] | OG and YG harvest within IRAs[1] | No | No |
| YG in Non-Development LUDs | No | Yes | Yes | No | Old Growth Habitat LUD only, no islands < 1,000 acres; commercial thinning or ≤10 acre openings; ≤35% removal; no harvest after 15 years |
| YG in Beach and Estuary Fringe | No | Clearcutting for first 15 years; commercial thinning thereafter | Commercial thinning | Commercial thinning | Commercial thinning or ≤10 acre openings; ≤35% removal; outside of 200-foot buffer; no harvest after 15 years |
| YG in RMAs | No | Commercial thinning outside of TTRA; ≤33% BA removal | No | No | Commercial thinning or ≤10 acre openings; ≤35% removal; outside of TTRA; no harvest after 15 years |
| YG in High Vulnerability Karst | No | Commercial thinning; ≤33% BA removal | Commercial thinning | Commercial thinning | No |

| Component | Alternative 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Scenery Standards for Young Growth | 2008 Forest Plan | SIOs relaxed to Very Low | SIOs relaxed by one level | 2008 Forest Plan | SIOs relaxed to Very Low in Development LUDs only |
| Renewable Energy Project Locations | No change | Most permissive; SIOs relaxed to Very Low | More permissive; SIOs relaxed to Low | More permissive; SIOs relaxed to Low | More permissive; SIOs relaxed to Low |
| Legacy standard and guideline applies to young growth harvest | No | No | Yes | Yes | No |

[1] Timber harvest is currently inconsistent with the 2001 Roadless Rule. Proposed timber harvest within IRAs could not occur until the Roadless Rule is changed or the Tongass Roadless Rule Exemption is reinstated.

**AFFECTED SPECIES AND ENVIRONMENT**

There are a number of federally-listed marine species that have the potential to occur on or within waters around the Tongass (Table 2). These include the short-tailed albatross (*Phoebastria albatrus*), humpback (*Megaptera novaeangliae*), fin *(Balaenoptera physalus)*, and sperm *(Physeter macrocephalus)* whales, the western distinct population segment (DPS) of the Steller sea lion (*Eumetopias jubatus*), the southern DPS of the green sturgeon (*Acipenser medirostris)*, six evolutionarily significant units (ESUs) of chinook salmon (*Oncorhynchus tshawytshca*), one ESU each of sockeye (*Oncorhynchus nerka*), coho (*Oncorhynchus kisutch*), and chum (*Oncorhynchus keta*) salmon, and five ESUs of steelhead trout (*Oncorhynchus mykiss*). The green sturgeon and all salmon and steelhead trout ESUs originate and spawn in freshwater habitats on the west coast of the contiguous United States, but may occur within the inner-channel and shallow-coastal waters around the Tongass during the marine phase of their life cycles. Due to similarities in their low likelihood of occurrence on the Tongass, occurrence here only during marine, non-breeding phases of their life cycles, likely use of similar marine habitats around the Tongass, and similar life-history requirements during their potential marine habitation around the Tongass, the federally-listed fish species (hereon TE Fish) will be grouped for analysis. Where appropriate to facilitate analysis, the three federally-listed whales will be referred to as TE whales. Where appropriate to facilitate analysis, the federally endangered western DPS and the FS sensitive eastern DPS of the Steller sea lion will be referred to as the Steller sea lion. Detailed information on the environmental baseline for these species including habitats and ranges, occurrence on the Tongass, and population status, trends and threats are summarized in Table 2.

Sensitive species are those identified by the Regional Forester for which population viability is a concern on FS lands within the region. A viability concern is identified by either a significant existing or predicted downward trend in population numbers or density, or a significant existing or predicted downward trend in habitat capability that would reduce a species' existing distribution. The objective of the FS Sensitive Species Program (FSM 2600; 1991) is to ensure that species numbers and population distributions are adequate so that no federal listing will be required and no extirpation will occur on FS

lands. Revisions to the Regional Forester's Sensitive Species list are completed periodically, based on new information derived from recent publications, fieldwork, and analysis.

The Alaska Region Sensitive Species list was last updated in 2009 (Goldstein et al. 2009). Five wildlife species are designated as sensitive in the Alaska Region and four of these are known to occur on the Tongass National Forest. One of these species, the Kittlitz's murrelet (*Brachyramphus brevirostris)*, was a Candidate for listing under the ESA when the list was developed and was automatically included on the list because of FS policy to do so (FSM 2672.11; 09/21/2005). Though the Kitlitz's murrelet was subsequently removed from Candidate status (78 FR 61764; 10/03/2013), this species is included as sensitive in this BE because it has not yet been determined if it can be removed from the Regional Forester's Sensitive Species list for no longer meeting other criteria for sensitive species status. One additional wildlife species that occurs within the Tongass, the eastern DPS of the Steller sea lion (*Eumetopias jubatus*), is considered sensitive in this BE because Alaska Region FS policy required that species removed from listing under the ESA are automatically added to the sensitive species list for at least five years to ensure that its recovery is maintained and monitored. The eastern DPS of the Steller sea lion was delisted on 11/04/2013 (78 FR 66139). The resulting 5 sensitive wildlife species that occur within the Tongass, and will be addressed in this BE, are listed in Table 2, along with detailed information on their environmental baselines, including their habitats and ranges, occurrence on the Tongass, and population status, trends and threats.

Tongass TES wildlife and fish species occur predominantly within, and depend on, for the majority of their life-history requirements, either old-growth forest (the Queen Charlotte Goshawk), or beach, estuary, and marine habitats (all other TES wildlife and fish) on the Tongass (Table 2). Old-growth forest habitat is critical to nesting and foraging needs of the Queen-Charlotte goshawk, though mature young-growth forests may be used when old growth is not available. Beach and estuary habitat is critical to black oystercatcher nesting and foraging, Aleutian tern nesting, and for terrestrial needs of the Steller sea lion. Marine waters are used by the short-tailed albatross, TE whales, Steller sea lion, TE fish, and Kittlitz's murrelet. Kittlitz's murrelet nest on unvegetated scree slopes, cliffs and rock ledges in coastal uplands and mountains, often in vicinity of tidewater glaciers. Kittlitz's murrelet nesting habitat will not be addressed further in this BE because a) it is largely within protected Wilderness within the Tongass and is further protected by Forest Plan standards and guidelines and b) given its unvegetated and remote nature, Kittlitz's murrelet nesting habitat will not be affected by any of the programmatic direction in the alternatives, including young-growth, old-growth, road, and renewable energy management. Kittlitz's murrelet foraging habitat within marine waters around the Tongass will be further assessed.

**Table 2. TES wildlife and fish species and critical habitat within the Tongass National Forest.[1] DPS = Distinct Population Segment.**

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
|---|---|---|---|---|
| Short-Tailed Albatross (*Phoebastria albatrus*) | Endangered | Forages offshore and in shelf-break waters throughout the north Pacific Ocean and Bering Sea. Frequent visitor to the productive waters in shelf-break areas along the outer coast of Alaska. Breeds on islands in Japan and Taiwan and recently on Midway Island. | May forage in nearshore waters adjacent to the outer coast of the Tongass, particularly where the continental shelf break | The population of this species continues to grow at between 5 and 8% per year from about 1,200 individuals in 2000. Historical declines from feather overexploitation. Current threats include commercial-fisheries bycatch, oil and other sea contaminants, invasive predators in nesting areas, |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
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| | | | is close to shore. | extreme weather and volcanic activity at their primary breeding colony on Torishima Island, Japan. |
| Humpback Whale *(Megaptera novaeangliae)* | Endangered | Common in the inside waters of the Alexander Archipelago and regularly sighted in coastal waters of southeast Alaska. Migrate seasonally from northern latitude feeding areas in summer to low-latitude breeding areas in winter. | Common in marine waters, including shallow coastal areas around the Tongass. | On 4/21/15 NMFS proposed to divide the globally listed endangered species into 14 DPSs, remove the broader species-level listing, and delist 10 of the DPSs, including the Hawaii DPS which encompasses southeast Alaska migrants. Observed recent positive population-growth rates in the proposed Hawaii DPS. Fishing gear entanglement is considered to be a medium threat to the Hawaii DPS. |
| Fin Whale *(Balaenoptera physalus)* | Endangered | Typically off-shore marine waters of the Bering Sea, Chukchi Sea, Cook Inlet, Gulf of AK, Aleutian Islands and Southeast AK; two sightings in lower Clarence Strait (Dahlheim et al. 2009) | May occur seasonally in marine waters around Tongass in proximity to the open ocean. | The present status of populations in the North Pacific Ocean basins relative to their pre-whaling population size is uncertain. Although the full range of the Alaska (Northeast Pacific) stock of fin whales has not been surveyed, a rough estimate of the size of the population west of the Kenai Peninsula is 5,700. Threats include collisions with vessels, entanglement in fishing gear, reduced prey abundance due to overfishing, habitat degradation, and disturbance from low-frequency noise. |
| Sperm Whale *(Physeter macrocephalus)* | Endangered | Typically off-shore marine waters of the Bering Sea, Gulf of AK, Southeast AK and Aleutian Islands. | May occur seasonally in marine waters around Tongass, primarily in proximity to the open ocean, but also uses inside passages. | Assuming sperm whale populations are growing at about 1.1%/year, the estimated global population is at about 32% of historical numbers. Because more sperm whale hunting was occurring in the Pacific Ocean during the 1940s-1970s than in the Atlantic Ocean, the current status in the Pacific is likely worse than the global estimate of 32%. |
| Steller Sea Lion (*Eumetopias jubatus*) Western DPS | Endangered | Rock, reef, and beach haulouts and rookeries and surrounding nearshore waters along the coasts of the Bering Sea, Aleutian Islands, Cook Inlet, Gulf of Alaska and southeast Alaska. Typically from breeding colonies west | May occur in marine waters around Tongass. Likely north | The Western DPS declined by 75% between 1976 and 1990, and decreased another 40% between 1991 and 2000. Since the 1970s, the most significant drop in numbers |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
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| | | of 144° W longitude, but move across and breed in northern areas of southeast Alaska. | of Sumner Strait; not likely in southern portions of Tongass.[2] | occurred in the eastern Aleutian Islands and the western Gulf of Alaska. Western DPS populations in Alaska have increased between 2003 and 2015 by about 2.25% per year[3]. Alaska Causal factors may include disease, incidental take in fishing gear, illegal shooting, and changes in prey abundance. |
| Green Sturgeon (*Acipenser medirostris*) Southern DPS | Threatened | Spawns in the Sacramento River; very low likelihood of occurrence in southeast Alaska waters during the marine phases of its lifecycle.[4] | Very low likelihood of occurrence in waters around the Tongass during marine phases of its lifecycle. | NMFS listed the green sturgeon southern DPS as threatened due to loss of spawning habitat, overharvest, and entrainment threats. The northern DPS is a NMFS Species of Concern. Only the southern DPS has been observed in Alaska's marine waters. Green sturgeon do not spawn in Alaska. No trend information available at this time. |
| Chinook Salmon, Lower Columbia River ESU (*Oncorhynchus tshawytshca*) | Threatened | The Lower Columbia River Chinook ESU includes naturally spawned Chinook salmon originating from the Columbia River and its tributaries downstream of a transitional point east of the Hood and White Salmon Rivers, and any such fish originating from the Willamette River and its tributaries below Willamette Falls. This ESU also includes Chinook from 15 artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | Primarily occur outside waters of southeast Alaska. May occur in waters around the Tongass during the marine phase of their life cycles. Occurrence in southeast Alaska waters has been documented, but infrequently. | **Most threats to Chinook salmon (applies to all ESUs) occur within the freshwater spawning and rearing habitat. These threats include logging, hydropower, agriculture, predation, and urbanization. Chinook marine life stages (e.g., juvenile and adult) are vulnerable to overfishing and transitory pollution events such as oil spills. Climate change and other factors affecting ocean productivity have the potential to impact the marine life stages of Chinook salmon as well (Mueter et al. 2002).**<br><br>Spawning abundance estimates from 11 of 32 populations suggest there was no significant trend in abundance of this ESU from 1999-2008. |
| Chinook Salmon, Upper Columbia River Spring ESU | Endangered | The Upper Columbia River Spring Chinook ESU includes naturally spawned spring-run Chinook salmon originating from Columbia River | | Spawning abundance estimates for all 3 populations from 1999-2008 show considerable variability, but |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
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| (*Oncorhynchus tshawytscha*) | | tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam (excluding the Okanogan River subbasin). In addition, spring-run Chinook salmon from 6 artificial propagation programs are included. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | suggest no significant overall change in abundance. |
| Chinook Salmon, Puget Sound ESU (*Oncorhynchus tshawytscha*) | Threatened | This ESU includes naturally spawned Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River eastward, including rivers in Hood Canal, South Sound, North Sound, and the Strait of Georgia. It also includes Puget Sound Chinook salmon from 26 artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | Although there was considerable variability in spawning abundance between 1999- 2008, the majority of populations showed no significant trend; therefore, the overall ESU status is "no trend." |
| Chinook Salmon, Snake River Spring/Summer ESU (*Oncorhynchus tshawytscha*) | Threatened | Updated spawning abundance estimates were available from 1999-2008 for 12 of 31 populations. The Spring/Summer Snake River Chinook ESU includes naturally spawned spring/summer-run Chinook salmon originating from the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins. It also includes spring/summer-run Chinook salmon from 11 artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | All Snake River ESU populations with available data showed no trend in abundance, although there was considerable variability over the 10 year period. |
| Chinook Salmon, Snake River Fall ESU (*Oncorhynchus tshawytscha*) | Threatened | The Fall Snake River Chinook ESU includes naturally spawned fall-run Chinook salmon originating from the mainstem Snake River below Hells Canyon Dam and from the Tucannon River, Grande Ronde River, Imnaha River, Salmon River, and Clearwater River subbasins. Fall-run Chinook salmon from 4 artificial propagation programs are also included. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | Spawning estimates from 1998-2007 for this ESU were variable, but indicated no trend in abundance. |
| Chinook Salmon, Upper Willamette River ESU (*Oncorhynchus tshawytscha*) | Threatened | This ESU includes naturally spawned spring-run Chinook salmon originating from the Clackamas River and from the Willamette River and its tributaries above Willamette Falls. Additionally, spring-run Chinook salmon from six | | Spawning abundance estimates were only available for 1 of 7 populations for this ESU from 1999-2008. This limited data suggests no significant trend in abundance. |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
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| | | artificial propagation programs are included. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | |
| Sockeye Salmon, Snake River ESU (*Oncorhynchus nerka*) | Endangered | This ESU includes naturally spawned anadromous sockeye salmon originating from the Snake River basin, and also sockeye salmon from one artificial propagation program (the Redfish Lake Captive Broodstock Program). May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | A variety of factors (including overfishing, irrigation diversions, obstacles to migrating fish, and eradication through poisoning) led to the demise of most Snake River sockeye populations except for those returning to Redfish Lake, Idaho. The Redfish Lake Captive Broodstock Program has maintained a viable population that appears to be slowly recovering or stabilizing.<br><br>A majority of this ESU is from the hatchery program, and there was no trend in the spawning abundance estimates from 1997-2006. There was considerable variation in spawning abundance between years. Adult returns in 2008 and 2009 were the highest since the current captive brood-based program began, with a total of 650 and 809 adults returning to the Sawtooth Hatchery weir. |
| Coho Salmon, Lower Columbia River ESU (*Oncorhynchus kisutch*) | Threatened | This ESU includes naturally spawned coho salmon originating from the Columbia River and its tributaries downstream from the Big White Salmon and Hood Rivers (inclusive) and any such fish originating from the Willamette River and its tributaries below Willamette Falls. In addition, coho salmon from 21 artificial propagation programs are included. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | Spawning abundance estimates are only available for 2 of 25 populations from 1999-2008. These two populations showed significant variability in spawning abundance over the 10 year period, but no significant trend. New information available since the last status review indicates there is an increase in the level of avian and pinniped predation on Lower Columbia River coho, but not enough information exists to quantify this potential stressor. (NMFS 2011). |
| Chum Salmon, Hood Canal Summer Run | Threatened | This ESU includes naturally spawned summer run chum salmon originating from Hood Canal and its tributaries as | | Most threats to chum salmon occur within the freshwater spawning and rearing habitat. |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
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| (*Oncorhynchus keta*) | | well as from Olympic Peninsula rivers between Hood Canal and Dungeness Bay. It also includes summer-run chum salmon from four artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | These threats include logging, hydropower, agriculture, predation, and urbanization. Chum salmon marine life stages (e.g., juvenile and adult) are vulnerable to overfishing and transitory pollution events such as oil spills. There are no directed fisheries for Hood Canal summer chum salmon, although they are taken indirectly in other fisheries.<br><br>Spawning abundance estimates increased significantly for this ESU from 1998-2007, however, productivity in the last 5-year period (2005-2009) has been very low, especially compared to the relatively high productivity observed during the 5-10 previous years (1994-2004). |
| Steelhead Trout, Lower Columbia River ESU (*Oncorhynchus mykiss*) | Threatened | This ESU includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from rivers between the Cowlitz and Wind Rivers (inclusive) and the Willamette and Hood Rivers (inclusive), but excludes such fish originating from the upper Willamette River basin above Willamette Falls. This ESU also includes steelhead from seven artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | **Most threats to steelhead trout (applies to all ESUs) occur within the freshwater spawning and rearing habitat. These threats include logging, hydropower, agriculture, predation, and urbanization. Steelhead trout marine life stages (e.g., juvenile and adult) are vulnerable to overfishing and transitory pollution events such as oil spills. Unlike other Pacific salmon species, steelhead trout are not commercially harvested, but the numbers of steelhead caught as bycatch are not commonly recorded or well understood.**<br><br>Few data are available for the abundance of this ESU, but 4 of 23 populations remained stable between 1999 and 2008. |
| Steelhead Trout, Middle Columbia River ESU (*Oncorhynchus mykiss*) | Threatened | This ESU includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Wind and Hood Rivers (exclusive) to and | | Spawning abundance estimates for 14 of 17 populations from 1996 to 2004 or 2005 showed no trend or significant increase over this time period. |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
|---|---|---|---|---|
| | | including the Yakima River. This ESU does not include steelhead originating from the Snake River basin, but does include steelhead from seven artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | |
| Steelhead Trout, Snake River Basin ESU (*Oncorhynchus mykiss*) | Threatened | This ESU includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Snake River basin, and steelhead from six artificial propagation programs. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | Spawning abundance estimates are available for only 2 of the 26 populations from 1997 to 2006. Although there was considerable variability in spawning abundance over that ten year period, the two populations showed no significant trend. A separate analysis of Lower Granite Dam counts of wild steelhead also showed no trend in spawning abundance. |
| Steelhead Trout, Upper Columbia River ESU (*Oncorhynchus mykiss*) | Threatened | This ESU includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Columbia River and its tributaries upstream of the Yakima River to the U.S.-Canada border. Steelhead from six artificial propagation programs are also included. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | All four populations of this ESU showed no trend in spawning abundance estimates between 2000 and 2009, although there was considerable variability over the 10 year period. |
| Steelhead Trout, Upper Willamette River ESU (*Oncorhynchus mykiss*) | Threatened | This ESU includes naturally spawned anadromous winter-run steelhead originating below natural and manmade impassable barriers from the Willamette River and its tributaries upstream of Willamette Falls to and including the Calapooia River. May occur in the Alaskan Inside Passage and coastal waters during the marine phase of their life cycles. | | Spawning abundance estimated for 4 of 5 populations showed considerable variability between 1999 and 2008, but no significant trend. |
| Steller Sea Lion (*Eumetopias jubatus*) Critical Habitat | Critical Habitat | Includes a terrestrial zone, an aquatic zone, and an air zone that extend 3,000 feet landward, seaward, and above, respectively, from each major rookery and major haulout designated as critical habitat in southeast Alaska. | Designated at 3 rookeries on the outer coast, and 11 major haulouts, 7 on the outer coast and 4 on inside channels of the Tongass. Two other | Use of traditional sites, and the link of territorial males, postpartum females, and pups to rookery sites during the breeding season, make them particularly vulnerable to harassment, disturbance, and disruption of essential life functions (e.g., breeding, pup care, and rest) at rookeries and haulouts. |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
|---|---|---|---|---|
| | | | major haul-outs designated in southeast Alaska, Cape Fairweather and Graves Rock, but these are within Glacier Bay National Park. | |
| Queen Charlotte goshawk (*Accipiter gentilis laingi*) | FS Sensitive | Nests and forages in coastal rainforests of British Columbia and southeast Alaska. Primarily use medium- and high-volume forests and avoid non-forested, clearcut, and dense-regrowth areas. Also use mature young growth with adequate structure (>45-100 years old, depending on temperatures and site productivity, USFWS 2007), and may nest in such stands where old growth is limited. | Occurs as a year-round resident on the Tongass. | A subspecies of the northern goshawk. British Columbia DPS was listed as threatened under the ESA due to estimated 35-45% productive old-growth habitat loss from clearcut logging in British Columbia. The Alaska DPS in southeast Alaska was not listed, in part due to protections in the 1997 and 2008 Forest Plans, which included designation of substantial areas of forest in no-harvest status and use of goshawk standards and guidelines in portions open to timber harvest. Range-wide population of about 500 breeding pairs and an unknown number of non-breeders estimated in 2007 from habitat capability and observed nest-occupancy rates, with about 300-400 of these breeding pairs in Alaska DPS. Primary threat is clearcut timber harvest impacts on nest sites, prey abundance and prey availability, and associated loss and degradation of suitable habitat. |
| Black oystercatcher (*Haematopus bachmani*) | FS Sensitive | Sheltered rocky shorelines and tidal flats with prolific intertidal invertebrates along the North American Pacific coast from the Aleutian Islands to Baja California. | Occurs in low densities in intertidal areas around the Tongass. | Small global population estimates at 8,500 – 11,000, but majority (65%) breed in Alaska. Dramatic decline of Sitka Sound population (48 pairs to 2). Concerns of low reproductive rates and variable nest survival due to natural and human-induced factors. |

| Species | Status | Habitat and Range | Occurrence on Tongass | Population Trends and Threats |
|---|---|---|---|---|
| Aleutian tern (*Sterna aleutica*) | FS Sensitive | Breeds in loose colonies in coastal sites at heads of bays, reefs, islands, estuaries, and river mouths within Alaska and eastern Siberia. In Alaska, breeds in the Aleutian islands, north to the southeastern Chukchi Sea and east to Yakutat and Glacier Bay (Walton et al. 2012). Winters in the eastern Pacific. | Large breeding colony on Black Sand Spit in the Yakutat Forelands on the Tongass, which supports about one third of Alaska's population.[5] Several smaller nesting areas documented on the Yakutat Ranger District.[6] | Populations at known colonies in Alaska have declined 8% annually since 1960, or 93% over 33 years[7]. Yakutat Black Sand Spit Colony on Tongass declined from 3,000 in 1980 to 513-2,700 during 2001-2007[5] and remained 500-1,500 during 2008-2012[6]. Suspected causes of range-wide declines from isostatic rebound, structural changes in vegetation, changes in prey populations, and human disturbance. Predation, egging, human disturbances, and degraded habitat may cause population changes at local levels[7]. |
| Kittlitz's murrelet (*Brachyramphus brevirostris*) | FS Sensitive | Occurs year-round in marine waters of Alaska and eastern Russia, generally offshore during nonbreeding and nearshore during breeding season. Nests solitarily on unvegetated scree slopes, cliffs and rock ledges in coastal uplands and mountains, often in vicinity of tidewater glaciers. | Core breeding area in Yakutat Bay. Also likely in smaller densities in marine waters and near tidewater glaciers on the Tongass. | Steep population declines in Prince William Sound, Malaspina Forelands, and Kenai Fjords, as well as declines in Glacier, Kachemak, and Icy Bays, most likely caused by glacial retreat and oceanic regime shifts. Gillnet fisheries and oil spills may also be factors. |
| Eastern DPS of the Steller sea lion (*Eumetopias jubatus*) | FS Sensitive | Rock, reef, and beach haulouts and rookeries and surrounding nearshore waters along the coasts of the Bering Sea, Gulf of Alaska, and southeast Alaska. Eastern DPS from breeding colonies east of 144° W longitude. | Common in waters around Tongass. Uses 3 major rookeries on outer coast, and 11major haulouts, 7 on outer coast and 4 on inside channels, plus other more minor haulouts in Tongass area. | Increases in pup counts, pup production, non-pup counts, expansion of terrestrial habitats used and establishment of new rookeries by Eastern DPS within southeast Alaska and range-wide since the 1970s. |

[1]Information compiled from NMFS online species lists dated April 2014 and 02/18/2014, NMFS interactive online range and critical habitat maps, Goldstein et al. 2009. Information on TE fish from NMFS 2015a, 2015b.
[2]From phone conversation with Jon Kurland of NMFS on 10/01/2015 and NMFS online document titled Occurrence of Western Distinct Population Segment Steller Sea Lions East of 144° W. Longitude dated 12/18/2013.
[3]Fritz et al. 2016.
[4]From Colway and Stevenson 2007, Lindley et al. 2008, and Huff et al. 2012.
[5]Alaska Audubon Important Bird Areas Summary.
[6]Oehlers and Catterson 2012.
[7]Renner et al. 2015.

## ANALYSIS AREA AND CONTEXT

### Spatial Context for Effects Analysis

The analysis area encompasses the Tongass and adjacent marine waters and lands. The analysis area includes all areas that would be directly and indirectly affected by the proposed alternatives from management actions associated with timber harvest, thinning treatments, road construction and renewable energy development where habitat alteration or disturbance of species' life-history needs (e.g., breeding, survival, shelter, dispersal, foraging) can reasonably be expected.

In addition to identifying the affected area, it is important to also understand how actions from the alternatives may interact with other past, present, and reasonably foreseeable future actions across time to produce cumulative effects. Discernible cumulative effects are not expected beyond the spatial and temporal boundaries of the area affected by direct and indirect effects (FS NEPA Handbook Chapter 10 Section 15.2b; 6/25/2012). Therefore, the analysis area described above for direct and indirect effects will also be used as the cumulative effects analysis area and cumulative effects contributions will be where direct and indirect effects from the proposed alternatives overlap in space and time with those from other past, present, and reasonably foreseeable future actions.

### Temporal Context for Effects Analysis

The temporal context for direct effects includes during or immediately after an action that may influence TES wildlife and fish. Indirect effects to TES wildlife and fish may span as long as decades or even centuries because of long-term effects associated with timber harvest, thinning treatments, road construction and renewable-energy development where habitat alteration and disturbance of species life-history needs can reasonably be expected. Cumulative effects overlap with direct and indirect timeframes.

### Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and reasonably foreseeable future projects considered in the cumulative effects analysis are both physically located within the analysis area which includes the Tongass and adjacent waters and lands, and most importantly have direct or indirect effects that overlap spatially and temporally with those of the proposed alternatives. Projects included relate to timber harvesting of old-growth forests, thinning or other treatments of young-growth forests, communication sites and projects, hydroelectric and other renewable energy projects, watershed restoration, recreation development, road and landing construction and maintenance, Log Transfer Facilities site construction, rock quaries, housing and building development on dispersed private lands, and highway improvements. Reasonably foreseeable future projects are those projects that currently have a proposed action. See Appendix C of the FEIS for a complete list of past, present, and reasonably foreseeable future projects included in the analysis. Other anthropogenic and non-anthropogenic activities and factors, such as vessel traffic and climate change, are also considered.

### Determinations

Washington Office FSM 2672.42 (7/24/2009) defines determinations for Biological Evaluations as no effect, beneficial effect, or "may" effect on the species.

**ENVIRONMENTAL EFFECTS**

Key differences between the alternatives that are relevant to TES wildlife and fish species and critical habitat on the Tongass are summarized in Table 3. Attributes of alternatives are relevant based on potential direct or indirect effects on habitat or life history requirements, such as survival, reproduction, foraging, dispersal and sheltering needs. The Tongass has one sensitive species that depends predominantly on old-growth habitat, and the remaining TES wildlife and fish occupy beach, estuary, and marine habitats. Attributes that most influence old growth habitat include management of old-growth harvest, protection of old growth in key areas, and young-growth succession. Attributes that most influence beach, estuary, and marine habitats include young growth, road, and renewable energy management within and near beach, estuary, and marine habitats and within and near riparian habitat for downstream influences. Measures of these attributes that show key differences of the alternatives on Tongass TES wildlife and fish are provided in Table 3. The two habitat categories used by Tongass TES wildlife and fish, Old-Growth Habitat and Beach, Estuary, and Marine Habitats, will be used as a framework for species-level assessments.

**Old-Growth Habitat – Queen Charlotte Goshawk**

Direct and Indirect Effects

The alternatives are likely to affect old-growth habitat used by the Queen Charlotte goshawk (hereon goshawk) differently. Attributes of the alternatives that most affect old-growth habitat include management direction that will result in differing a) old-growth harvest over time, b) continued protection of old growth in key areas, and c) succession of young-growth habitat towards old-growth-habitat conditions.

***Old-Growth Harvest.***—The following measures are used to assess old-growth harvest over time: acres of old-growth harvest predicted in 25 and 100 years, acres of high-volume and large-tree productive old-growth harvest total, and within up to 800 feet elevation, predicted in 100 years, and the percent of existing productive old-growth harvest predicted in 100 years (Table 3). These measures were chosen for the goshawk because goshawks predominantly use old-growth habitat for all of their life-history needs, including survival, reproduction, foraging, dispersal and sheltering (USFWS 2007). In addition, high-volume and large-tree productive old growth represent optimal goshawk nesting and post-fledging habitat and the elevation category of <800 feet of high-volume and large-tree productive old growth is included because female goshawks have been shown to prefer lower elevations (USFWS 2007).

In all measures of old-growth harvest over time relevant to the goshawk, Alternatives 2 and 3 have the lowest rates of old-growth harvest over time (Alternative 3 is slightly higher than Alternative 2 for all old growth combined; Alternative 2 is slightly higher than Alternative 3 for high-volume and large-tree productive old growth), followed by Alternatives 5 and 4 with intermediate rates that are similar (Alternative 4 very slightly more than Alternative 5 in most measures), and lastly, Alternative 1 has the highest old-growth harvest predictions (Table 3). Alternatives 2, 3, 4, and 5 propose modifications to old-growth reserves that compensate for effects associated with the Sealaska land conveyance. The Biodiversity Section and Appendix E of the FEIS discuss the modifications in detail. These modifications would result in greater protection of goshawk habitat under the conservation strategy, which are evident in the measures for this attribute. A schematic of how the alternatives compare in predicted old-growth harvest over time, given in least impacts to most impacts follows:
(least impacts) Alt 3 $\simeq$ Alt 2 < Alt 5 $\simeq$ Alt 4 < Alt 1 (most impacts).

***Protection of Old Growth in Key Areas.***—Protecting old-growth habitat in key areas was an integral part of the conservation strategy developed for the 1997 and 2008 Forest Plans for old-growth dependent species. The key strategy was in protecting a network of old-growth forested lands that connected old-growth reserves. Features that were critical to this network included the 1000-foot buffer in the beach and estuary fringe, RMAs including the 100-foot buffer imposed by the TTRA, the Old Growth Habitat LUDs, and other non-development lands. Old-growth forest near riparian, beach, and estuary habitats generally support greater prey diversity and net prey productivity, features important to goshawk habitat suitability (USDA 1996). In addition, the size of reserves alone were not thought to be large enough to meet foraging needs of the goshawk, so the protected connective lands between reserves were seen as critical for the goshawk to serve foraging territory needs (USDA 1996). Note that because goshawks can fly over noncontiguous forest and non-forest habitats, the actual connected nature of these lands was not as important, but the protection of additional old growth habitat in proximity to old-growth reserves to serve as additional foraging habitat, and preserving these high quality habitats, especially the beach fringe and riparian habitats, were important for the goshawk.

The most important attribute of the alternatives that influences continued protection of old-growth in key areas for the goshawk include the following measure: acres of old-growth forests protected within estuary, beach, riparian, and other non-development lands. Of secondary value is protection of young growth within these areas because it will progress to old-growth conditions over time and may be used by the goshawk as soon as it develops adequate structure, typically after 45-100 years, depending on site productivity. These structural ages in young-growth stands are also likely those that are currently at, or nearing commercial viability.

Among the alternatives, old-growth habitat protected by beach, riparian, and other standards and guidelines, is most protected under Alternative 5 (1,127,428 acres), followed by Alternative 4 (1,087,353 acres), then by Alternative 1 (1,035,499 acres), followed by Alternative 2 (1,007,109 acres), and lastly followed by Alternative 3 (839,922 acres) under which old-growth habitat in key areas is least protected (Table 3). Therefore, though all of the action alternatives would reduce the harvest of productive old-growth habitat compared to no action under Alternative 1 and thus maintain habitat for old-growth associated or dependent wildlife species like the goshawk, Alternatives 5 and 4 would be the only alternatives to enhance protection of old-growth habitat in key areas for the goshawk.

Of lesser current importance to the goshawk, but still with some current, and more future value to protection of goshawk habitat in key areas, young growth protected by beach fringe, riparian and other standards and guidelines is most protected in Alternative 1 (94,129 acres), followed by 4 (92,828 acres), then 3 (54,695 acres), then 5 (53,102 acres), and then Alternative 2 (32,895 acres) under which young growth within key areas would be least protected (Table 3). Impacts under Alternative 2 would be slightly offset by protection of a 1000-foot wide corridor inland of the harvest. These impacts would be only slightly offset in terms of impacts to the goshawk, because habitats nearer to beach and estuary fringe support greater prey diversity and net prey productivity (USDA 1996), so habitat that is closer to the shoreline will have higher value to the goshawk than habitat further inland. Likewise, some impacts within the beach and estuary fringe under Alternative 5 would be offset by establishment of a 200-foot no-cut buffer along the beach and estuary fringe. This is smaller than the current 1000-foot buffer along beach and estuary edges and protected under Alternative 1. It is important to note that 'protection' of young-growth habitat can have impacts as well as benefits because some management prescriptions within young growth benefit habitat for goshawk and their prey. Clearcutting prescriptions will have obvious impacts, but commercial thinning and patch cuts, depending on their size and distribution, are likely to have some benefits. As discussed below in the Young-Growth Succession Towards Old-Growth Habitat Section, Alternatives 1, 4, and 5 are expected to have the least impacts to young-growth

succession within key areas for the goshawk, followed by Alternative 3, and then 2. Pulling all of this together with protection of young-growth weighted much less than protection of old-growth, a schematic that represents how the alternatives compare in protecting old-growth in key areas for the goshawk from least impacts to most impacts follows:
(least impacts) Alt 5 < Alt 4 < Alt 1 < Alt 2 < Alt 3 (most impacts).

***Young-Growth Succession Towards Old-Growth Habitat.***—How the different alternatives influence the succession of young growth from previously clearcut forests back towards old-growth habitat conditions is also of importance to the goshawk. Conifer stands in mid- to late-seral-stand structures support adequate stand structure for prey production and goshawk-foraging opportunities, whereas goshawks avoid logged early-seral and clearcut cover types (USFWS 2007). Clearcutting young growth that is starting to mature and progress towards mid- to late-seral structures starts those stands over at age 0, a setback of the age of the stand, which varies depending on site productivity and market needs, about could be a setback of about 55-80+ years. Thinning, on the other hand, can progress stem-dense stands towards old-growth and mature-structural conditions that support goshawk nesting and foraging, if the thinning is designed for these objectives. Commercial thinning may compete with these objectives by seeking the largest, commercially-viable young-growth trees for harvest, and may set the stand back, or progress it in some characteristics, while setting it back in others, but impacts would be much less than under clearcutting prescriptions. Commercial thinning under all action alternatives would have benefits in opening up stem-dense stands to more light and understory vegetation. In doing so, commercial thinning and creating small gap openings in young-growth stands are likely to increase prey production for the goshawk. Alternative 5 would include dual objectives for young-growth treatments in beach and estuary fringe, Old-Growth Habitat LUDs, and RMAs, to facilitate more rapid recovery of late-seral, successional forest characteristics, while also producing commercial timber byproducts.

Measures that best assess differences among the alternatives related to the succession of young growth towards old-growth conditions required by the goshawk therefore include the number of acres of young-growth harvest predicted by clearcutting vs by thinning prescriptions in 15 and 100 years, summarized within beach and estuary fringe, RMAs, and the Old Growth Habitat LUD. Descriptive differences among the alternatives in management direction related to clearcutting and thinning prescriptions within beach and estuary fringe, riparian habitats, and the Old Growth Habitat LUD are also informative.

Differences among the alternatives in application of the Legacy Forest Structure standard and guidelines to young growth are additionally informative. All alternatives include the Legacy Forest Structure standard and guideline that protect habitat features that are important for goshawks on a stand level. The Legacy Forest Structure standard and guideline applies only to old-growth harvest, but is modified under alternatives 3 and 4 to apply also to young-growth harvest. Therefore, under alternatives 3 and 4, in VCUs that have received concentrated past old-growth harvest, and in young-growth timber harvest projects >20acres, 30% of the entire young-growth unit area would be retained to diversify structural characteristics and promote future recruitment of snags, helping to maintain foraging habitat for goshawks (USDA Forest Service 2008b).

Based on prescriptive and numerical differences in young-growth management, Alternatives 1, 4, and 5 would have the least impacts to young-growth succession (Alt 1: no acres commercial thinning in beach and estuary fringe, RMAs or Old-Growth Habitat LUD, limited opportunities for opening stem-dense stands in these areas as per current Forest Plan; Alt 4: intermediate acres commercial thinning in beach and estuary fringe, limited opportunities for opening stem-dense stands in Old-Growth Habitat LUD and RMAs as per current Forest Plan, young growth Legacy applies; Alt 5: smallest acres of young-growth treatments in beach and estuary fringe after Alt 1, commercial thinning and/or patch cuts with ≤ 10-acre

openings in beach and estuary fringe, RMAs, and Old-Growth Habitat LUD with dual intent objectives of promoting old-growth conditions while procuring commercial byproducts), followed by Alternative 3 (clearcutting young growth in Old-Growth Habitat LUD, commercial thinning in beach and estuary fringe, young growth Legacy), and the most impacts to young-growth succession would occur under Alternative 2 (clearcutting young growth in beach and estuary fringe for 15 years, clearcutting young growth in Old-Growth Habitat LUD). Here is a schematic showing relative impacts of the alternatives on young-growth succession:
(least impacts) Alt 1 $\simeq$ Alt 4 $\simeq$ Alt 5 < Alt 3 < Alt 2 (most impacts).

***All Goshawk Attributes Together.***—The Tongass conservation strategy was designed to maintain well-distributed, viable wildlife populations, including goshawk populations, across the Forest in the context of past and anticipated old-growth timber harvest. Since 2008, old-growth timber-harvest rates have been far below those assumed in the 2008 Forest Plan final Environmental Impact Statement. The transition from old-growth harvest to young-growth harvest under the action alternatives would further reduce old-growth harvest levels, with the greatest amounts of productive old growth maintained under Alternatives 3 and 2, followed by 4 and 5, and then by 1. However, also key to the conservation strategy, and arguably paramount to the goshawk because of its widely dispersed breeding sites and large foraging territories in southeast Alaska likely related to prey availability (USDA 1996, USFWS 2007), is maintenance of old-growth habitat in key areas. Protection of old-growth in key areas, including young growth within these areas that will progress towards old growth, is particularly important within the beach and estuary fringe and riparian habitats because of high prey availability and productivity in these areas, in additional to old growth reserves. Protection of old-growth by beach fringe, riparian, and other standards and guidelines would be greatest under Alternative 5, followed by 4, then 1, then 2, and least by 3. Similarly, the succession of young growth towards old-growth conditions within these areas would incur least impacts under Alternatives 1, 4, and 5, followed by 3, and then 2 with the most impacts.

As shown above, the alternatives have opposing effects with respect to old-growth harvest vs. the protection of old-growth in key areas and young-growth succession attributes. Alternatives 2 and 3 have the least impacts on old-growth harvest, but the most impacts on protection of old-growth in key areas and young-growth succession. On the other hand, Alternative 1 and then 4 and 5, have the most impacts on old-growth harvest, but these three alternatives have the least impacts on protection of old-growth in key areas and young-growth succession. In addition to the relative order of impacts, the relative magnitudes of differences between the alternatives concerning these attributes is also important. For old-growth harvest, the largest magnitude of difference between alternatives with the least and most impacts is 30,242 acres (Alternative 2 = 32,609 vs. Alternative 1 = 62,815 acres predicted productive old-growth harvest in 100 years). For high-volume old growth, this magnitude of difference is 13,748 acres (Alternative 3 = 13,716 vs. Alternative 1 = 27,464 acres predicted high-volume-old-growth harvest in 100 years). However, the magnitude of difference for protection of old growth within key areas is much higher at 287,506 acres (Alternative 5 = 1,127,428 vs. Alternative 3 = 839,922 acres protected), indicating substantial differences between the alternatives with respect to this attribute. The magnitude of difference for young-growth succession impacts based on clearcutting of young growth within the Old Growth Habitat LUD is 31,640 acres (Alternatives 1 and 4 = 0 vs. Alternative 2 = 31,640 acres in 100 years).

There are also road and renewable energy attributes that may affect the goshawk, but to a much lesser degree than old-growth harvest and changes in old growth protections in key areas for the goshawk. Reconstruction of roads from previous harvests is typical to young-growth management. New roads would impact a new footprint of linear forest and possible goshawk nesting areas. Noise and activity

associated with new road development and reconstruction of previous roads could disturb nesting goshawks. Activity buffers within the surrounding 600 feet of active nests that prohibit continuous disturbance activities likely to result in nest abandonment as well as the standard to conduct inventories to determine the presence of nesting goshawks for proposed projects that affect goshawk habitat, will reduce potential effects under all alternatives. New plus reconstructed road, including reconstruction of decommissioned roads, on FS lands after full implementation of the Forest Plan (100 years) would be least under Alternative 4 (2,216 miles), followed by 1 (2,259 miles), 5 (2,579 miles), 3 (2,716 miles), and then Alternative 2 (2,846 miles) would have the most new plus reconstructed road miles (Table 3). Within beach and estuary fringe and RMAs, the least number of miles of new plus reconstructed roads predicted in 100 years would be least under Alternative 1, followed by Alternatives 4 and 5 (4>5 in beach fringe, 4<5 in RMAs), then by Alternatives 2 and 3 (3>2 in beach fringe, 3<2 in RMAs; Table 3).

Siting for renewable energy projects, such as hydroelectric, wind, solar, geothermal, tidal, wave, and biomass, plus associated transmission-line and maintenance infrastructure (e.g., roads or helicopter pads), would be least permissive under Alternative 1, followed by Alternatives 3 = 4 = 5 as intermediary, and lastly followed by Alternative 2 as most permissive and therefore incurring the most potential impacts from proposed changes in renewable energy management.

While old-growth habitat is critical, old-growth protection in key areas is also important for the goshawk because of its large-ranging foraging territories and high dispersion across the landscape. This, coupled with the relative magnitude of differences between alternatives based on these two attributes and relative effects of the alternatives on young-growth succession, and less importantly road development and renewable energy development, lead to the following overall order of impacts on the goshawk: (least impacts to goshawk) Alt 5 < Alt 4 < Alt 1 < Alt 2 $\simeq$ Alt 3 (most impacts to goshawk).

Impacts to goshawks from the alternatives could include loss or degradation of nesting and foraging habitat and portions of the landscape becoming marginal or unsuitable for goshawks. In addition, impacts to individual goshawks could include injury or mortality, loss of a nest or decreased reproductive output, decreased ability to locate suitable and productive nest sites, decreased fledgling survival and recruitment, decreased prey availability and foraging success, or increased territory size and energy expenditure to find prey. Operation of renewable energy sites could increase disturbance and could result in electrocution with powerlines and/or collisions with project structures by goshawks or their prey. Standards and guidelines under all alternatives including adherence to the USFWS Land-Based Wind Energy Guidelines (USFWS 2012) and Avian Power Line Interaction Committee (APLIC) guidelines (APLIC 2012), and other standards that protect goshawk nest habitat and active nests from disturbance will minimize impacts to goshawks.

Cumulative Effects

When considering effects to the goshawk, it is important to look at all land ownerships within the analysis area and the cumulative effects of the alternatives in the context of past, present, and reasonably foreseeable future activities. The significance of any direct or indirect effect in contributing to the cumulative effects on the goshawk depend on the amount and type of cumulative disturbance in the analysis area and how that cumulative disturbance affects the goshawk. A list of past, present, and reasonably foreseeable future projects within the analysis area is provided in Appendix C of the FEIS. This analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is appropriate because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

The current condition of old-growth habitat within the analysis area has been moderately degraded in some areas, but remains intact, healthy, and continues to be productive for the goshawk throughout the majority of the analysis area. Of approximately 21.6 million acres of land in southeast Alaska, non-FS lands comprise about 4.8 million acres or 22 percent; Glacier Bay National Park consists of about 2.5 million acres. Approximately 30 percent of the lands in southeast Alaska were originally productive old growth (POG). Approximately 875,700 acres of POG have been harvested across the Tongass, including both FS lands and non-FS lands, resulting in a reduction to 86, 79, and 68 percent of the original total, high-volume, and large-tree POG in Southeast Alaska, respectively (Tables 3.9-16, 3.9-17, and 3.9-18 in the FEIS). Of the 5.4 million acres of original (1954) POG that occurred on FS lands on the Tongass, approximately 92 percent remains (Table 3.9-6 of the FEIS). The percent of POG remaining on FS lands is higher than for non-FS lands that lie within the Tongass boundary (92 and 70 percent, respectively) due to concentrated timber harvest in non-FS lands.

Non-FS lands in Southeast Alaska are likely to experience a continuing decline in old-growth forest in the future. Therefore, the cumulative long-term trend within the Forest boundary under all alternatives is likely to be a decline in optimum habitat for the goshawk, with non-FS lands contributing to this trend. Additionally, future land exchanges and conveyances (e.g., Mental Health Trust) have the potential to remove some lands from protection under the Conservation Strategy. The Forest Service would continue to evaluate opportunities to compensate for these losses by evaluating additional OGR modifications when these land exchanges or conveyances are implemented.

When combined with other management activities occurring on non-FS lands, all alternatives would produce additional impacts to the goshawk. However, these declines would be lessened to some extent through the transition to young-growth harvest on FS lands under Alternatives 2, 3, 4, and 5. Cumulative effects to old-growth habitat are anticipated to be the greatest under Alternative 1, which proposes the highest amount of POG timber harvest, followed by Alternatives 5, 4, 3, and 2 (i.e., cumulative effects would be least under the alternatives that propose the shortest transition from old-growth to young-growth harvest), and would be most evident in areas where timber harvest is concentrated. Tables 3.9-16, 3.9-17, and 3.9-18 in the Biodiversity section of the FEIS summarize the maximum long-term cumulative percent of the original total, high-volume, and large-tree POG that would be harvested in Southeast Alaska on all ownerships by biogeographic province by alternative. After 100 years of Forest Plan implementation, cumulative POG harvest levels on all lands of Southeast Alaska would maintain approximately 83 percent of the original (1954) total POG under Alternative 1. Harvest levels on FS lands would be less under Alternatives 2, 3, 4, and 5 but would also maintain approximately 83 percent of the original total POG after implementation of the alternatives cumulatively with future harvest on non-FS lands (FEIS Table 3.9-16).

As discussed in the direct and indirect effects section, old-growth habitat protection in key areas and young-growth succession to old growth conditions are also important to the goshawk. Both of these attributes would continue to decline within the analysis area because of the continued loss of old growth on FS and non-FS lands, and the likelihood that commercially viable young-growth will also be harvested in non-FS lands, which lack the protections of FS lands.

The likelihood of a wildlife population persisting over time has been suggested to be related to some threshold level of habitat loss on the landscape (Fahrig 1997, 1999, 2003; Flather et al. 2002; Andren 1994). After reaching this threshold, the rate of population decline, and thus the likelihood of extinction, may increase (Haufler 2006). Reported threshold levels (percentage of habitat maintained on the landscape) range from 20 percent (Fahrig 1997) to 50 percent (Soule and Sanjayan 1998), depending in part on the dispersal capability of the species under consideration. Though the goshawk has good

dispersal capabilities, this species' need for large quality foraging territories make it more sensitive to habitat fragmentation and loss than it would be based on dispersal capabilities alone. Natural fragmentation of habitats can also affect the level of additional fragmentation that can be supported. No specific threshold has been determined for goshawks on the Tongass; however, all of the biogeographic provinces on the Tongass would maintain at least 57 percent of the original (1954) POG after 100 years of Forest Plan implementation. Moreover, all of the action alternatives would maintain 80 percent or more of the original (1954) total POG forest in 18 of 21 biogeographic provinces over this period (FEIS Table 3.9-16).

The Forest Plan Conservation Strategy would continue to provide for extensive areas in reserves, distributed across the Forest. The Legacy Forest Structure and other standards and guidelines that retain POG forest in harvested and harvestable areas (e.g., beach and estuary fringe, RMAs, and Scenic Integrity Objectives) would also ensure the maintenance of a functional and interconnected old-growth ecosystem on the Tongass. These measures, particularly when implemented in areas that have experienced concentrated past harvest increase the likelihood that these landscapes will continue to provide the full range of functions that support viable and well-distributed populations of goshawk.

Additional effects, associated with the cumulative timber harvest described above, include road construction, which has the potential to impact goshawks through habitat fragmentation, and access-related disturbance, though this is of much less importance to the goshawk than old growth harvest. FEIS Table 3.10-12 summarizes existing and proposed total (open and closed roads) cumulative road densities (all land ownerships included) by the proportion of WAAs within road density categories. Generally road densities on non-FS lands are greater than those found on adjacent FS lands. Forest-wide total and open road densities would be approximately the same under all of the alternatives, representing an increase in cumulative road densities (FS and non-FS lands) of 0.11 to 0.12 miles per square mile above current conditions (FEIS Table 3.10-12).

Climate change may also contribute to cumulative effects. Warmer temperatures and decreased precipitation are anticipated to result in changes to vegetation and thus, the suitability of wildlife habitat, among other impacts (Haufler et al. 2010, Shanley et al. 2015; see Climate and Air section in the FEIS). Habitat changes resulting from a longer growing season, wind, fires, insect infestations, and disease would have uncertain and variable effects on the goshawk and their prey. The greatest concerns for goshawks in relation to climate change, however, are the weather extremes that can be expected to occur periodically (Haufler et al. 2010). Periodic severe winter snowfalls, which may seem counterintuitive given the general warming trend, are anticipated (SNAP 2010). These stochastic events may affect reproductive success during more sensitive nesting stages, e.g., when young goshawk nestlings or eggs are thermoregulatory vulnerable. Stochastic weather events are also likely to affect goshawk prey populations and associated foraging success and foraging territory needs of the goshawk. The Forest Plan Conservation Strategy was designed to maintain a resilient old-growth forest ecosystem in the face of this uncertainty.

In summary, when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would have minor to moderate cumulative effects on goshawks, meaning that individuals would be affected. However, the cumulative effects would not compromise the integrity of the conservation strategy for the goshawk, nor affect the future viability of goshawks or cause a trend towards federal listing for the species. Effects of activities on goshawks will also be considered at project-specific levels, with opportunities to further reduce cumulative effects.

***Conclusions for the Queen Charlotte Goshawk.***--Based on direct, indirect and cumulative effects to the goshawk from the alternatives, it is determined that all of the alternatives may affect the goshawk. None of the impacts to individuals are expected to rise to levels that would decrease viability or lead towards an ESA listing under any of the alternatives because a) Alternatives 5 and 4 would have overall beneficial effects, with benefits to old-growth protection in key areas and young-growth succession, especially within the beach and estuary fringe, RMAs, and the Old-Growth Habitat LUD, outweighing costs from predicted intermediate levels of old-growth harvest over time; b) impacts from old-growth harvest under Alternative 1 would be offset by current management direction towards old-growth protection in key areas developed in the conservation strategy, continued young-growth succession within key beach and estuary fringe habitat, and continued less permissive renewable-energy development; c) beneficial effects of Alternatives 2 and 3 on protection of old-growth habitat help offset negative effects on changes in old-growth habitat protection in key areas and young-growth succession, as well as from road and renewable-energy management; d) impacts from Alternatives 5 (patch cuts and commercial thinning) and 2 (clearcutting) on old-growth succession in the beach and estuary fringe will be lessened, though not completely offset by protection of a 200-foot shoreline no-harvest buffer, and an approximately 1000-foot buffer corridor inland of the harvest area, respectively; e) project-level goshawk surveys and application of goshawk standards and guidelines that preserve nesting habitat and active nesting will minimize effects to goshawks under all alternatives, with additional benefits from application of Legacy standards and guidelines to young growth under Alternatives 3 and 4; and f) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would have minor to moderate cumulative effects on this species that would not compromise the integrity of the conservation strategy for this species.

**Beach, Estuary, and Marine Habitats –Short-Tailed Albatross, Steller Sea Lion, TE Whales, TE Fish, Black Oystercatcher, Aleutian Tern, and Kittlitz's Murrelet**

Direct and Indirect Effects

Impacts to beach, estuary, and marine habitats differ among the alternatives based on young-growth, renewable-energy, and road management within and near these habitats and in riparian habitats for downstream influences. Future actions that could result from the alternatives include: tree harvesting; transport of logs; floating or shoreline accumulation of loose logs; contaminant spills from vessels or upstream actions; vessel, large equipment, and personnel presence along shorelines; vessel transit; development and operation of log transfer facilities; development and maintenance of facilities plus associated transmission-lines for hydroelectric, wind, solar, geothermal, tidal, wave, and biomass energy; and maintenance, access, and road infrastructure associated with these actions. The application in all alternatives of Forest-wide standards and guidelines and Best Management Practices (BMPs) developed to meet soil protection, fish-habitat protection, and water-quality standards (USDA 2012) will help minimize impacts of contaminants to riparian habitat and downstream beach, estuary and marine habitats. Proposed standards and guidelines under all action alternatives for adherence to the USFWS Land-based Wind Energy Guidelines (USFWS 2012) and APLIC guidelines (APLIC 2012) would help minimize impacts of renewable energy development.

Beach and estuary fringe harvest has potential to impact the marine system in a number of ways. In addition to direct disturbance and habitat loss and degradation of marine habitats from tree-harvest actions, transport, and equipment staging, impacts could also have more indirect effects such as increased sediment entry to local marine waters, decreased shading and increased desiccation along beaches and upper-intertidal areas, reductions in organic input such as insects and leaves, reduced bank stability, and slight coverage of shallow (< 60 feet deep) regions of nearshore habitat with wood debris, affecting primarily benthic marine organisms in very small areas of tidal and subtidal habitat. Thus, the harvest of beach and estuary fringe in Alternatives 2 through 5 could impact nearshore marine resources.

While Alternative 1 had important impacts on old-growth habitat harvest that were identified in the goshawk/old-growth habitat section of this BE, Alternative 1 has little impacts to beach, estuary, and marine habitats due to retention of the 1000-foot no-harvest beach and estuary fringe buffer. Slight impacts may occur, however, from continued, low-level permissiveness of renewable-energy development in coastal areas and continued, low-level non-commercial uses, access needs, exceptions, and wildlife habitat restoration of young-growth forest within the beach and estuary fringe according to the 2008 Forest Plan.

Measures that best show impacts to beach, estuary, and marine-dwelling TES species from the alternatives include the number of acres of young-growth harvest by clearcutting, patch cuts (≤10-acre openings, ≤35% stand removal), and commercial thinning, predicted in 100 years within both the beach and estuary fringe and RMAs and the maximum number of miles of new plus reconstructed roads predicted in 100 years within beach and estuary fringe and RMAs. A descriptive measure of management direction related to renewable-energy siting is also elucidating as it applies to beach, estuary, and riparian habitats. Generally, effects from harvest-related activities within beach and estuary fringe habitat on beach, estuary, and marine systems would be somewhat proportional to the amount of harvest. However, the amount of time, infrastructure, and magnitude of actions that may disturb or displace TES species in beach and estuary habitat, as well as the potential for direct and indirect effects from beach and estuary fringe harvest, are likely to be somewhat higher with clearcutting (Alternative 2), intermediate with patch cuts, depending on their size and dispersion (Alternative 5; ≤ 10-acre openings, ≤35% stand removal), and lowest with commercial thinning (Alternatives 3 and 4). The 200-foot buffer along the beach and estuary fringe proposed under Alternative 5 will further reduce disturbance and adjacency impacts to TES species using beach, estuary, and marine habitats as will 15-year and single-entry restrictions under this alternative. Assessment of impacts based on overall acreage or harvest should be adjusted according to disturbance likely from management prescriptions and restrictions. Management within the beach and estuary fringe will have more direct impacts than indirect, downstream influences from management within RMAs.

Among the alternatives, the number of acres of predicted commercial young-growth harvest by all prescriptions within beach and estuary fringe habitat within 100 years will be least to most in the following order: Alternative 1, 5, 4, 2 and 3 at 0, 3903, 11114, 21871 (8791 clearcut + 13079 commercial thin), and 30769 (all commercial thin) acres, respectively (Table 3). Note that young growth harvest can occur in this area under the current Forest Plan and Alternative 1 to accelerate development of advanced seral stand structure and for a few additional exceptions. Alternative 5 objectives also include dual intents of facilitating recovery of late-seral forest characteristics, while also producing commercial timber byproducts. Adjusting acreage impacts with differential impacts from prescriptions and restrictions suggests the potential disturbance to TES in beach and estuary from young-growth management would be lowest in Alternative 1 (no commercial young-growth harvest), followed by Alternative 5 (low acres, ≤ 10 acre openings, ≤35% stand removal, 200-foot buffer, 15-year and single-entry), then 4 (intermediate acres, commercial thinning), then by Alternative 3 (highest acres, commercial thinning), and most by Alternative 2 (higher acres, clearcutting first 15 years then commercial thinning).

The number of acres of predicted young-growth harvest within RMAs will be lowest in Alternatives 1, 3, and 4 (all none), followed by Alternative 5 (1,089 acres), and lastly by Alternative 2 (26,030 acres; Table 3). Though Alternative 5 allows ≤ 10-acre openings and commercial thinning, with ≤ 35% stand removal in RMAs, while Alternative 2 allows commercial thinning only and ≤ 33% stand removal, these prescriptive differences in impacts are not likely substantial enough to offset the larger discrepancy in

acreage. The order of impacts from young-growth harvest in RMAs would be lowest in Alternatives 1, 3, and 4, followed by 5, and lastly by 2 with the most impacts.

Impacts to TES in beach, estuary, and marine habitats may also differ among the alternatives due to management direction related to renewable energy siting and road development. The descriptive measure of renewable-energy permissiveness indicates that Alternative 1 is least permissive, followed by Alternatives 5, 4, and 3 with equally intermediate permissiveness, and lastly followed by Alternative 2, which is most permissive (Table 3). Road construction and reconstruction will cover the fewest miles in 100 years within the beach and estuary fringe under Alternative 1 (34 miles), followed by Alternative 5 (67 miles), then 4 (115 miles), then 2 (204 miles), while the most road miles will be constructed and reconstructed within the beach and estuary fringe under Alternative 3 (268 miles; Table 3). Within RMAs, road construction and reconstruction will cover the fewest miles in 100 years under Alternative 4 (177 miles), followed by Alternative 1 (181 miles), then 5 (214 miles), then 3 (217 miles), while the most road miles will be constructed and reconstructed within RMAs under Alternative 2 (420 miles; Table 3).

Pulling together impacts from young-growth, renewable-energy, and road management within and near beach, estuary, marine, and upstream riparian habitats, TES within beach, estuary, and marine habitats will be least affected by Alternative 1 (no commercial young-growth harvest, least energy impacts, least road impacts), followed by Alternative 5 (low-intermediate young-growth-harvest, intermediate energy impacts, and low-intermediate road impacts), then by 4 (intermediate young-growth-harvest, energy, and road impacts), then 3 (high-intermediate young-growth-harvest impacts, intermediate energy impacts, and highest road impacts with Alternative 2), and most affected by Alternative 2 (highest young-growth-harvest, energy, and road impacts). A schematic that shows the relative relationships among alternatives in terms of impacts to TES species in beach, estuary, and marine habitats follows:
(least impacts) Alternative 1 < Alternative 5 < Alternative 4 < Alternative 3 < Alternative 2 (most impacts).

Cumulative Effects

When considering effects to TES wildlife and fish, it is important to look at all land ownerships within the analysis area and the cumulative effects of past, present, and reasonably foreseeable future activities. The significance of any direct or indirect effect in contributing to the cumulative effects on TES wildlife and fish species from management activities depend on the amount and type of cumulative disturbance in the analysis area and how that cumulative disturbance affects TES wildlife and fish. A list of past, present, and reasonably foreseeable future projects within the analysis area is provided in Appendix C of the FEIS. Considered projects and activities include, but are not limited to, timber harvest, young-growth treatments, residential development, energy development, mining, recreation and tourism, and road construction. This analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is appropriate because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

The current condition of beach, estuary, and marine habitats within the analysis area has been moderately degraded in localized areas, especially on non-FS lands in cities and towns. However, these habitats are largely intact, healthy, and continue to be productive for TES wildlife and fish across the majority of the analysis area, including a very high proportion of FS lands. For perspective, the total lands within the Tongass boundary, including FS and non-FS lands, is about 17.8 million acres. Of this, only about 6 percent (1.1 million acres) are non-FS lands. Ongoing and future projects and activities within the analysis area are likely to continue to degrade, convert, and fragment these habitats on non-FS

lands at mostly low and localized levels and on FS lands at very low and localized levels. Ongoing and future projects and activities are expected to contribute to the existing level of noise and disturbance, potential for oil or fuel spills, and collisions associated with vessel activity, which could result in decreased foraging or breeding success of some TES wildlife and fish in beach, estuary, and marine habitats. It is assumed that other vessel activity would abide by Marine Mammal Protection Act (MMPA), ESA, and NMFS guidelines for speed and approaching marine mammals, which would reduce the likelihood of disturbance and collisions.

Changes in Alaska's climate could also affect habitat conditions of TES wildlife and fish in beach, estuary, and marine habitats. While the models do not fully agree on the climate change predictions for southeast Alaska, they generally predict warmer air, marine water, and stream temperatures, increased rainfall, changed flow regimes, decreased snowfall, and rising sea levels. Recent research by Shanley and Albert (2014) predicted an increase in mean annual temperature of approximately 3 to 10 degrees Fahrenheit, a three to eighteen percent increase in mean annual precipitation, and a 22 to 58 percent decrease in snowfall by the 2080s. Sea level changes have obvious importance to wildlife and fish TES species that inhabit beach, estuary, and marine environments. Current predictions are for a sea-level rise of 1.3 to 2.1 feet by 2081-2100 (Shanley et al. 2015). However, the Southeast Alaska land mass is rising in many areas, due to isostatic rebound from past glaciation, and sea levels in Southeast Alaska are decreasing by as much as about 3 cm/year (Larsen et al. 2005). Some areas, particularly in northern Southeast Alaska, may rise 1-4 feet over the next century (Kelly et al. 2007). This rate of increase could offset water level rises. Overall effects on estuaries and beaches will vary considerably and changes are difficult to predict and may be difficult to detect.

When taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect to TES wildlife and fish in beach, estuary, and marine habitats. Effects of activities on TES wildlife and fish will also be considered at project-specific levels, with opportunities to further reduce cumulative effects, in project-specific NEPA analysis.

***Conclusions for the Short-Tailed Albatross***

Potential effects on foraging by the short-tailed albatross could result from young-growth or renewable-energy management, or associated vessel transit, along the outer coast, especially where the shelf break is nearer to shore and with activities that span into outer coast waters (e.g., wave or shoreline energy development, outer coast log transfer and tree-harvest-related shipping). Short-tailed albatross do not nest within or near the Tongass (Table 2), so no effects would occur to nesting of this species. If effects to foraging occur, they are least to most likely to occur in the following order by alternative: Alt 1 < Alt 5 < Alt 4 < Alt 3 < Alt 2.

Alternative 1 would result in continued, low-level permissiveness of renewable-energy development in coastal areas and continued, low-level non-commercial uses, access and other exceptions, and wildlife habitat restoration of young-growth forest within the beach and estuary fringe according to the 2008 Forest Plan. Alternatives 2-5 would result in increased young growth, road, and renewable-energy management within beach and estuary fringe along outer-coast waters and from shipping-related changes in outer-coast areas. Therefore, all alternatives may affect the short-tailed albatross. None of the alternatives, however, are likely to adversely affect this species because of a) exclusive non-terrestrial use by this species of outer-coast and shelf-break waters for foraging only, b) this species' ability and proclivity to avoid foraging along beaches and shorelines where overlapping activities related to the action alternatives are most likely, c) that alternative-related activities are unlikely to overlap with foraging areas of this species except in rare instances, d) the very low likelihood of activities related to the action alternatives having negative effects on foraging of this species if they do overlap, e) use of

proposed standards and guidelines under all action alternatives for adherence to the USFWS Land-based Wind Energy Guidelines (USFWS 2012) and APLIC guidelines (APLIC 2012) would help minimize any potential effects on this species from renewable energy development along the outer coast, and f) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on this species.

***Conclusions for the Steller Sea Lion and Designated Critical Habitat.***—There is a very low likelihood of disturbance or displacement of Steller sea lions from proposed young-growth, road, and renewable-energy management within and near beach, estuary, and marine habitats under Alternatives 2-5, and from continued low-level permissiveness of renewable-energy development in coastal areas and continued, low-level non-commercial uses, access needs, exceptions, and wildlife habitat restoration of young-growth forest within the beach and estuary fringe according to the 2008 Forest Plan under Alternative 1. Any effects will be minimized by requirements to avoid taking of marine mammals under the MMPA, which includes harassment, adverse disturbance, pursuit, or attempting any such activity, and by standards and guidelines in the 2008 Forest Plan (Chapter 4 WILD1 X, p 4-93), which will be included in all alternatives. In addition, ESA consultation with the NMFS will be conducted for the federally-listed western DPS of the Steller sea lion and for designated Steller sea lion critical habitat, which includes a terrestrial zone, an aquatic zone, and an air zone that extends 3,000 feet landward, seaward, and above, respectively at 3 major rookeries on the outer coast, and 11 major haulouts, 7 on the outer coast and 4 on inside channels of the Tongass. However, despite all of these protective measures, there is still the very small possibility of effects to the Steller sea lion from management activities along beaches, estuaries, and marine waters in the alternatives. If effects occur, they are least to most likely to occur in the following order by alternative: Alt 1 < Alt 5 < Alt 4 < Alt3 < Alt 2.

All of the alternatives may affect the western DPS of the Steller sea lion and Steller sea lion critical habitat because of young-growth, road, and renewable-energy management within and near the beach fringe and coastal areas of the Tongass. The alternatives are not likely to adversely affect the western DPS and its critical habitat due to a) protective measures for this species and its critical habitat provided by the MMPA and the Forest Plan that would apply under all alternatives, b) the low proportions of this DPS within northern waters around the Tongass and its range-based absence in the southern portion of the Tongass where most young-growth management is likely under all action alternatives, and c) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect.

For the FS sensitive eastern DPS of the Steller sea lion, all alternatives may affect the eastern DPS because of young-growth, road, and renewable-energy management within the beach fringe and coastal areas of the Tongass around waters where the eastern DPS is common. The action alternatives are not likely to affect viability or continued recovery of this species due to a) MMPA and Forest Plan protective measures that apply to this species and its haul outs, rookeries, and known concentration areas, b) the existing condition of a well-documented and consistent trajectory of increasing population trends in the eastern DPS, and c) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on this species.

***Conclusions for the TE Whales.***—There is a very low likelihood of potential disturbance, displacement, and/or boat-strike of TE whales from future FS actions that could result from proposed management direction under all of the alternatives. Any potential effects from proposed changes in management direction will be minimized because of requirements to avoid take, including adverse disturbance and displacement, of marine mammals as per the MMPA. Additional marine mammal protective measures

in standards and guidelines in the 2008 Forest Plan will also be included in this Forest Plan Amendment under all alternatives. In addition, ESA consultation with the NMFS will be conducted for the TE whales, providing further opportunities to protect TE whales. However, despite all of these protective measures, there is still the very small possibility of effects to the TE whales from management activities within and near beaches, estuaries, and marine waters in some of the alternatives. If effects occur, they are least to most likely to occur for all three whales in the following order by alternative: Alt 1 < Alt 5 < Alt 4 < Alt3 < Alt 2. Impacts are especially unlikely for the fin, which occur along the outer coast and only rarely in the mouths of a couple of larger channels in close proximity to the open ocean. Impacts are also less likely for the sperm whale than the humpback whale, because the sperm whale occurs primarily along the outer coast but does also use inside channels. The potential for the alternatives to affect the humpback whale is higher than for the other two whales because of its frequent use of inner channels and shallow waters around the Tongass.

All alternatives may affect TE whales because of young-growth, road, and renewable energy management within and near beach, estuary, and marine habitats. While Alternative 1 would see continued low levels of management within these habitats according to the 2008 Forest Plan, the action alternatives would involve opening up the beach and estuary fringe buffer to commercial harvest (except for the first 200 feet in Alternative 5) and increasing permissiveness for renewable-energy development within coastal areas. Any such effects are likely to be discountable and insignificant, and therefore the alternatives are not likely to adversely affect TE whales because a) fin and sperm whales don't typically occur within inside passage waters where activities associated with the alternatives are most likely, b) most land-based activities will not affect TE whales because of exclusive use of marine waters by these species and their mobile nature; the exception is substantial noise-inducing activities, and water-based activities that are interrelated with FS land-based activities, c) further project-specific NEPA and ESA analysis will allow for project-specific protections for TE whales, especially related to heavy noise-inducing activities and interrelated water-based activities, d) MMPA and Forest Plan protective measures would apply under all alternatives, and e) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on these species.

***Conclusions for the TE Fish.***—There is a low likelihood of disturbance or displacement of TE fish from young-growth and renewable energy management proposed by the action alternatives within and near beach, estuary, and riparian habitats. Management within riparian habitat is considered for downstream influences because the TE fish only have the potential to occur within marine waters and do not breed within riparian areas of the Tongass. Degradation and possible loss of eel-grass habitat that may be used by TE fish during their marine-life phases could occur as a result of young-growth and renewable-energy management within and near beaches and estuaries. Displacement or decreased foraging success may result from indirect effects of harvest within the beach and estuary fringe, including increased sediment entry to local marine waters, decreased shading and increased desiccation along beaches and upper-intertidal areas, reductions in organic input such as insects and leaves, reduced bank stability, and slight coverage of shallow (< 60 feet deep) regions of nearshore habitat with wood debris (primarily bark), affecting primarily benthic marine organisms in very small areas of tidal and subtidal habitat. Beach and estuary fringe no-harvest buffers in Alternatives 1 (1000ft) and 5 (200ft) will minimize these indirect effects. The relative order of these direct and indirect effects to TE fish from the alternatives is: (least potential for effects) Alt 1 < Alt 5 < Alt 4 < Alt 3 < Alt 2 (most potential for effects).

Slight impacts to habitats near waters used by TE fish may continue to occur under Alternative 1 from continued, low-level permissiveness of renewable-energy development in coastal areas and continued,

low-level non-commercial uses, access needs, salvage and other exceptions, and wildlife habitat restoration of young-growth forest within the beach and estuary fringe according to the 2008 Forest Plan. All of the action alternatives will see increases in young-growth, road, and renewable energy management within and near beach, estuary, and marine habitats, including opening up the beach and estuary fringe buffer to commercial harvest (except for the first 200 feet in Alternative 5) and increasing permissiveness for renewable-energy development within coastal areas. Therefore, all of the alternatives may affect TE fish. None of the alternatives are likely to adversely affect TE fish because of a) the very low likelihood of TE fish occurring within waters around the Tongass, b) the potential occurrence of TE fish within marine waters around the Tongass only during the marine, non-breeding phases of their life cycle, c) the ubiquitous nature of high-quality beach and estuary habitat across the Tongass and mobile nature of these species, d) the application in all alternatives of Forest Plan standards and guidelines and BMPs developed to meet soil protection, fish-habitat protection, and water-quality standards (USDA 2012) that will help minimize impacts of contaminants and sediments to riparian habitat and downstream beach, estuary and marine habitats, and e) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on these species.

***Conclusions for the Black Oystercatcher.***—Impacts to nesting and foraging by the black oystercatcher along beaches could include disturbance and displacement of individuals, as well as degradation and loss of habitat, due to young-growth, road, and renewable-energy management within and near beach and estuary habitat and upstream riparian habitat. Disturbance, displacement, and localized habitat loss and degradation within beach habitat for this species could cause reduced foraging success and reduced breeding success of individuals. Though they are mobile, black oystercatchers defend foraging and nesting territories during the breeding season, making potential impacts to breeding individuals more likely. The alternatives differ in the degree of impacts anticipated to the black oystercatcher, based on their relative aggressiveness towards young-growth and renewable energy management within and near beach habitat: Alt 1 < Alt 5 < Alt 4 < Alt3 < Alt 2.

All alternatives may affect individual black oystercatchers. Alternative 1 would have continued, low-level permissiveness of renewable-energy development in coastal areas and continued, low-level non-commercial uses, access needs, exceptions, and wildlife habitat restoration of young-growth forest within the beach and estuary fringe 1000-foot no-harvest buffer allowed by the 2008 Forest Plan. Alternatives 2-5 would have increased young-growth, road, and renewable energy management within and near coastal areas used by black oystercatchers, including opening up the beach and estuary fringe buffer to commercial harvest (except for the first 200 feet in Alternative 5) and increasing permissiveness for renewable-energy development within coastal areas. Use of standards and guidelines under all alternatives for adherence to the USFWS Land-based Wind Energy Guidelines (USFWS 2012) and APLIC guidelines (APLIC 2012) would help minimize impacts from renewable energy development. None of the alternatives are likely to lead to a loss of viability or trend towards federal listing for this species because of a) minimization measures to reduce effects from renewable energy development, b) BMPs (USDA 2012) to reduce impacts from upstream actions on soils and waters, c) the ubiquitous nature of high-quality beach habitat across the Tongass, combined with the comparatively localized scope of beach-related actions that are likely to result from the alternatives, and d) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on this species.

***Conclusions for the Aleutian Tern.***—Disturbance or displacement of Aleutian terns or degradation and loss of beach and estuary habitat used by Aleutian terns could occur under some of the alternatives. The Aleutian tern is most likely to be affected by actions that occur within or near nesting habitat, which

exists on sandy spits at heads of bays, reefs, islands, estuaries, and river mouths. Because of the colonial nature of this species, impacts to nesting areas would be of substantive concern as management activities could affect breeding success of many individuals or could lead to abandonment of a nesting colony. The largest nesting area on the Tongass is the Black Sand Spit near Yakutat, which supports about 1/3 of Alaska's Aleutian tern population. Several other smaller nesting areas have also been documented on the Yakutat Ranger District (Oehlers and Catterson 2012), and other nest areas that have not been previously surveyed may exist.

Specific activities that could affect the Aleutian tern under the proposed alternatives include young-growth and associated road and access management in the beach and estuary fringe, and renewable energy development, within or near nesting areas. Very little suitable young growth is available within the Yakutat Ranger District, and even less is near identified Aleutian tern nesting areas (see FEIS maps of suitable young growth and nest area maps in Oehlers and Catterson 2012). Potential young growth near nest areas is limited to a couple of small patches near the Lost River and 9-Mile Meadow nest areas that were identified as having suitable young growth under Alternatives 1, 2, 3, and 5 (none under Alternative 4). Aleutian tern population estimates in these two areas were 50-75 and 20-100 individuals, respectively, during 2010 and 2012, respectively (Oehlers and Catterson 2012). The likelihood of young-growth management within these areas is low given the small size of these patches of suitable young growth and the lacking commercial young-growth-harvest infrastructure in the Yakutat area. Impacts from renewable energy development within or near nesting areas are also possible. Renewable energy impacts are anticipated to be least likely under Alternative 1 because it is least permissive, followed by Alternatives 3-5 at an intermediate level, and would be most likely under Alternative 2, which is most permissive. Combining renewable energy management with the slight chance of young-growth management near Aleutian tern nesting habitat (in all but Alternative 4), gives a relative difference in degree of impacts among the alternatives in the following order of least to most: Alt 1 < Alt 4 < Alt 5 < Alt 3 < Alt 2.

Any impacts from renewable energy and other management activities would be minimized by Forest Plan seabird rookery standards and guidelines that would apply under all alternatives. Specifically, measures include a) provide for the protection and maintenance of seabird rookeries, b) locate facilities and concentrated human actions requiring FS approval as far from known seabird colonies as feasible consistent with the Migratory Bird Treaty Act, and c) regulate human use to maintain a 250 meter no-disturbance distance from seabird colonies on upland habitats. These measures are critical in minimizing effects of the alternatives in the cumulative context of a severely declining Alaska population and current and reasonably foreseeable slightly increasing human-related disturbance, predation, and recreation on Aleutian tern breeding habitats.

In conclusion, may affect determinations are appropriate for the Aleutian tern for all of the alternatives because of the potential for renewable energy management, and the small potential for young-growth and associated road and access management, within or near Aleutian tern nesting habitat. Under Alternative 1, this would be at the continued low levels allowed under the 2008 Forest Plan, while management changes proposed in Alternatives 2-5 would increase the likelihood of management within breeding habitats for this species. None of the alternatives are likely to lead to a loss of viability or trend towards federal listing for this species because of a) application of Forest Plan standards and guidelines for seabird rookeries under all alternatives, which are critical for this species, b) USFWS Land-Based Wind Energy Guidelines (USFWS 2012), APLIC Guidelines (APLIC 2012), and soil and water BMPs (USDA 2012) that would also help minimize impacts under all alternatives, and c) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would have a minor cumulative effect on this species.

***Conclusions for the Kittlitz's Murrelet.***—All of the alternatives may affect this species via disturbance or displacement of foraging Kittlitz's murrelet in marine waters from water-based activities that are interrelated with FS young-growth or renewable-energy management. Impacts could include reduced foraging success or energy reserves of individual Kittlitz's murrelets. The alternatives would be least to most likely to impact individuals of this species in the following order: Alt 1 < Alt 5 < Alt 4 < Alt3 < Alt 2, based on the aggressiveness of young-growth and renewable energy management within and near marine waters that may be used by Kittlitz's murrelets. Under Alternative 1, this would be at the continued low levels allowed under the 2008 Forest Plan, while management changes proposed in Alternatives 2-5 would increase the likelihood of management-related impacts to this species. However, any such effects would not result in loss of viability of this species or a trend toward federal listing under any of the alternatives because a) impacts to foraging or energy expenditure would be minimal and temporary due to the mobile nature of this species and ubiquitous nature of marine waters around the Tongass, b) use of marine waters for foraging only, lack of use of beach, estuary, or other forest habitats that would be affected, a very low likelihood of young-growth management occurring near Kittlitz's murrelet foraging areas near tidewater glaciers, and that nesting habitat is on unvegetated upland scree slopes that would not be affected by proposed management changes and is protected by Forest Plan standards and guidelines, c) minimization measures such as USFWS Land-Based Wind Energy Guidelines (USFWS 2012), APLIC Guidelines (APLIC 2012), and soil and water BMPs (USDA 2012) under all alternatives, and d) when taken together with other past, present, and reasonably foreseeable activities and disturbances, all alternatives would only have a minor cumulative effect on this species.

**Table 3. Key differences between alternatives for amending the Tongass National Forest Land and Resource Management Plan that are relevant to habitat and life-history requirements of federally-listed and sensitive species and critical habitat within the Tongass National Forest. High-volume productive old growth refers to size-density classes 5N, 5S, and 67 as per the Tongass Size Density Model. Large-tree productive old growth refers to class 67. OG = Old Growth Land Use Designation (LUD).**

| **Attributes** | **Alternative** | | | | |
|---|---|---|---|---|---|
| Measures | **1** | **2** | **3** | **4** | **5** |
| **Old-Growth Harvest** | | | | | |
| Acres of old-growth harvest predicted in 25 years | 38,527 | 15,027 | 16,599 | 23,255 | 23,813 |
| Acres of productive old-growth harvest predicted in 100 years | 62,815 | 32,609 | 35,568 | 42,597 | 42,479 |
| Acres of high-volume productive old-growth harvest predicted in 100 years | | | | | |
| <800 feet elevation | 16,116 | 8,120 | 6,297 | 9,929 | 9,844 |
| Total | 27,464 | 14,022 | 13,716 | 18,248 | 17,816 |
| Acres of large-tree productive old-growth harvest predicted in 100 years | | | | | |

| **Attributes** Measures | **Alternative** 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| <800 feet elevation<br>Total | 6,076<br>9,303 | 2,989<br>4,629 | 1,937<br>3,685 | 3,542<br>6,021 | 3,594<br>5,805 |
| Percent of existing productive old-growth harvest predicted in 100 years | 1.3 | 0.7 | 0.7 | 0.9 | 0.8 |
| **Old-Growth Habitat Protected in Key Areas** | | | | | |
| Acres productive old growth protected by beach fringe, riparian and other standards and guidelines | 1,035,499 | 1,007,109 | 839,922 | 1,087,353 | 1,127,428 |
| Acres of young growth protected by beach fringe, riparian and other standards and guidelines | 94,129 | 32,895 | 54,695 | 92,828 | 53,102 |
| **Young-Growth Succession Towards Old-Growth Habitat** | | | | | |
| Acres of young-growth harvest by clearcut (CC), patch cut (PC), or commercial thinning (CT) predicted in 15 years:<br>Beach Fringe =<br>RMAs =<br>Old Growth LUD = | <br><br><br><br><br>0<br>0<br>0 | <br><br><br><br><br>8,791 CC<br>2,327 CT<br>2,477 CC | <br><br><br><br><br>7,819 CT<br>0<br>2,181 CC | <br><br><br><br><br>4,436 CT<br>0<br>0 | <br><br><br><br><br>3,903 PC/CT<br>1,089 PC/CT<br>1,811 PC/CT |
| Acres of young-growth harvest by clearcut (CC), patch cut (PC), or commercial thinning (CT) predicted in 100 years:<br>Beach Fringe =<br>RMAs =<br>Old Growth LUD = | <br><br><br><br><br>0<br>0<br>0 | <br><br><br><br><br>8,791 CC + 13,079 CT<br>26,030 CT<br>31,640 CC | <br><br><br><br><br>30,769 CT<br>0<br>26,186 CC | <br><br><br><br><br>11,114 CT<br>0<br>0 | <br><br><br><br><br>3,903 PC/CT<br>1,089 PC/CT<br>1,811 PC/CT |
| Management direction for young growth in beach and estuary fringe | None | Clearcutting for first 15 years; commercial thinning thereafter; maintain | Commercial thinning | Commercial thinning | ≤10 acre openings; ≤35% stand removal; outside of 200-foot buffer; no |

| **Attributes** Measures | **Alternative** 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| | | ~1,000-foot wide protected corridor immediately inland of harvest and as close to shoreline as possible | | | harvest after 15 years |
| Management direction for young growth in RMAs | None | Commercial thinning outside of TTRA; ≤33% stand removal | None | None | ≤10 acre openings; ≤35% stand removal; outside of TTRA; no harvest after 15 years |
| Management direction for young growth in Old Growth Habitat LUDs | Thinning and other treatments to accelerate forest succession to old-growth structure | Clearcutting | Clearcutting | Thinning and other treatments to accelerate forest succession to old-growth structure | ≤10 acre openings; ≤35% stand removal; no harvest after 15 years |
| Legacy standard applies to young growth[4] | No | No | Yes | Yes | No |
| **Beach, Estuary, and Riparian Habitat** | | | | | |
| Acres of young-growth harvest predicted in beach and estuary fringe in 100 years:<br>Clearcut or PC/CT[3] =<br>commercial thinning=<br>all prescriptions = | <br><br><br>0<br>0<br>0 | <br><br><br>8,791<br>13,079<br>21,871 | <br><br><br>0<br>30,769<br>30,769 | <br><br><br>0<br>11,114<br>11,114 | <br><br><br>3,903<br>0<br>3,903 |
| Acres of young-growth harvest predicted in RMAs in 100 years:<br>Clearcut or PC/CT[3] =<br>commercial thinning= | <br><br><br>0<br>0 | <br><br><br>0<br>26,030 | <br><br><br>0<br>0 | <br><br><br>0<br>0 | <br><br><br>1,089<br>0 |

| **Attributes** Measures | **Alternative** 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| all prescriptions = | 0 | 26,030 | 0 | 0 | 1,089 |
| **Roads and Renewable Energy** | | | | | |
| Number of miles of new plus reconstructed roads predicted in 100 years: | | | | | |
| Beach fringe = | 34 | 204 | 268 | 115 | 67 |
| RMAs = | 181 | 420 | 217 | 177 | 214 |
| All FS lands = | 2,259 | 2,846 | 2,716 | 2,216 | 2,579 |
| Permissiveness in Siting Renewable Energy Projects | No change | Most permissive | More permissive | More permissive | More permissive |

[1]The beach and estuary fringe includes a 1000-foot forest buffer.
[2]TTRA = 100-foot buffer protected by the Tongass Timber Reform Act.
[3]Applies to Alternative 5 only and includes ≤ 10-acre openings or commercial thinning with ≤ 35% stand removal.
[4]Applies the Legacy Forest Structure standard and guideline to young-growth harvest projects >20 acres in VCUs that have received concentrated past old-growth harvest.
[5]Includes reconstruction of obliterated roads.

## SUMMARY

Based on the analysis detailed in this BE, the relative impacts from the alternatives and determinations for TES wildlife and fish species are summarized in Table 5. Determinations considered were no effect, beneficial effect, or may affect as per Washington Office FSM 2672.42 (7/24/2009). Determinations of may affect were made for all alternatives for all TES wildlife and fish species on the Tongass, as well as Steller sea lion critical habitat.

**Table 5. Summary of relative impacts of the alternatives and determinations for TES wildlife and fish species on the Tongass.**

| **Species** | **Relative Impacts of the Alternatives** | **Determinations** Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
|---|---|---|---|---|---|---|
| Short-Tailed Albatross (*Phoebastria albatrus*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Humpback Whale (*Megaptera novaeangliae*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Fin Whale (*Balaenoptera physalus*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Sperm Whale (*Physeter macrocephalus*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steller Sea Lion (*Eumetopias jubatus*) Western DPS | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |

| Species | Relative Impacts of the Alternatives | Determinations | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| Green Sturgeon (*Acipenser medirostris*) Southern DPS | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Lower Columbia River ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Upper Columbia River Spring ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Puget Sound ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Snake River Spring/Summer ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Snake River Fall ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chinook Salmon, Upper Willamette River ESU (*Oncorhynchus tshawytshca*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Sockeye Salmon, Snake River ESU (*Oncorhynchus nerka*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Coho Salmon, Lower Columbia River ESU (*Oncorhynchus kisutch*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Chum Salmon, Hood Canal Summer Run (*Oncorhynchus keta*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steelhead Trout, Lower Columbia River ESU (*Oncorhynchus mykiss*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steelhead Trout, Middle Columbia River ESU (*Oncorhynchus mykiss*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steelhead Trout, Snake River Basin ESU (*Oncorhynchus mykiss*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steelhead Trout, Upper Columbia River ESU (*Oncorhynchus mykiss*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |

| Species | Relative Impacts of the Alternatives | Determinations | | | | |
|---|---|---|---|---|---|---|
| | | Alt 1 | Alt 2 | Alt 3 | Alt 4 | Alt 5 |
| Steelhead Trout, Upper Willamette River ESU (*Oncorhynchus mykiss*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Steller Sea Lion (*Eumetopias jubatus*) Critical Habitat | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Queen Charlotte goshawk (*Accipiter gentilis laingi*) | 5 < 4 < 1 < 2 ≃ 3 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Black oystercatcher (*Haematopus bachmani*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Aleutian tern (*Sterna aleutica*) | 1 < 4 < 5 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Kittlitz's murrelet (*Brachyramphus brevirostris*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |
| Eastern DPS of the Steller sea lion (*Eumetopias jubatus*) | 1 < 5 < 4 < 3 < 2 | May Affect | May Affect | May Affect | May Affect | May Affect |

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