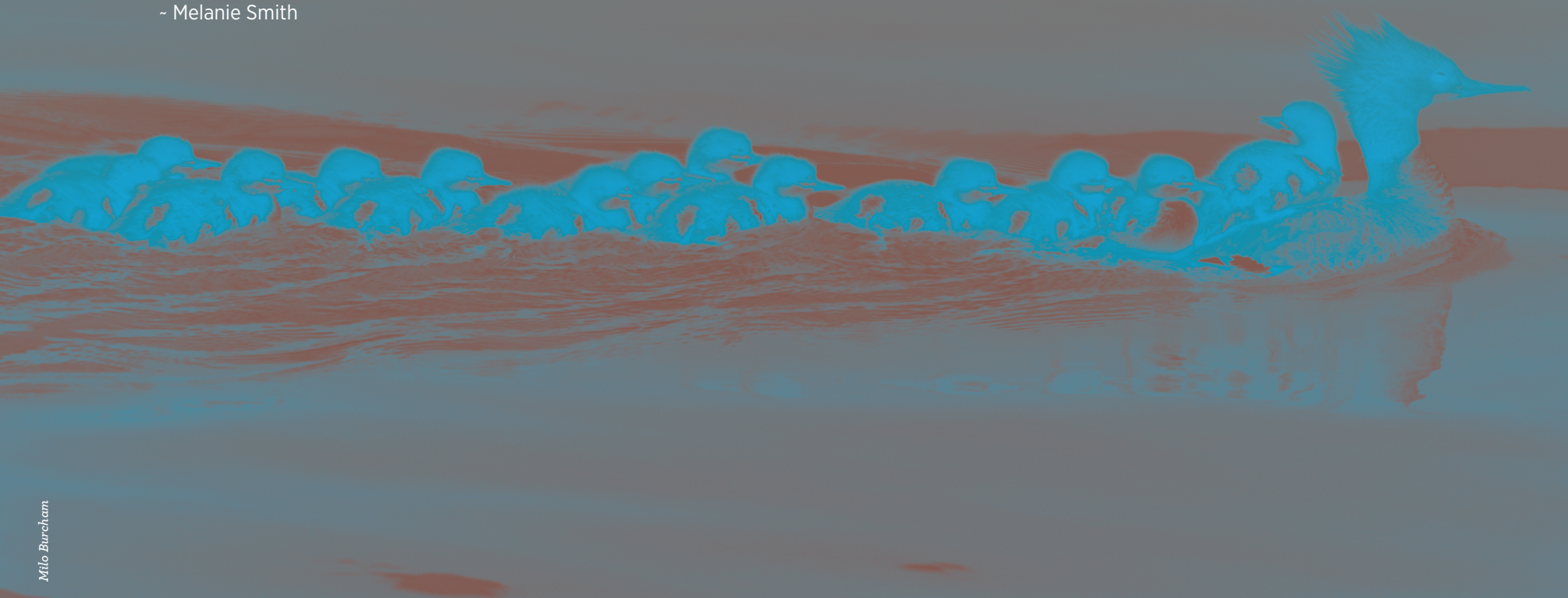
BIRDS

The landscape and seascape of Southeast Alaska offer a combination of habitats that bring in a great diversity of birds, exhibited by a virtual walk from the ocean to the mountaintops. Beginning in the Gulf of Alaska, pelagic seabirds such as Northern Fulmars, auklets, and storm-petrels fish the waters offshore of the island archipelago. Moving nearer to shore, murrelets dive for small forage fish, scoters swim to the shallow bottom for mussels, and several species of gulls pick fish and zooplankton from the top of the water column. Along the thousands of miles of shore are rocky cliffs hosting raucous gatherings of colonial nesters such as puffins, kittiwakes, cormorants, and murres, totaling over 1 million birds. Preferring the coastline, there are nesting oystercatchers, foraging crows, and migrating Surfbirds. Moving inland a bit, in the estuaries are Sandhill Cranes and tens of thousands of sandpipers making their way to northern Alaska. Bald Eagles can be found in great numbers where the forest edge meets the water, their preferred nesting habitat. Stepping just inside the forest, Ruby-crowned Kinglets, Winter Wrens, and Varied Thrushes are singing boldly. Further along where a stream runs through the forest, an American Dipper is foraging, and a group of Harlequin Ducks swims by, as well as a mother merganser trailing a group of chicks. In the interior muskegs there are Mallards, goldeneyes, and Rusty Blackbirds. Somewhere among the trees of the upland forest there are Northern Saw-Whet Owls, Northern Goshawks, Spruce Grouse, and Olive-sided Flycatchers to be found. Even farther up the mountainside is alpine habitat that hosts migrating longspurs, Horned Larks, and Gray-crowned Rosy Finches.

Including casual and accidental sightings, Southeast Alaska hosts about 70% of the species known to occur in Alaska, or about 40% of the bird species found in North America. These birds are keying in on the abundance of foraging and breeding opportunities, whether migrating to northern Alaska to nest, or arriving in Southeast for the season. About one-third of the species that migrate through or breed in Southeast Alaska come from British Columbia and the Lower 48 states. Around one-quarter of the species winter in Central or South America. Year-long residents are just under one-fifth of Southeast Alaska's birds. Just over one-tenth of species spend winter in Southeast Alaska from areas farther north in Alaska. The rest are either Asiatics that are accidental to rare, or Oceanics that travel across the sea to forage in productive waters.

~ Melanie Smith



Milo Burcham

BIRDS MAPS INDEX

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BIRD SPECIES RICHNESS

Melanie Smith, Nils Warnock, and Iain Stenhouse

From the mountains to the sea, glacial moraines to forests, and rivers to muskegs, Southeast Alaska's diverse habitats host a high richness of bird species that come here from many parts of the world. The majority of species that migrate through or breed in Southeast Alaska, about a third (34%), come from British Columbia and the Lower 48 states. Around 25% of the species are neotropical migrants that spend winter in Central or South America. Resident birds make up 16%. About 12% of species spend winter in Southeast from areas farther north in Alaska. The rest are either Asiatics (7%) that are accidental to rare, or Oceanics (6%) that travel across the sea to forage in these productive waters (Armstrong and Hermans Undated-a).

Several sources have estimated the number of bird species that migrate, breed, overwinter, or forage in Southeast Alaska. This number increases over time due to the growth in number and distribution of observers, as well as the influence of changing weather and climate, which can boost the occurrence of accidental, non-Alaskan species.

A recent US Forest Service (USFS) publication on the Birds of the Major Mainland Rivers of Southeast Alaska (Johnson et al. 2008) recorded 211 species at 11 major transboundary and coastal mainland rivers. Impressively, in those river corridors alone, 128 known or suspected breeders constitute 50% of Alaska's statewide breeding avifauna, and 80% of Southeast Alaska's breeding species. Looking region-wide, Armstrong's 6th edition Guide to the Birds of Alaska (2015) includes 168 known or suspected breeding birds in the Southeastern Region (which included Dixon Entrance through Glacier Bay but not the Yakutat Forelands). This represents 56% of the 300 regularly occurring species in Alaska (Armstrong 2015).

Perhaps the earliest estimate of total bird richness was the 1978 publication Birds of Southeast Alaska: A Checklist which stated that "a total 384 species of birds have been found in Alaska. Of these, 278 have occurred in southeastern Alaska" (USDA Forest Service Alaska Region et al. 1978). Following a great increase in the number of observers birding around the state, 35 years later we know the total richness to be much higher. Birders and citizen scientists have played a great role in the discovery and documentation of bird distribution throughout Alaska through participation in such venues as the Christmas Bird Count, eBird, and rare bird announcement lists. The 21st edition of the Checklist of Alaska Birds includes 505 substantiated species accounts from across the entire state (Gibson et al. 2015), with 364 of those occurring in the Southeastern Region (Armstrong 2015).

TABLE 5-1 Species richness (including rare and accidental sightings) recorded in eBird checklists, by reporting area, through August 2015.

Reporting Area	Number Species Recorded	Number Check-lists Submitted
Juneau	314	29,351
Skagway-Hoonah-Angoon	284	7,911
Ketchikan Gateway	253	7,239
Prince of Wales-Outer Ketchikan	222	1,228
Wrangell-Petersburg	218	2,703
Sitka	205	1,766
Haines	197	1,391
Yakutat	194	301
All Combined	357	51,890

Based on eBird records, the Juneau area boasts the greatest species richness, and importantly the greatest number of observers reporting bird sightings. More than 29,000 eBird checklists for the Juneau reporting area have identified 314 species, including sightings of rare and accidental birds (eBird 2015) (see Table 5-1). Combined with data from the other seven reporting areas in the region, as of August 2015, 357 unique species have been reported in eBird from nearly 52,000 checklists submitted for Southeast Alaska (eBird 2015). Based on the Armstrong (2015) data, and eBird records (2015), bird occurrences in Southeast include 70% of the species in Alaska, or about 40% of the species in North America (US/Canada).

Milo Burcham

The Red-throated Loon nests in wetlands throughout Alaska and is identified on the Audubon Alaska WatchList as a Red List species, indicating it is a high priority for conservation.

TABLE 5-2 Summary of Audubon Alaska WatchList regularly occurring bird species in Southeast Alaska.

Red List	Yellow List
Red-throated Loon	Brant
Yellow-billed Loon	Queen Charlotte Goshawk
Black Scoter	Prince of Wales Spruce Grouse
American Golden-plover	Black Oystercatcher
Wandering Tattler	Short-billed Dowitcher
Surfbird	Whimbrel
Lesser Yellowlegs	Black Turnstone
Rock Sandpiper	
Dunlin	
Marbled Murrelet	
Kittlitz's Murrelet	
Aleutian Tern	
Varied Thrush	
Rusty Blackbird	
Olive-sided Flycatcher	

Milo Burcham

Rufous Hummingbirds migrate to Southeast Alaska for the summer season.

WATCHLIST SPECIES

Some of Alaska's numerous species rise to priority level for conservation based on consideration of habitat threats and population status. First published in 2002, and revised in 2005 and 2010, the Alaska WatchList is Audubon Alaska's science-based, early warning system to identify birds at risk (Kirchhoff and Padula 2010). It is a tool to focus attention and resources on vulnerable and declining bird populations across the state.

Audubon Alaska compiles the WatchList every few years by evaluating the vulnerability of each regularly occuring bird species (and select subspecies and populations) in the state. Drawing upon current data from a variety of sources, we consider four criteria: population size, population trend, range size, and percentage of the population dependent on Alaska habitats. Species and subspecies that are on the WatchList face some combination of population decline, small population size, or limited geographic range.

The list recognizes two levels of conservation concern. The Red List has the highest level of concern: species are vulnerable and currently declining, or depressed from a prior decline. The Yellow List is of somewhat lesser concern: species are vulnerable, but populations are either increasing, stable, or unknown.

Of the 22 WatchList species known to be regularly occuring in Southeast Alaska (see Table 5-2), 13 are known to breed in the region. Two of the WatchList species are loons; the Red-throated Loon (*Gavia stellata*) nests in wetlands throughout Alaska, including in Southeast (Gabrielson and Lincoln 1959), while the Yellow-billed Loon (*G. adamsii*) spends the winter foraging in marine waters in Southeast. The sole WatchList raptor, the Queen Charlotte subspecies of Northern Goshawk (*Accipiter gentilis laingi*), occurs in low densities throughout the coastal temperate rainforest of Southeast (Iverson et al. 1996a). The only gallinaceous bird on the WatchList in the region is the Prince of Wales subspecies of Spruce Grouse (*Falcipennis canadensis isleibi*). As its name indicates, it occurs only on Prince of Wales Island and nearby islands of the Alexander Archipelago (Dickerman and Gustafson 1996).

Of the shorebird species that are on the WatchList, four breed in Southeast Alaska, one is a potential breeder, and five have no records of breeding. Black Oystercatchers (*Haematopus bachmani*) are uncommon to common breeders (Armstrong 2015), laying eggs in close proximity to the tidal zone along rocky coastal areas. Lesser Yellowlegs (*Tringa falvipes*) and Short-billed Dowitchers (*Limnodromus griseus caurinus*), which rarely breed in the region, typically breed in bogs, muskegs, and other wetland timber tracts (Gabrielson and Lincoln 1959), although they can rarely be found breeding above timberline (Weeden 1960). Wandering Tattlers (*T. incana*), which are montane breeders that rarely nest in Southeast, are known to have nested in the Chilkat Pass area near Haines (Weeden 1960), near Skagway (Skagway Bird Club 2010), and potentially around Glacier Bay (Kessel and Gibson 1978). Surfbirds (*Aphriza virgata*) are rare to uncommon in Southeast Alaska during the breeding season with no known breeding records. Rock Sandpipers (*Calidris ptilocnemis ptilocnemis*), Black Turnstones (*Arenaria melanocephala*), and Dunlin (*C. alpina pacifica*) spend winter along the shores of Southeast, then head to coastal Western or Arctic Alaska for the breeding season. American Golden-Plovers (*Pluvialis dominica*) and Whimbrels (*Numenius phaeopus beringiea*) migrate through Southeast on their way to interior and northern Alaska.

There are two seabird species, both murrelets, that occur on Alaska's WatchList that breed in Southeast Alaska. Marbled Murrelets (*Brachyramphus marmoratus*) are widespread throughout the nearshore marine zone of Southeast, with nesting habitat in coastal old-growth forest (DeGange 1996). Kittlitz's Murrelets (*B. brevostris*) have a more clumped distribution, usually associated with rocky nesting habitats and silty, turbid waters near glaciers (Kissling et al. 2011).

Three final waterbird species are on the WatchList. Aleutian Terns (*Onychoprion aleuticus*) are uncommon coastal breeders in Southeast Alaska, extending from the north down to Dry Bay and Lituya Bay in Glacier Bay National Park and Preserve (Kessel and Gibson 1978). Black Scoters are uncommon marine foragers during the non-breeding season, and rare in the summer as most move north to breed near tundra lakes and ponds (Armstrong 2015). Brant (*Branta bernicla*) migrate through Southeast in spring on their way to the Arctic.

Of the landbirds on the WatchList, the Rusty Blackbird (*Euphagus carolinus*) is a formerly rare breeder in northern Southeast (Kessel and Gibson 1978, Armstrong 2015) but is not known to have nested recently (Gwen Baluss, Tongass National Forest, personal communication). Other WatchList breeding landbirds include the Olive-sided Flycatcher (*Contopus cooperi*), broadly distributed but uncommon (Kessel and Gibson 1978), usually nesting in open canopy spruce, with a preference for forest edges. More widely distributed throughout forest regions of Southeast is the Varied Thrush (*Ixoreus naevius*) (Armstrong 2015). While Varied Thrushes are not uncommon, the dense clustering of their breeding population in Southeast and the loss of mature forest habitat, especially in the Pacific Northwest, earns this species a place on the WatchList (Kirchhoff and Padula 2010).

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CONSERVATION ISSUES

Around the world, the greatest threat to bird populations is the fragmentation, degradation, and loss of habitat. Over the last century, such losses have often been driven by natural resource extraction, industrial development, and urban encroachment. These days, however, long-term, human-induced climate disruption is having additional dramatic effects on bird habitats at a global scale, especially in northern regions. Other threats to bird populations include pollution (i.e. marine oil spills and toxic contaminants), excessive harvest, introduced predators, and increased human disturbance.

In Alaska, natural ecosystems are still relatively intact and large portions of the landscape are protected in state and federal conservation units. Even in Alaska, however, there are serious concerns about future habitat loss, as natural resource development, habitat fragmentation, and other human influences intensify and expand into remote areas. Attempting to recover a species pushed to the brink of extinction is difficult, costly, and controversial. A far more effective approach is to work cooperatively with resource managers, land owners, industry, conservationists, and others to study, monitor, manage, and protect birds and their habitats before crises arise.

The wide variety of bird species that breed, forage, migrate, and winter across Alaska utilize a broad range of ecosystem types. Conservation planning for Southeast Alaska birds should therefore include representative habitats from these major ecosystem types, including old-growth forest, wetlands, riparian areas, estuaries, and alpine areas. At the regional scale, the richest areas are places where habitat diversity is high, such as the upper reaches of Lynn Canal or transboundary rivers where temperate rainforest and interior boreal influences come together. Also, recently deglaciated areas are suitable for some species otherwise only seen in interior Alaska (Gwen Baluss, Tongass National Forest, personal communication). Major transboundary river corridors, including the Chilkat, Taku, and Stikine rivers, are also hotspots of species richness and connect interior and coastal populations. The primary aims of the WatchList are to focus attention on at-risk populations and to encourage preventative action before they are in jeopardy of extinction.

Most watersheds in Southeast Alaska have not been systematically inventoried for landbird distribution and abundance; setting up a more thorough monitoring program is a first step in regional bird conservation. Conservation efforts should prioritize watersheds or biogeographic provinces where many species ranges overlap, where multiple life-history uses occur (e.g. breeding, migration, stop-over/staging, winter foraging) or places of particular importance to individual species, including Important Bird Areas (IBAs) and Western Hemispheric Shorebird Reserve Network (WHSRN) sites.

MAPPING METHODS

The Alaska Natural Heritage Program developed distribution models for each of 346 vertebrate species across Alaska. Gotthardt et al. (2013) provide details on the modeling process, including data sources and accuracy assessment. This map summarizes the results of these individual species models to show relative richness, calculated as the number of bird species predicted for each subwatershed in Southeast Alaska (HUC 12, or sixth level watershed).

There are certain limitations inherent to both observation data and the modeling process used by the Heritage Program. Because these models have much greater spatial resolution than other available continental-scale species distribution datasets, we utilized the data to depict species richness even though inaccuracy of some individual layers is known. Given these limitations, the information is most useful as a way to interpret broad ecological patterns and relationships. The results summarized on this map should be interpreted as a generalized representation of the relative level of species richness among province groups rather than exact species numbers.

Overall, these models predict 166 breeding bird species to be present in Southeast Alaska. Of these, 70 were passerines, 17 were raptors, 6 were seabirds, 15 were shorebirds, 23 were waterfowl, 21 were other waterbirds, and 14 were other birds.

Most environmentally sensitive areas (MESAs) were produced by the Alaska Department of Fish and Game (ADFG) (2001). As part of the ADFG's participation in the review of oil spill contingency plans, they identified MESAs along the Alaska coastline that could be impacted by a marine spill. ADFG states that these MESAs should not be considered a complete list of highly sensitive areas. Birding hotspots are from eBird (2015). Hotspots are public birding areas recommended by birders and approved by eBird staff. Shown here are the birding hotspot locations with 100 or more species reported through eBird checklists. These are the top 40 known birding locations in Southeast Alaska.

MAP DATA SOURCES

- Breeding bird species richness by province: Audubon Alaska (2014c) based on Gotthardt et al. (2013).
- Most environmentally sensitive areas: Alaska Department of Fish and Game Habitat and Restoration Division (2001)
- Birding hotspots: eBird (2015).

David Shaw

Red-breasted Sapsuckers breed in Southeast Alaska.

Audubon ALASKA

Breeding Bird Species Richness

From the mountains to the sea, glacial moraines to forests, and rivers to muskegs, Southeast Alaska's diverse habitats host a high richness of bird species that come here from many parts of the world. As of mid-2015, 364 species were known to occur in Southeast Alaska, including 168 known or suspected breeding species, which represent over half of the regularly occurring species in the state of Alaska. The majority of species that migrate through or breed in Southeast Alaska, about a third (34%), come from British Columbia and the Lower 48 states. Around 25% of the species are neotropical migrants that spend winter in Central or South America. Resident birds make up 16%. About 12% of species spend winter in Southeast Alaska from areas farther north in Alaska. The rest are either Asiatics (7%) that are accidental to rare, or Oceanics (6%) that travel across the sea to forage in productive waters.

Top 40 birding hotspots
(reporting over 100 species on eBird)[1]

Documented sensitive areas
(spring and fall concentrations)[2]

Number of breeding bird species predicted per watershed[3]

- 1 – 80
- 81 – 90
- 91 – 105
- 106 – 125
- 126 – 147

1. eBird 2015.
2. Alaska Department of Fish and Game 2001.
3. Audubon Alaska 2014c, based on Gotthardt et al. 2013a

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Map 5.1: Breeding Bird Species Richness

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IMPORTANT BIRD AREAS (IBAS)

Melanie Smith and Beth Peluso

Effective bird conservation requires identification of locations used by bird populations for key life history events including breeding, foraging, staging, and migration. Important Bird Areas (IBAs) are based on an established program to identify these essential habitats for birds (BirdLife International 2012b, National Audubon Society 2012). IBAs are designated using a rigorous set of scientific criteria, then reviewed by local and national committees of leading bird experts convened by Audubon.

IBAs may be a few acres or thousands of acres, but they are discrete sites that stand out from the surrounding landscape. For a place to qualify as an IBA, it must either support a large concentration of birds, provide habitat for a threatened or rare species, or provide habitat for a bird with a very limited or restricted range. Once nominated and selected as an IBA, a site is then ranked as significant at either the state, continental, or global level. The majority of Alaska's IBAs are recognized at the global level for including 1% or more of the global population of seabirds, or of the North American population for waterfowl and shorebirds.

Alaska's IBAs are part of a growing global network of designated IBAs, spanning 156 countries around the world. This international effort is led worldwide by BirdLife International and in the US by the National Audubon Society. Audubon Alaska has identified 208 IBAs in the state, more than three-quarters of which are globally significant. Alaska has more globally significant IBAs than any other US state, and almost half of all globally significant IBAs identified in the US. Southeast Alaska currently has 17 IBAs identified for 34 species. Of those, 2 are state-level and 15 are globally significant. Table 5-3 describes the location, size, and significant populations present in Southeast Alaska IBAs.

CONSERVATION SUMMARY

Ever-increasing human demands on natural resources have amplified the need to identify and conserve important ecosystem functions and habitat for birds. The goal of the IBA program is to conserve birds by identifying, monitoring, and protecting critical bird habitats. Because habitat loss is the most serious threat facing bird species across North America and around the world, Audubon's IBA program is a site-based initiative to address habitat loss through community-supported conservation. Globally, thousands of IBAs and millions of acres of avian habitat have received recognition and better protection as a result of the IBA program.

Some of Alaska's IBAs are publicly owned; some are privately owned; some are swaths of marine areas. In Alaska, conservation needs range from monitoring to education to legal protections. There are no explicit restrictions on human use or development attached to IBA designations. However, IBAs can provide a starting point for establishing legal protections, and IBA information can be utilized in regional to global applications, such as environmental assessments, designing best management practices, or broad-scale integrative spatial planning.

IBAs are places that are significant to the life history of many species that live in Southeast Alaska, and should be regarded as having high conservation priority.

MAPPING METHODS

Alaska's IBA network is a compilation of areas identified using a blend of methods. At-sea IBAs were established using an extensive database of at-sea survey data spanning over 30 years (Drew and Piatt 2013). We developed a standardized and data-driven spatial method for identifying globally significant marine IBAs across Alaska. To delineate these areas we developed a six-step process: 1) spatially binning data, and accounting for unequal survey effort; 2) filtering input data for persistence of species use; 3) analyzing data to produce maps representing a gradient from low to high abundance; 4) drawing core area boundaries around major concentrations based on abundance thresholds; 5) validating the results; and 6) combining overlapping boundaries into important areas for multiple species (Smith et al. 2014b).

We identified globally significant colony IBAs by analyzing an extensive colony catalog (World Seabird Union 2011). We used spatial analysis to group nearby colonies (e.g., on adjoining cliffs or islets) together into meta-colonies, in order to identify globally significant population groups (Smith et al. 2012).

Land IBAs and coast IBAs were identified by using expert-drawn boundaries around areas of known high concentration combined with GIS analysis of aerial survey data, employing similar methods to those described above (Smith et al. 2014a).

MAP DATA SOURCES

- Important Bird Areas: Audubon Alaska (2014a), Bird Studies Canada and Nature Canada (2004-2012)

Glacier Bay and Icy Strait is an Important Bird Area for more bird species than any other IBA in Southeast Alaska.

Erika Knight

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TABLE 5-3 Summary of recognized Important Bird Areas in Southeast Alaska.

Site Name	Priority	Type	Trigger Species[1]	Acres
Berners Bay	State	Coast	*State*: Bald Eagle, Surf Scoter, Thayer's Gull	24,300
Blacksand Spit Colony	Global	Colony	*Global*: Aleutian Tern	76,428
Chilkat Bald Eagle Preserve	State	Land	*State*: Bald Eagle, Trumpeter Swan	44,783
Dixon Entrance 132W54N	Global	At-Sea	*Global*: Ancient Murrelet, Marbled Murrelet; *State*: Rhinoceros Auklet	422,070
Forrester Island Colonies	Global	Colony	*Global*: Cassin's Auklet, Fork-tailed Storm-Petrel, Leach's Storm-Petrel, Rhinoceros Auklet; *State*: Glaucous-winged Gull, Pelagic Cormorant	130,465
Frederick Sound to Duncan Canal	Global	At-Sea	*Global*: Marbled Murrelet, *State*: Bonaparte's Gull	195,099
Glacier Bay & Icy Strait	Global	At-Sea	*Global*: Barrow's Goldeneye, Black Oystercatcher, Glaucous-winged Gull, Harlequin Duck, Kittlitz's Murrelet, Marbled Murrelet, Pigeon Guillemot, Surf Scoter, White-winged Scoter; *State*: Black-legged Kittiwake, Common Goldeneye, Common Merganser, Mew Gull	890,109
Glacier Bay Outer Coast Marine	Global	At-Sea	*Global*: Kittlitz's Murrelet, Marbled Murrelet, Pelagic Cormorant, White-winged Scoter; *State*: Herring Gull	648,930
Mendenhall Wetlands	Global	Coast	*Global*: Marbled Murrelet, Surfbird, Thayer's Gull; Continental: American Golden-Plover, Canada Goose, Rock Sandpiper, Short-billed Dowitcher; *State*: Pectoral Sandpiper	4,583
Outside Islands Marine	Global	At-Sea	*Global*: Marbled Murrelet, Rhinoceros Auklet, Pelagic Cormorant; *State*: Harlequin Duck	1,525,371
Sitka Sound	Global	At-Sea	*Global*: Marbled Murrelet, Pelagic Cormorant; *State*: Glaucous-winged Gull	337,649
St. Lazaria Island Colony	Global	Colony	*Global*: Fork-tailed Storm-Petrel, Leach's Storm-Petrel; *State*: Rhinocerous Auklet	76,428
Stephens Passage	Global	At-Sea	*Global*: Marbled Murrelet, Surf Scoter, White-winged Scoter; Continental: Pigeon Guillemot; *State*: Harlequin Duck, Mew Gull	558,241
Stikine River Delta	Global	Coast	*Global*: Marbled Murrelet, Western Sandpiper; Continental: Snow Goose; *State*: Bald Eagle, Sandhill Crane	67,973
Sumner Strait	Global	At-Sea	*Global*: Bonaparte's Gull, Marbled Murrelet	190,958
Tebenkof Bay	Global	At-Sea	*Global*: Marbled Murrelet	58,160
Yakutat Bay	Global	At-Sea	*Global*: Kittlitz's Murrelet; *State*: Glaucous-winged Gull, Herring Gull	562,565

[1]Trigger species are documented population concentrations significant at the global, continental, and/or state threshold levels within the IBA boundary.

Milo Burcham

White-winged Scoters have been documented in concentrations significant at the global level in the Glacier Bay & Icy Strait IBA, Glacier Bay Outer Coast Marine IBA, and Stephens Passage IBA.

Important Bird Areas (IBAs)

Audubon ALASKA

Effective bird conservation requires identification of locations used by bird populations for breeding, foraging, staging, and migration. Important Bird Areas (IBAs) are based on an established program that uses standardized criteria to identify essential habitats for birds. IBAs are defined as places that hold a significant proportion of the population of one or more bird species, as evidenced by documented, repeated observation of significant congregations in an area. Generally, IBAs are areas that hold 1% or more of the global, continental, or state population of a species.

ALTE = Aleutian Tern
AMGP = American Golden-Plover
ANMU = Ancient Murrelet
BAEA = Bald Eagle
BAGO = Barrow's Goldeneye
BLKI = Black-legged Kittiwake
BLOY = Black Oystercatcher
BOGU = Bonaparte's Gull
CAAU = Cassin's Auklet
CAGO = Canada Goose
COGO = Common Goldeneye
COME = Common Merganser
FTSP = Fork-tailed Storm-Petrel
GWGU = Glaucous-winged Gull
HADU = Harlequin Duck
HEGU = Herring Gull
KIMU = Kittlitz's Murrelet
LESP = Leach's Storm-Petrel
MAMU = Marbled Murrelet
MEGU = Mew Gull
PECO = Pelagic Cormorant
PESA = Pectoral Sandpiper
PIGU = Pigeon Guillemot
RHAU = Rhinoceros Auklet
ROSA = Rock Sandpiper
SACR = Sandhill Crane
SBDO = Short-billed Dowitcher
SNGO = Snow Goose
SURF = Surfbird
SUSC = Surf Scoter
THGU = Thayer's Gull
TRUS = Trumpeter Swan
WESA = Western Sandpiper
WWSC = White-winged Scoter

Globally Significant Colony[1]

Recognized Important Bird Area

Globally significant species

Continentally significant species

State-significant species

Underlined species are on the Audubon Alaska WatchList

1. Audubon Alaska 2014a.
2. Bird Studies Canada and Nature Canada 2004–2012.

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Map 5.2: Important Bird Areas (IBAs)

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MARINE BIRD COLONIES

Beth Peluso and Melanie Smith

The convoluted and often rocky shorelines of Southeast Alaska provide excellent habitat for colony-nesting seabirds: over 100 colonies scattered throughout the region provide nesting areas for more than 1.3 million birds (World Seabird Union 2011). Table 5-4 shows the estimated abundance and number of colonies for marine birds in the region.

The three most numerous species are Leach's Storm-Petrel (*Oceanodroma leucorhoa*), Rhinoceros Auklet (*Cerorhinca monocerata*), and Cassin's Auklet (*Ptychoramphus aleuticus*). The storm-petrels concentrate mainly in two large colonies: one on St. Lazaria Island about 20 miles from the town of Sitka, and the aptly named Petrel Island in the southern Tongass National Forest. Rhinoceros Auklets mainly nest on Forrester Island, near the northern edge of Dixon Entrance, and in another smaller colony on St. Lazaria Island. The vast majority of Cassin's Auklets in Southeast Alaska nest in colonies on the closely grouped Forrester, Petrel, and Lowrie Islands.

Colony-nesting seabird species are not evenly distributed, partly due to available habitats. Different species prefer different nesting habitats, resulting in several species sharing the same area but utilizing various niches. For example, Tufted Puffins (*Fratercula cirrhata*) usually dig burrows in soil, often at the tops of cliffs or steep slopes (Piatt and Kitaysky 2002). Common Murres (*Uria aalge*) search out ledges on craggy cliffs, preferring large, raucous colonies. On St. Lazaria Island, Common Murres further subdivide the space by selecting ledges that are wider and lower on the cliff than the similar Thick-billed Murres (*U. lomvia*), which also nest there (Ainley et al. 2002). Pigeon Guillemots (*Cepphus columba*) nest closer to the water, in lower cavities and boulder rubble, up to roughly 100 feet (30 meters) from the high water line. They tend to select small islands, and although they will nest in small colonies, pairs may nest separately from other guillemots (Ewins 1993), unlike the gregarious murres.

There are 123 mapped marine bird colonies in Southeast Alaska from Yakutat Bay to the Dixon Entrance. These colonies host an estimated 1.36 million breeding birds of 23 species. Pigeon Guillemots are present at the greatest number of colonies (64), followed by Glaucous-winged Gulls (*Larus glaucescens*) (54), Black Oystercatchers (49), Pelagic Cormorants (*Phalacrocorax pelagicus*) (29), and Arctic Terns (*Sterna paradisaea*) (28). The most abundant species are Leach's Storm-Petrels (784,000), Fork-tailed Storm-Petrels (*O. furcata*) (311,000), and Rhinoceros Auklets (110,000).

Three colonies in Southeast Alaska have over 100,000 birds present. The largest colony is located at Petrel Island with 714,000 birds estimated. Petrel Island is part of the Forrester Island Colonies IBA. Second in abundance is Forrester Island itself with 128,000 birds. In total, the Forrester Island IBA is a breeding site for 884,000 birds of 12 species at 5 colonies. Four species are present in this IBA in globally significant abundances: Leach's Storm-Petrel (577,000), Fork-tailed Storm-Petrel (111,000), Rhinoceros Auklet (108,000), and Cassin's Auklet (68,000).

The island with the third largest abundance is St. Lazaria, which is recognized as an IBA of global significance. St. Lazaria Island Colony IBA has globally significant populations of Leach's Storm-Petrel (203,000) and Fork-tailed Storm-Petrel (181,000). Blacksand Spit Colony is another colony IBA in Southeast for its significance to Aleutian Terns (*Onychoprion aleuticus*) (about 2,000 individuals).

CONSERVATION ISSUES

There are three globally significant colonies designated as IBAs in Southeast Alaska: Blacksand Spit, near Yakutat; St. Lazaria Island; and Forrester Island (Smith et al. 2012).

TABLE 5-4 Abundance of marine bird species at Southeast Alaska breeding colonies (World Seabird Union 2011).

Species	Abundance	Number of Colonies
Leach's Storm-Petrel	784,052	6
Fork-tailed Storm-Petrel	311,070	4
Rhinoceros Auklet	110,080	4
Cassin's Auklet	68,800	5
Common Murre	27,274	7
Tufted Puffin	17,725	20
Glaucous-winged Gulls	14,299	54
Black-legged Kittiwake	6,709	14
Arctic Tern	3,969	28
Pigeon Guillemot	3,812	64
Pelagic Cormorant	3,110	29
Herring Gull	2,186	7
Aleutian Tern	2,131	6
Thick-billed Murre	2,000	1
Ancient Murrelet	1,700	2
Unidentified Cormorant	1,458	2
Mew Gull	914	15
Unidentified Murre	737	1
Black Oystercatcher	379	49
Unidentified Gull	271	2
Horned Puffin	267	15
Double-crested Cormorant	228	3
Brandt's Cormorant	80	1
Northern Fulmar	30	1
Parakeet Auklet	30	1
Caspian Tern	16	1
Total	1,363,327	123

Blacksand Spit IBA supports one of the largest known nesting colonies of Aleutian Terns in the world (Yakutat Tern Festival 2011). Between 1,000–2,000 Aleutian Terns nest there, although historically the number was closer to 3,000. Although that number seems small compared to the hordes of storm-petrels, it represents a significant percentage of the world population for this species (12%) and is the largest Aleutian Tern colony in Alaska. This colony appears stable, although other populations in the state seem to be declining (Oehlers et al. 2009). The terns are ground nesters, so are very susceptible to human disturbance and may abandon eggs or chicks. The Blacksand Spit IBA is managed by the USFS, but has no special conservation status. In 2011, USFS personnel and other local sponsors teamed up to build awareness of the unique nature of this area through the now-annual Yakutat Tern Festival, which occurs in late May or early June. Protecting the Blacksand Spit nesting area from disturbance and development merits consideration, due to its importance to Aleutian Terns.

MAP ON PAGE 119

Nils Warnock

The rocky shorelines of Southeast Alaska provide habitat for colony-nesting birds such as these Common Murres on St. Lazaria Island.

St. Lazaria Island is designated Wilderness, part of the Alaska Maritime National Wildlife Refuge managed by the US Fish and Wildlife Service (USFWS). Because of the high number of burrow-nesting birds such as Rhinoceros Auklets, storm-petrels, and Tufted Puffins, the only people allowed on the island are part of a small research team. However, this volcanic island is surrounded by deep and accessible waters, and small tour boats may easily view the birds from just offshore (Alaska Department of Fish and Game 2015b).

Forrester Island IBA lies within the Alaska Maritime National Wildlife Refuge and is designated Wilderness managed by the USFWS (U.S. Fish and Wildlife Service 2013). This IBA encompasses five seabird colonies, including Petrel Island, with an estimated total of more than 880,000 birds of 12 species. This is an IBA for an astonishing estimated 44,400 Cassin's Auklets, 108,000 Rhinoceros Auklets, 111,000 Fork-tailed Storm-Petrels, and 576,000 Leach's Storm-Petrels.

Conservation concerns for seabird colonies in Southeast Alaska include commercial fisheries and climate change, which may affect the availablity of forage fish.

Although some colonies with large bird populations are obvious conservation targets, others with only several hundred birds are also important, depending on the sensitivity of the species. Some species may have few breeding sites in Alaska or low population numbers. All colonies depicted on this map should be protected from human disturbance and development.

MAPPING METHODS

The North Pacific Seabird Data Portal is part of the Seabird Information Network published by the World Seabird Union. This portal contains data depicting seabird colony locations, species, and populations across Alaska. Statewide, these colonies range in size from a few individuals to several million birds. Surveyors recorded the abundance of each species present at each colony by counting the number of individuals, nests, or pairs. The database reports the best estimate made for that colony based on one or more site visits. We eliminated older (pre-1971), poor, or questionable records, resulting in a total of 1640 seabird colonies statewide (World Seabird Union 2011, Smith et al. 2012). Finally, we added an additional dataset of 23 colonies observed by the USFS (Baluss 2015a) and aggregated abundance in the same manner as above.

This map shows the proportion of birds in each of four general categories, listed here from highest to lowest proportion: alcids—Rhinoceros Auklet, Cassin's Auklet, Common Murre, Tufted Puffin, Pigeon Guillemot, Thick-billed Murre, Ancient Murrelet (*Synthliboramphus antiquus*), Unidentified Murre, Horned Puffin (*Fratercula corniculata*), and Parakeet Auklet (*Aethia psittacula*); gulls/terns—Glaucous-winged Gull, Black-legged Kittiwake (*Rissa tridactyla*), Arctic Tern, Aleutian Tern, Herring Gull (*L. argentatus*), Mew Gull (*L. canus*), Unidentified Gull, and Caspian Tern (*Hydroprogne caspia*); Storm-petrels—Leach's Storm-Petrel and Fork-tailed Storm-Petrel, and cormorants/other—Pelagic Cormorant, Unidentified Cormorant, Black Oystercatcher, Double-crested Cormorant (*P. auritus*), Brandt's Cormorant (*P. penicillatus*), and Northern Fulmar (*Fulmarus glacialis*). Sizes of the pie charts were calculated using a modified log transformation to represent the relative number of birds per colony.

MAP DATA SOURCES

- Colonies: Audubon Alaska (2014a), based on World Seabird Union (2011); Baluss (2015a)

Audubon ALASKA

Marine Bird Colonies

The convoluted and often rocky shorelines of Southeast Alaska provide excellent habitat for colony-nesting seabirds. There are 123 mapped marine bird colonies in Southeast Alaska from Yakutat Bay to the Dixon Entrance. These colonies host an estimated 1.36 million breeding birds of 23 species. The three most numerous species are Leach's Storm-Petrel, Rhinoceros Auklet, and Cassin's Auklet. Three colonies in Southeast Alaska have over 100,000 birds present: Petrel Island, Forrester Island, and St. Lazaria Island.

Yakutat
Alsek River
Tatshenshini R.
Haines Hwy
Klondike Hwy
Tagish Lake
Chilkat R.
Skagway
Haines
Atlin Lake
Mt. Fairweather
Fairweather Mountains
Icy Strait
Lynn Canal
Taku River
Juneau
Whiting River
CHICHAGOF ISLAND
Chatham Strait
Stephens Passage
ADMIRALTY ISLAND
CANADA
UNITED STATES
Coast Mountains
Sealion Islands
Sitka
BARANOF ISLAND
Frederick Sound
Stikine River
Cassiar Hwy
KUIU ISLAND
KUPREANOF ISLAND
Petersburg
Iskut River
Unuk River
St. Lazaria Island
Pacific Ocean
Wrangell
Sumner Strait
ZAREMBO ISLAND
WRANGELL ISLAND
ETOLIN ISLAND
Hazy Islands
PRINCE OF WALES ISLAND
Clarence Strait
REVILLAGIGEDO ISLAND
Timbered Island
Craig
Ketchikan
Lowrie Island
Metlakatla
Forrester Island
Petrel Island
UNITED STATES
CANADA
Dixon Entrance
Prince Rupert

Colony Important Bird Area[1]
Colony Data:[2, 3]
Alcid
Gull/Tern
Storm-petrel
Cormorant/Other
‹ 100 Birds
100–999 Birds
1,000–9,999 Birds
10,000–99,999 Birds
›=100,000 Birds

1. Audubon Alaska 2014a.
2. World Seabird Union 2011.
3. Baluss 2015a.

N
0 50 miles
0 50 km

Map 5.3: Marine Bird Colonies

MAP ON PAGE 122

MARBLED MURRELET

Matt Kirchhoff

The Marbled Murrelet (*Brachyramphus marmoratus*) is a small seabird that nests on moss-covered boughs in the canopy of old-growth trees. Because of this nesting preference, the species range largely parallels that of the north temperate rainforest, from northern California, through Oregon, Washington ,and British Columbia, to Southeast and Southcentral Alaska (Nelson 1997). The substantial loss of old-growth forest due to logging is a major contributing factor for murrelet population declines in the Lower 48 states. There, the Marbled Murrelet is listed as a threatened species under the Endangered Species Act.

In Alaska, the Marbled Murrelet is still quite abundant (Agler et al. 1998), and is by far the most common alcid seen in nearshore waters during the summer. The species center of abundance is in Southeast Alaska, with especially high numbers found in summer in the archipelago's northern straits and passages, including Icy Strait and Glacier Bay (Fair 2014). This area attracts birds from long distances for the rich foraging opportunities (Whitworth et al. 2000).

Marbled Murrelet populations in at least some areas of Southeast Alaska appear stable (Kirchhoff et al. 2010), although populations elsewhere in the species range are declining (Piatt et al. 2007, Falxa et al. 2014). The last region-wide survey estimated the Southeast Alaska population at 687,061 ± 201,162 (95% CI) in summer 1994 (Agler et al. 1998). Because of its unique association with old growth forests, and declining population trend, the Marbled Murrelet is a species of conservation concern at statewide, national, and international levels (Butcher et al. 2007, Kirchhoff and Padula 2010, BirdLife International 2012a).

Twenty years ago, areas of marine concentration in Southeast Alaska were mapped in a general way based on observations of commercial fisherman (DeGange 1996), and were believed to reflect both important marine foraging areas as well as proximity to high-quality nesting habitat. More recently, as depicted in the marine portion of the associated map, Smith et al. (2014b) utilized at-sea survey data to map and quantify nearshore abundance of Marbled Murrelets. These data were used to identify species core areas and to nominate globally significant IBAs.

The land portion of the associated map shows the distribution and quality of Marbled Murrelet nesting habitat, based on old-growth and topographic features that appear positively correlated with occupancy and nesting success in this species (Albert and Schoen 2007). Most of this understanding was derived from studies of radio-tagged birds in the Pacific Northwest and British Columbia, although recent studies in Southeast Alaska (Barbaree et al. 2014) are shedding light on inland ground nest sites in this region as well.

Because the birds nest in tall trees, and many kilometers inland, nests have been historically hard to find. The first nest was described in 1974. With the development of effective capture techniques on the water, and advent of miniaturized radio-transmitters to track birds inland, approximately 260 nests had been found in North America by 2006 (Denlinger 2006).

Most nests in the Pacific Northwest have been found within 30 km of the sea and very few farther than 50 km inland (Hamer and Nelson 1995). Marbled Murrelets generally prefer low elevation old-growth and mature coniferous forests with multi-layered canopies, on the lower two-thirds of forested slopes, with moderate gradients (Hamer and Nelson 1995). Stand canopy closure is typically low at nest sites, suggesting the birds use canopy openings for access to nest platforms. Nests in the Pacific Northwest were typically found in the largest diameter old-growth trees available in a stand (Hamer and Nelson 1995).

Milo Burcham

Marbled Murrelets often forage in pairs within a mile of the shore. Commonly, two individuals will pair up during the day; the joint effort appears to help with safety from predators and efficiency in catching prey.

In British Columbia, murrelets preferred to nest at elevations below 2625 ft (800 m) (Burger 2004). Marbled Murrelets do nest on steep slopes, and in some studies, nest success has been positively correlated with steeper slopes (Bradley 2002), which may facilitate access into and out of the canopy. Aspect does not appear to have a strong effect on the placement or success of nests in Britsh Columbia (Burger 2004) or elsewhere.

Until recently, very few nests had been described in Southeast Alaska (Quinlan and Hughes 1990). A study conducted between 2005 and 2007 in Port Snettisham on the Southeast Alaska mainland located 19 nests (Nelson and Newman 2009), of which 8 were in trees, 5 were on the ground (on cliffs), and 6 were uncertain. All were in old forests (typical of the area) and along steep cliff areas with a wide range of aspects, elevations, and distances from the coastline. Two nests were found in Canada, >50 km inland (Nelson and Newman 2009).

In Southeast Alaska, Marbled Murrelets appear to use a wider range of habitat types for nesting than in the Pacific Northwest and British Columbia. Alaska birds have access to abundant, high-quality forage fish, making long flights to relatively distant nest sites energetically feasible. Steeper topography and wetter climate in Southeast Alaska may increase availability of suitable moss nest platforms on the ground in cliffy terrain that is also well inland from shore where predation risks are reduced.

CONSERVATION ISSUES

The species is currently listed in the Lower 48 states as a threatened species under the Endangered Species Act. Populations in the Lower 48 states are declining, presumably as a result of diminishing old-growth nesting habitat and increased predation on eggs and chicks. Similar pressures exist in Southeast Alaska, although old-growth forest in Southeast Alaska is still relatively abundant, and Marbled Murrelets in Alaska may have a lesser dependence on old-growth trees for nesting than birds in the Lower 48 (Barbaree et al. 2014).

Threats to these birds include loss of old-growth nesting habitat due to logging, depredation by gulls and corvids, by-catch in nearshore drift gill nets, and declines in key forage fish species. The species marine distribution overlaps spatially with drift gillnets in local salmon fishing areas in Southeast Alaska, and mortality from by-catch can be significant (Carter et al. 1995).

MAP ON PAGE 122

Conservation needs include protection of important nesting habitat from clearcut logging, and increased monitoring of population trends, especially in southern Southeast Alaska where clearcut logging is more intensive. Perhaps more importantly, scientists have documented crashes in prey fish populations and predict that ocean warming and acidification could cause further prey fish declines in the future. Gaining a better understanding of prey fish response to warming oceans could allow managers to better prepare for Marbled Murrelet conservation needs in a changing climate (Norris et al. 2007).

MAPPING METHODS

An interagency and university group of experts (including ADFG, Audubon, The Nature Conservancy (TNC), University of Alaska Fairbanks (UAF), USFS, and USFWS) was convened to develop and evaluate a nesting habitat capability model based on data from Alaska and British Columbia. This model was based on stand age, forest structure, slope, and distance from shoreline. Old-growth forests have the highest habitat value because they include canopy gaps that are thought to provide murrelets access to nest platforms. Large-tree old-growth was assigned higher value than medium- and small-tree old-growth because larger trees are easier to access and have larger limbs for nest platforms. Younger stands are considered not suitable because of the relatively dense, uniform canopies, lack of large-diameter branches, and limited nest platform structures. Assignment of forest structure classes was based on the USFS TIMTYPE (timber type) database.

Nesting habitat value increased with slope steepness up to 20 degrees, assuming that the upper crown of trees on such slopes is more exposed, and therefore more accessible to nesting murrelets and fledging young. The final habitat attribute is distance from shoreline: Marbled Murrelets do not nest immediately near the shore; they have been found to fly as far as 30 mi (50 km) inland to nest sites, presumably due to the increased numbers of avian predators found along the beach fringe. The murrelet model assigned a low value to beach fringe habitat, defined as from the coastline out to 984 ft (300 m), and high value beyond that distance.

The nesting habitat capability model was developed for inclusion in the 2007 Audubon-TNC Conservation Assessment. More recent analyses (Nelson and Newman 2009) have found that, in addition to the habitat predicted by this model, Marbled Murrelets also use habitat along cliff edges for nesting.

This map depicts habitat predicted by the nesting habitat capability model, as well as the top-ranked nesting habitat watershed in each biogeographic province.

TABLE 5-5 Values applied to habitat variables for the Marbled Murrelet nesting habitat suitability index model.

Variable	Habitat Type	Suitability Index
Forest Stand Age Class	<150 years	0.00
	>=150 years	1.00
Tree Size	Small POG*	0.50
	Medium POG	0.75
	Large POG	1.00
Slope	0-5	0.20
	5-10	0.40
	10-15	0.60
	15-20	0.80
	>20 degrees	1.00
Distance from shoreline	<984 feet (300m)	0.30
	>=984 feet (300m)	1.00

*POG = productive old growth

The map also includes IBA boundaries from Audubon's recent revision of IBAs statewide (Smith et al. 2014a, Smith et al. 2014b). Because IBAs often include combined core areas for multiple species, the specific core areas for Marbled Murrelets are also shown on the map. These core areas are based on Audubon's analysis of at-sea survey data (Smith et al. 2014b) and are an intermediate step toward IBA identifiation. Individual observations are also included to show the known distribution of the species throughout Southeast Alaska.

MAP DATA SOURCES

- Marbled Murrelet nesting habitat suitability index model: Albert and Schoen (2007)
- Marbled Murrelet marine core areas: Audubon Alaska (2014b)
- Important Bird Areas: Audubon Alaska (2014a).

Adult Marbled Murrelet on a nest in the top of an old-growth hemlock on Baranof Island.

Jeff Hughes

Marbled Murrelet

Audubon ALASKA

The Nature Conservancy

The Marbled Murrelet is a small seabird that nests on moss-covered boughs in the canopy of old-growth trees. Because of this nesting preference, the species range largely parallels that of the north temperate rainforest, from northern California, through Oregon, Washington and British Columbia, to Southeast and Southcentral Alaska. Because of its unique association with old growth forests, and declining population trend, the Marbled Murrelet is a species of conservation concern and is listed as threatened under the Endangered Species Act in the Lower 48 states. Conservation needs include protection of important nesting habitat from clearcut logging, and increased monitoring of population trends, especially in southern Southeast Alaska where clearcut logging is more intensive.

Marbled Murrelet priority watershed (#1 ranked in province based on suitable habitat quality)[1]

Marbled Murrelet core area[2]

Globally Important Bird Area including Marbled Murrelet[3]

Murrelet Habitat Suitability Score[1]

0.1 – 3

3.1 – 10

10.1 – 30

25.1 – 90

1. Albert and Schoen 2007.
2. Audubon Alaska 2014b.
3. Audubon Alaska 2014a.

N

0 50 miles

0 50 km

Map 5.4: Marbled Murrelet

MAP ON PAGE 125

KITTLITZ'S MURRELET

Matt Kirchhoff

The Kittlitz's Murrelet (*Brachyramphus brevirostris*) is a small seabird in the auk (Alcidae) family. The family is found only in the upper latitudes of the northern hemisphere, possibly due to the advantages that cold water affords to divers who must pursue poikilothermic (cold-blooded) prey (Gaston 2004).

The global distribution of the Kittlitz's Murrelet at sea is extensive, from the Russian Far East (northern Okhotsk Sea, Bering Sea coast, and coast of the Chukchi Sea), across the Aleutians, and Gulf of Alaska, to the inshore waters of Southcentral and Southeast Alaska (Day et al. 1999, Artukhin et al. 2011). Despite a wide distribution at sea during most of the year, in the summer breeding season, many birds move into nearshore waters to nest, with the highest concentrations found in association with tidewater glaciers along the southern Alaska coastline (Day et al. 1999, Kissling et al. 2011, Kuletz et al. 2011, Piatt et al. 2011).

In Southeast Alaska, the bird is found in summer in glacially influenced waters of the northern mainland, including Tracy-Endicott Arm, Cross Sound, Yakutat Bay, and Glacier Bay (Kissling et al. 2011, Piatt et al. 2011). The largest single known population of breeding birds occurs in Glacier Bay, where surveys have reported up to 18,000 birds, representing an estimated 18 to 36% of the global population (Kirchhoff et al. 2014). Glacier Bay adjoins the Tongass National Forest, and is part of the Glacier Bay National Park and Preserve.

Our understanding of why the Kittlitz's Murrelet has evolved to prefer glaciated systems is incomplete, but part of the attraction is certainly the availability of relatively inaccessible, predator-free nesting habitat in recently deglaciated landscapes. This is especially critical to the Kittlitz's Murrelet, which, in contrast to typical seabirds, nests solitarily, laying a single egg in an exposed scrape on the ground (Day et al. 1999). Until 1999, only 19 nests of this species had been discovered (US Fish and Wildlife Service 2013). Since that time, focused research on the species has yielded over 200 nests, mostly in nonglaciated settings (Kodiak Island, Aggatu Island, Attu Island). In all areas, Kittlitz's Murrelets consistently nest in the least vegetated areas available on the landscape (US Fish and Wildlife Service 2013). These sparsely vegetated sites tend to occur at the highest elevations and on the steepest sites, and offer the greatest security from terrestrial predators.

Nesting success for this species can be low, and is a suspected cause of local population declines (e.g. Kissling et al. 2015). Because the species is relatively long-lived (assumed to be approximately 15 years), adult birds are able to make multiple nesting attempts during their lifetime. Weather conditions and marine productivity may combine to facilitate episodic breeding success in this species.

The distribution and reproductive success of seabirds, as a group, is closely tied to the productivity of their marine environment (Gaston 2004). Breeding success is highest in areas, and years, of high productivity in the ocean. There is mounting evidence that glacial systems, like those in Southeast Alaska, provide unusually high levels of dissolved organic carbon (DOC) into marine systems (Hood and Scott 2008, Hood et al. 2009). Summer-long input of nutrients, and cold, fresh water, fuels unusually high levels of productivity in some glacial estuaries (Etherington et al. 2007) and may provide cold-water refugium for important forage fish species, like capelin (*Mallotus villosus*) (Arimitsu et al. 2008) that are important to seabirds.

CONSERVATION ISSUES

The Kittlitz's Murrelet is a species of conservation concern featured on both the Audubon Alaska and National Audubon WatchLists. The International Union for Conservation of Nature and Natural Resources (IUCN) currently has the species listed as near threatened, having down-listed it in 2014 from critically endangered (BirdLife International 2014). In October 2013, the USFWS issued a 12-month finding on a petition to list the species under the Endangered Species Act. They determined listing the species as endangered or threatened was not warranted at that time (US Fish and Wildlife Service 2013).

Milo Burcham

Kittlitz's Murrelet's have a larger eye than other similar species, making them better adapted to foraging in silty water near glaciers.

MAP ON PAGE 125

The species is of concern because of its relatively small population size (<100,000), declining trend in some areas, and because most of the world's population is associated (during summer) with glacially influenced habitats that are undergoing relatively rapid change. The number of birds counted in surveys is 33,538 (US Fish and Wildlife Service 2013), although this is a conservative estimate for the global population, given that large areas were not surveyed or incompletely surveyed. Further, the species is difficult to accurately and precisely survey (Kissling et al. 2007, Kirchhoff 2011), and differences in survey methods and designs have confounded interpretation of survey results, particularly those from early years (Day 2011, Hodges and Kirchhoff 2012, Kirchhoff et al. 2014). The total population may in fact number 48,000 to 82,000 (BirdLife International 2014). Because of these uncertainties, this is a species that should continue to be monitored closely.

Principle threats to Kittlitz's Murrelets are associated with changes in its nesting and foraging habitat, especially along the glaciated southern coast of Alaska. The loss of ice may initially benefit the species by adding suitable nest substrate and enhancing marine productivity. But the loss of ice altogether would eventually result in the disappearance of much of the bird's traditional nesting habitat (or make it very distant from water). Reduction in ice could also significantly reduce the productivity of the marine ecosystem. Other threats that may affect local populations include water pollution, disease, predation, vessel traffic, and drift-net bycatch. The USFWS (2013) concluded that no one threat was likely to have the population-level, rangewide effect sufficient to warrant listing; however, the agency acknowledged that exposure to one or more of these threats could have negative impacts on local populations.

Conservation actions in the future include continued monitoring to reveal declining population trends and identifying factors responsible for those declines. If cruise ship traffic or drift gillnet bycatch is shown to be driving declines, those activities could be regulated.

MAPPING METHODS

This map includes two different sources:

- Point data representing observed locations of Kittlitz's Murrelets from the North Pacific Pelagic Seabird Database (Drew and Piatt 2013).
- IBA boundaries from Audubon's recent revision of IBAs statewide (Smith et al. 2014a, Smith et al. 2014b). Because IBAs often include combined core areas for multiple species, the specific core areas for Kittlitz's Murrelets are also shown. These core areas are based on Audubon's analysis of at-sea survey data (Smith et al. 2014b) and are an intermediate step toward IBA identifiation.

MAP DATA SOURCES

- Kittlitz's Murrelet at-sea observations: Drew and Piatt (2013)
- Kittlitz's Murrelet marine core areas: Smith et al. (2014b)
- Important Bird Areas: Smith et al. (2014a).

Milo Burcham

Audubon ALASKA

Kittlitz's Murrelet

The Kittlitz's Murrelet is a small seabird in the auk (Alcidae) family. The global distribution of the Kittlitz's Murrelet at sea is extensive, from the Russian Far East, across the Aleutians and Gulf of Alaska, to the inshore waters of Southcentral and Southeast Alaska, yet its global population size is relatively small (<100,000 birds). The largest single known population of breeding birds occurs in Glacier Bay, where surveys have reported up to 18,000 birds. The species is of concern because most of the world's population is associated (during summer) with glacially influenced habitats that are undergoing relatively rapid change.

Yakutat
Alsek River
Tatshenshini R.
Haines Hwy
Klondike Hwy
Tagish Lake
Chilkat R.
Skagway
Haines
Atlin Lake
Mt. Fairweather
Fairweather Mountains
Lynn Canal
Taku River
Juneau
Whiting River
CHICHAGOF ISLAND
ADMIRALTY ISLAND
Chatham Strait
Stephens Passage
CANADA
UNITED STATES
Coast Mountains
Sitka
BARANOF ISLAND
Frederick Sound
Stikine River
Cassiar Hwy
KUIU ISLAND
KUPREANOF ISLAND
Petersburg
Iskut River
Unuk River
Pacific Ocean
Sumner Strait
Wrangell
ZAREMBO ISLAND
WRANGELL ISLAND
ETOLIN ISLAND
PRINCE OF WALES ISLAND
Clarence Strait
REVILLAGIGEDO ISLAND
Craig
Ketchikan
Metlakatla
UNITED STATES
CANADA
Dixon Entrance
Prince Rupert

Kittlitz's Murrelet observation[1]

Kittlitz's Murrelet core area[2]

Globally Important Bird Area including Kittlitz's Murrelet[3]

1. Drew and Piatt 2013.
2. Audubon Alaska 2014b.
3. Audubon Alaska 2014a.

N

0 50 miles
0 50 km

Map 5.5: Kittlitz's Murrelet

MAP ON PAGE 128

SHOREBIRDS

Nils Warnock and Melanie Smith

Each spring, millions of shorebirds visit Southeast Alaska. Most are migrating to northern Alaska to breed and forage in wetlands rich in algae, aquatic plants, crustaceans, mollusks, and insects (Armstrong and Hermans Undated-b). Several common species stay in Southeast Alaska to breed, including Semipalmated Plover (*Charadrius semipalmatus*), Black Oystercatcher (*Haematopus bachmani*), Greater and Lesser Yellowlegs (*Tringa melanoleuca* and *T. flavipes*), Spotted Sandpiper (*Actitis macularius*), Least Sandpiper (*Calidris minutilla*), Short-billed Dowitcher (*Limnodromus griseus*), Wilson's Snipe (*Gallinago delicata*), and Red-necked Phalarope (*Phalaropus lobatus*) (Armstrong 2015). These birds rely on high-density food resources of amphipods, worms, and small clams. Food resources are especially high in the Stikine River Delta and the Mendenhall Wetlands where studies have estimated up to 20,000 amphipods and/or hundreds of thousands of tiny worms in a single cubic meter of mud; some sandpipers can eat 30,000 amphipods per day (Armstrong and Hermans Undated-b).

Of the 45 confirmed species of shorebirds that occur in Southeast Alaska, 16 are listed as common at some point in the year (Armstrong 2015), while 11 species are considered breeders, and 2 are probable breeders. Eighteen species that have been confirmed in Southeast Alaska are listed as High Priority in the Alaska Shorebird Conservation Plan (Alaska Shorebird Group 2008), while 16 species are on Audubon Alaska's WatchList (Table 5-6). Five shorebird species that are on the Audubon Alaska WatchList breed in Southeast.

Black Oystercatcher, Greater Yellowlegs, Spotted Sandpiper, and Semipalmated Plover are fairly common breeders and widely distributed through Southeast, although with differences in breeding habitats (Heinl 2010, Armstrong 2015). The oystercatchers breed in close proximity to the tidal zone along rocky, coastal areas while the Greater Yellowlegs typically breed in bogs, muskegs, and other wetland timber tracts (Gabrielson and Lincoln 1959). Yellowlegs can also rarely be found breeding above timberline (Weeden 1960). Spotted Sandpipers and Semipalmated Plovers breed on gravel or grass along the shores of rivers, streams, and lakes (Armstrong 2015).

Southeast Alaska supports between 1,000 to 2,000 Black Oystercatchers (out of a global population of 6,900 to 10,800), with highest concentrations in and around Glacier Bay (Tessler et al. 2010). The largest concentrations of migrant shorebirds in Southeast Alaska occur at coastal estuaries, with highest numbers usually in the spring. The most abundant spring species are Western Sandpiper (*Calidris mauri*), Dunlin (*Calidris alpina*), and Short- and Long-billed Dowitchers (*L. griseus* and *L. scolopaceus*) (Andres and Browne 1998). The only common shorebird found in the region in the winter is the Rock Sandpiper (*Calidris ptilocnemis*) (Armstrong 2015), although other species like Black Turnstone (*Arenaria melanocephala*), Dunlin, Black Oystercatcher, and Surfbirds (*Aphriza virgata*) occur with regularity.

CONSERVATION ISSUES

Three sites in Southeast Alaska are known to be of particular importance to migrant shorebirds (Alaska Shorebird Group 2008). The highest numbers of migrant shorebirds occur at the Stikine River Delta. In late April to early May, Western Sandpiper numbers peak on the Stikine tidal flats at about 350,000 birds, accompanied by many thousands of other birds of up to 22 species, including Dunlin and dowitchers (Iverson and Walsh 1994, Iverson et al. 1996b, Johnson et al. 2008).

The Delta is a globally significant IBA for Western Sandpiper, and qualifies for status as a Western Hemispheric Shorebird Reserve Network (WHSRN) site, but has not been officially designated.

Not far behind in terms of numerical importance to springtime migrating shorebirds is the Yakutat Forelands, especially at the Seal Creek-Ahrnklin estuary. Andres and Browne (1998) estimated over 350,000 shorebirds, mainly Western Sandpipers, Dunlin, Least Sandpipers, and dowitchers, moved through the area during spring migration. Yakutat Forelands qualifies as a WHSRN site for high numbers of migrating Marbled Godwits (*Limosa fedoa*).

Having lower bird abundance, but of critical importance to a high number of species of shorebirds, is the Mendenhall Wetlands (Armstrong et al. 2009). Western Sandpipers are the most abundant spring migrant at Mendenhall, but the wetlands support significant numbers of other species during fall migration and in winter as well. Notably, single day counts of over 2,000 Surfbirds have occurred there (Armstrong et al. 2009). Mendenhall Wetlands is therefore a globally significant IBA, triggered by the large numbers of migrating Surfbirds; a continentally significant abundance of migrating American Golden-Plovers (*Pluvialis dominica*) and Short-billed Dowitchers, and wintering Rock Sandpipers; and state-significant numbers of migrating Pectoral Sandpipers (*Calidris melanotos*).

MAPPING METHODS

The Alaska Natural Heritage Program developed distribution models for each of 346 vertebrate species across Alaska. Gotthardt et al. (2013) provide details on the modeling process, including data sources and accuracy assessment. This map summarizes the results of these

Milo Burcham

Dunlin.

Milo Burcham

Red-necked Phalarope.

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TABLE 5-6 Shorebird species known to occur in Southeast Alaska. Birds in bold are fairly common to common at some time during the year.

Species	Special Status[8]	Breeder?	Species	Special Status[8]	Breeder?
Black-bellied Plover			Red Knot	RL, AS	
European Golden-Plover[1]			Red-necked Stint[2]		
American Golden-Plover	RL, AS		Sanderling	AS	
Pacific Golden-Plover			Semipalmated Sandpiper		
Semipalmated Plover		yes	**Western Sandpiper**	AS	
Killdeer		yes	Long-toed Stint[2]		
Black Oystercatcher	RL, AS	yes	**Least Sandpiper**		yes[9]
American Avocet[2]			White-rumped Sandpiper[5]		
Greater Yellowlegs		yes	Baird's Sandpiper		
Lesser Yellowlegs	RL, AS	yes	**Pectoral Sandpiper**		
Solitary Sandpiper	RL, AS	yes[9]	Sharp-tailed Sandpiper		
Wandering Tattler[3]	RL	yes[9]	**Rock Sandpiper**		
Spotted Sandpiper		yes	**Dunlin**	RL, AS	
Upland Sandpiper	AS		Curlew Sandpiper[7]		
Whimbrel	YL, AS		Stilt Sandpiper		
Bristle-thighed Curlew[4]	YL, AS		Buff-breasted Sandpiper[5]	RL, AS	
Long-billed Curlew[2]			Ruff[5]		
Bar-tailed Godwit[5]	RL, AS		**Short-billed Dowitcher**	RL, AS	yes
Hudsonian Godwit[6]	RL, AS	yes[9]	Long-billed Dowitcher		
Marbled Godwit	YL, AS		**Wilson's Snipe**		yes
Ruddy Turnstone			Wilson's Phalarope[5]		
Black Turnstone	YL, AS		**Red-necked Phalarope**		yes[9]
Surfbird	RL, AS		Red Phalarope		

Data from Armstrong (2015), eBird (2015), Yakutat Bird Checklist (Baluss 2015b), Andres and Browne (1998), Birds of the Chilkat Valley Checklist (Bertsch Undated), The Birds of Chilkat Pass (Weeden 1960), Birds of Juneau Alaska Checklist (Juneau Audubon Society 2007), Birds of Skagway Alaska Checklist (Skagway Bird Club 2010), Birds of Southeast Alaska Checklist (Heinl 2010), Glacier Bay Checklist (Paige and Drumheller 2012), and personal communication with USFS biologist Gwen Baluss.

[1]accidental; Ketchikan
[2]accidental; Juneau
[3]past breeding records near Haines and Skagway; currently not known to breed in the region
[4]accidental; Lituya Bay, Douglas Island
[5]casual; Juneau, Gustavus
[6]past record of breeding pair on territory in Chilkat Pass area
[7]accidental; Juneau, Gustavus
[8]Status, RL = Red List Audubon WatchList Species, YL = Yellow List Audubon WatchList Species; AS = Alaska Shorebird Conservation Plan High Priority Species
[9]rare breeder

individual species models to show relative richness, calculated as the number of breeding shorebird species predicted for each subwatershed in Southeast Alaska (HUC 12, or sixth level watershed).

There are certain limitations inherent to both observation data and the modeling process used by the Heritage Program. Because these models have much greater spatial resolution than other available continental-scale species distribution datasets, we utlized the data to depict species richness even though inaccuracy of some individual layers is known. Given these limitations, the information is most useful as a way to interpret broad ecological patterns and relationships. The results summarized on this map should be interpreted as a generalized representation of the relative level of species richness among province groups rather than exact species numbers.

There are 14 breeding shorebird species present during the breeding season in Southeast Alaska based on the predictions of these models: Baird's Sandpiper (*Calidris bairdii*), Black Oystercatcher, Greater Yellowlegs, Killdeer (*Charadrius vociferus*), Lesser Yellowlegs, Pectoral Sandpiper, Red-necked Phalarope, Sanderling (*Calidris alba*), Short-billed Dowitcher, Semipalmated Plover, Spotted Sandpiper, Surfbird, Wandering Tattler, and Wilson's Snipe.

Compared to Table 5-6, four species with predicted breeding habitat are not known to breed in Southeast Alaska: Baird's Sandpiper (predicted in a small portion of Upper Lynn Canal); Surfbird (predicted in a small portion of the Yakutat Forelands); Sanderling (predicted in areas along the coast from Juneau to Berner's Bay); and Pectoral Sandpiper (predicted in a small portion of Taku Inlet and Upper Lynn Canal). Two other species that are known to breed rarely in Southeast, Solitary and Least sandpipers, were not predicted by the Alaska Natural Heritage Program models.

MAP DATA SOURCES

- WHSRN qualifying sites: Alaska Shorebird Group (2008)
- Important Bird Areas: Audubon Alaska (2014a)
- Shorebird species richness by watershed: Audubon Alaska (2014c) based on Gotthardt et al. (2013).

Shorebirds

Audubon ALASKA

Each spring, millions of shorebirds visit Southeast Alaska. Most are migrating to northern Alaska to breed and forage in wetlands rich in algae, aquatic plants, crustaceans, mollusks, and insects. Of the 45 confirmed species of shorebirds that occur in Southeast Alaska, several common species stay in Southeast Alaska to breed, including Semipalmated Plover, Black Oystercatcher, Greater and Lesser Yellowlegs, Spotted Sandpiper, Short-billed Dowitcher, Wilson's Snipe, and Red-necked Phalarope. Five of these breeding shorebird species are on the Audubon Alaska Watchlist.

YAKUTAT FORELANDS
Key species: Marbled Godwit (WHSRN qualifying), Western Sandpiper, Dunlin, Least Sandpiper

GLACIER BAY & ICY STRAIT
Key species: Black Oystercatcher (global IBA)

MENDENHALL WETLANDS
Key species: Surfbird (global IBA), American Golden-plover (continental IBA), Short-billed Dowitcher (continental IBA), Rock Sanpiper (continental IBA), Pectoral Sandpiper (state IBA), Western Sandpiper, Ruddy Turnstone, Least Sandpiper, Dunlin

STIKINE RIVER DELTA
Key species: Western Sandpiper (global IBA, WHSRN qualifying)

Yakutat, Alsek River, Tatshenshini R., Haines Hwy, Klondike Hwy, Tagish Lake, Chilkat R., Skagway, Haines, Atlin Lake, Mt. Fairweather, Fairweather Mountains, Lynn Canal, Icy Strait, Juneau, Taku River, CHICHAGOF ISLAND, ADMIRALTY ISLAND, Chatham Strait, Stephens Passage, UNITED STATES, CANADA, Coast Mountains, Sitka, BARANOF ISLAND, Frederick Sound, KUIU ISLAND, KUPREANOF ISLAND, Petersburg, Stikine River, Cassiar Hwy, Wrangell, Sumner Strait, ZAREMBO ISLAND, WRANGELL ISLAND, ETOLIN ISLAND, PRINCE OF WALES ISLAND, Clarence Strait, REVILLAGIGEDO ISLAND, Craig, Ketchikan, Metlakatla, Unuk River, Pacific Ocean, Dixon Entrance, Prince Rupert

Significant shorebird site[1]
(WHSRN = Western Hemisphere Shorebird Reserve Network)

Important Bird Area (IBA) for shorebird species[2]

Number of shorebird species predicted per watershed[3]

- 1 – 4
- 5 – 7
- 8 – 10
- 11 – 13

1. Alaska Shorebird Group 2008.
2. Audubon Alaska 2014a.
3. Audubon Alaska 2014c, based on Gotthardt et al. 2013a.

N

0 50 miles
0 50 km

Map 5.6: Shorebirds

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PRINCE OF WALES SPRUCE GROUSE

Beth Peluso

In Southeast Alaska, the Prince of Wales subspecies of Spruce Grouse (*Falcipennis canadensis isleibi*) is endemic to the Prince of Wales Island complex, with records on 11 islands. This is the only place in the species' range where they inhabit temperate rainforest (Kissling and Jahrsdoerfer 2010). First proposed as a subspecies in 1996 based on coloration and shape of the wings and tail (Dickerman and Gustafson 1996), a 2010 paper detailed genetic differences from the mainland subspecies (Barry and Tallmon 2010). The USFWS considers the Prince of Wales birds a subspecies. Prince of Wales Spruce Grouse are darker than other subspecies and have different markings on the tail (Kissling and Jahrsdoerfer 2010). These grouse are not long-distance fliers; because Prince of Wales and the surrounding islands are more than 3.75 mi (approx. 6 km) from the mainland, it is thought the subspecies' isolation dates back more than 10,000 years to the last ice age when glaciers made the islands accessible by bridging the mainland to the islands.

Spruce Grouse, as their name implies, feed almost exclusively on conifer needles during winter. During other seasons they broaden their diet to include berries, mushrooms, and insects. Insects make up the majority of chicks' diet for their first couple months; plants become a larger proportion of their diet by the end of their first summer. Spruce Grouse tend to forage in the lower portion of the crown of conifers, where they can watch for predators but remain mostly hidden (Boag and Schroeder 1992). Spruce Grouse grow bristles on the sides of their toes in fall and shed them in the spring. The bristles act as snowshoes on snowy ground and possibly provide traction on slippery tree branches.

A Spruce Grouse male attracts mates with a strutting display that includes raising the red combs above his eyes, raising his tail almost vertically to show off the white-tipped feathers underneath, and drooping his wings. When defending a territory from other males, the male does a display flight and loudly claps his wings together behind his back once, making a sound like a gunshot, before gliding to another tree (Kissling and Jahrsdoerfer 2010). The female chooses the nest site, which is always on the ground in a natural or created depression. The site is usually at the base of a coniferous tree providing overhead cover (Boag and Schroeder 1992).

Spruce Grouse rely on their mottled feathers as camouflage, staying still when they feel threatened. They stay motionless even when a person approaches closely. Because of this behavior, Spruce Grouse are difficult to detect and there is very little historical population information. There is no precise information on pre-logging population size for this subspecies (Kissling and Jahrsdoerfer 2010), though researchers have made a rough estimate of less than 25,000 (Kirchhoff and Padula 2010). Because of this lack of past population data, it is unknown if the population is changing or stable (Kissling and Jahrsdoerfer 2010).

Although capable of explosive take-offs and fast, short flights, these grouse are not long-distance fliers. There is no information on Prince of Wales Spruce Grouse migration, but the most closely related subspecies do migrate locally between winter and breeding habitat, preferring denser forest where there is less snow in winter (Kissling and Jahrsdoerfer 2010). Prince of Wales Spruce Grouse may follow a similar migration pattern, within the constraints of their island boundary.

Spruce Grouse prefer to walk rather than take wing when traveling, sometimes using human trails and roads. As a game species, this behavior leaves them vulnerable to hunting along roads as well as to vehicle collisions. The hunting harvest of Spruce Grouse on Prince of Wales Island is not monitored or monitored only in a limited capacity, but the USFWS does not consider overhunting a threat (Kissling and Jahrsdoerfer 2010).

Prince of Wales Spruce Grouse use a variety of habitats, such as old-growth, second-growth, and muskegs. In the breeding season, both males and females seem to prefer open-canopy scrub-forest, which offers food and cover as well as display areas for males. These habitat needs mean the birds do not depend solely on old-growth, and their use of clearcut areas shifts during different stages of forest succession. Prince of Wales Spruce Grouse are rarely seen crossing

Spruce Grouse chicks.

Milo Burcham

MAP ON PAGE 131

young clearcuts, possibly because of the diffuculty of walking through logging debris. After about 15 to 25 years, understory vegetation is more habitable, providing berries and other foods as well as shelter for chicks. As the forest canopy gradually fills in, it blocks light used by understory vegetation and shifts to habitat that no longer meets grouse needs. These unsuitable conditions can last for more than a century (Kissling and Jahrsdoerfer 2010).

CONSERVATION ISSUES

The Prince of Wales Spruce Grouse is listed on the Yellow List of the Audubon Alaska WatchList because of small population size and limited geographic range.

Spruce Grouse are sensitive to habitat loss and predation, as, "Modern industrial forest exploitation, with its creation of open clearcuts and subsequent single-species plantations, reduces populations locally and often eliminates them entirely" (Boag and Schroeder 1992). Although the Tongass National Forest is not managed as a single-species plantation, the effect of deforestation is a concern for the Prince of Wales subspecies of Spruce Grouse. Prince of Wales Island, especially the northern end, has been heavily logged over the last 60 years. Many stands that are now in the stem-exclusion stage effectively eliminate light and understory cover and forage. These conditions are akin to the kind of concerns raised by Boag and Schroeder (1992). Managing the forest for stand structural stages that more closely mimic the natural range of variability would increase nesting, hiding, and foraging habitat for the Spruce Grouse. Nelson (2010) found that Prince of Wales Spruce Grouse prefer unharvested forest at the watershed scale, and that grouse avoid edges and prefer roads. Their preference for roads is the biggest management issue facing the grouse. Road mortality is the largest known source of death; subsequently, roads should be seasonally closed during times of the year when grouse are most vulnerable (Nelson 2010).

The USFWS determined in a 2010 assessment that the Prince of Wales Spruce Grouse did not warrant listing. In part, this assessment was based on the Tongass Land Management Plan's (TLMP) Old Growth Reserve system and wildlife management guidelines for other old-growth dependent species that would benefit the grouse (Kissling and Jahrsdoerfer 2010). At the time of the assessment, it was assumed TLMP would not be revised for 15 years; however, in 2015, a draft TLMP amendement was released that may alter how old-growth reserves are managed. It remains to be seen how changes to TLMP will affect Prince of Wales Spruce Grouse in the future. More research to develop baseline population numbers is an important next step.

Sealaska Corporation lands make up a substantial portion of the Prince of Wales Spruce Grouse habitat as well. In 2015, the USFS transferred 68,400 acres of the Tongass to Sealaska Native Corporation, in order to finalize the tribe's allotment under the Alaska Native Claims Settlement Act (Brehmer 2015). As a result, Spruce Grouse habitat may undergo greater deforestation and road pressures on these privatized lands than other areas of the forest. Future conservation of this subspecies may therefore include cooperation between the corporate landowner, federal agencies, and scientists.

MAPPING METHODS

For Prince of Wales and the surrounding islands, Prince of Wales Spruce Grouse confirmed distribution is shown in based on documented sightings and museum specimens, as reported in the USFWS's species assessment (Kissling and Jahrsdoerfer 2010).

Elsewhere, this map uses the Bayesian network model from Suring (2014) to identify high-quality summer and winter habitat. Within this model, land cover (productive old forest) was most strongly associated with high-quality habitat, followed by high canopy closure (Suring 2014). The output maps form this report were georeferenced and manually digitized by Audubon.

Note that Suring (2014) and the USFWS assessment (Kissling and Jahrsdoerfer 2010) indicate Prince of Wales Spruce Grouse habitat in different areas. The Suring analysis is based on occurrence at the scale of 4th level basins, which assumes that Spruce Grouse may occur on Kupreanof, Etolin, and Wrangell Islands. The Kissling and Jahrsdoerfer (2010) data describe these areas as unconfirmed or potential distribution.

MAP DATA SOURCES

- Prince of Wales Spruce Grouse confirmed distribution: Kissling and Jahrsdoerfer (2010)
- Prince of Wales Spruce Grouse seasonal habitat quality: Suring (2014).

Nick Jans

Adult female Spruce Grouse on Prince of Wales Island.

Audubon ALASKA

Prince of Wales Spruce Grouse

In Southeast Alaska, the Prince of Wales subspecies of Spruce Grouse is endemic to the Prince of Wales Island complex, with records on 11 islands. These grouse are not long-distance fliers; it is thought the subspecies' isolation dates back more than 10,000 years to the last ice age when glaciers made the islands accessible by bridging the mainland to the islands. Prince of Wales Spruce Grouse use a variety of habitats, such as old-growth, second-growth, and muskegs. The Prince of Wales Spruce Grouse is listed on the Yellow List of the Audubon Alaska WatchList because of small population size and limited geographic range. They are sensitive to habitat loss and predation associated with clearcuts. Managing the forest for stand structural stages that more closely mimic the natural range of variability would increase nesting, hiding, and foraging habitat for the Spruce Grouse.

Yakutat
Alsek River
Tatshenshini R.
Haines Hwy
Klondike Hwy
Tagish Lake
Chilkat R.
Skagway
Haines
Atlin Lake
Mt. Fairweather
Fairweather Mountains
Glacier Bay
Icy Strait
Lynn Canal
Taku River
Juneau
Whiting River
CHICHAGOF ISLAND
ADMIRALTY ISLAND
Chatham Strait
Stephens Passage
UNITED STATES
CANADA
Coast Mountains
Sitka
BARANOF ISLAND
Frederick Sound
KUIU ISLAND
KUPREANOF ISLAND
Petersburg
Stikine River
Cassiar Hwy
Iskut River
Unuk River
Pacific Ocean
Wrangell
Summer Strait
ZAREMBO ISLAND
WRANGELL ISLAND
ETOLIN ISLAND
Clarence Strait
PRINCE OF WALES ISLAND
REVILLAGIGEDO ISLAND
Craig
Ketchikan
Metlakatla
UNITED STATES
CANADA
Dixon Entrance
Prince Rupert

Prince of Wales subspecies of Spruce Grouse, confirmed distribution[1]

Predicted Habitat Value[2]

- Winter and summer high value
- Winter high value
- Summer high value
- Low to moderate value

1. Kissling and Jahrsdoerfer 2010.
2. Suring 2014.

N

0 50 miles
0 50 km

Map 5.7: Prince of Wales Spruce Grouse

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QUEEN CHARLOTTE GOSHAWK

Paul Cotter and Melanie Smith

The Northern Goshawk (*Accipiter gentilis*) is a short-winged, highly maneuverable hawk of the accipiter group inhabiting boreal and mountain forests of North America, Europe, and northern Russia. Some goshawks migrate; some are resident; and others are probably nomadic, moving more in years of low prey. The breeding and winter ranges of the goshawk overlap extensively. Short wings and a long tail make the goshawk very maneuverable and well-suited for navigating through its most common habitat of old-growth forest, where it often crashes through dense brush to capture birds and small mammals. In Southeast, the primary diet of the goshawk includes grouse, ptarmigan (*Lagopus spp.*), red squirrels (*Tamiasciurus hudsonicus*), songbirds, jays, and Northwestern Crows (*Corvus caurinus*) (Lewis et al. 2006).

The Queen Charlotte Goshawk (*A. g. laingi*), the subspecies most commonly found in Southeast Alaska, is endemic to coastal rainforests from Vancouver Island to northern Southeast (Iverson et al. 1996a, Squires and Reynolds 1997), where it is a year-round resident and an integral part of the biodiversity and natural heritage of the Tongass National Forest. The importance of the Tongass to the Queen Charlotte Goshawk becomes apparent when one considers the amount of suitable habitat found in insular (i.e., island) British Columbian forests. Generally, insular British Columbia forests have been converted to early seral stages (i.e., younger forests) more rapidly, and to a greater extent, than the old-growth forests of the Tongass (US Fish and Wildlife Service 2007). Because the species is associated with old-growth coniferous forests for nesting and hunting, the goshawk is particularly vulnerable to widespread conversion of old-growth habitats to clearcuts and younger-aged successional forests (Iverson et al. 1996a, Flatten et al. 2001, US Fish and Wildlife Service 2007, Smith 2013). A persistent goshawk population in the Tongass could serve as an indicator of old-growth forest health.

A precise quantitative population estimate for Southeast Alaska's goshawks does not yet exist. Northern Goshawks are found in low density across the Tongass from Dixon Entrance to Yakutat (Isleib and Kessel 1973, Titus et al. 1994, Iverson et al. 1996a). The most recent estimate of Queen Charlotte Goshawk abundance across their range is 300 to 700 breeding pairs (US Fish and Wildlife Service 2007), plus an unknown number of juvenile and non-breeding birds (Crocker-Bedford 1994). USFWS (2007) estimated that habitat quality has declined by 23% range-wide, and that Southeast Alaska currently holds 61% of the existing habitat value.

The 2014 USFS Northern Goshawk occurrence dataset includes locations where goshawks have been known to nest on the Tongass. Based on researchers' best judgement of which alternate nest clusters are (or were) used by the same mating pair, the dataset indicates 83 known active or inactive territories during the last 25 years. This dataset is known to be incomplete because surveyors typically discover goshawk nests during surveys when planning for timber sales, or as a follow up to an anecdotal hawk or nest sighting, thus leaving some areas of the Tongass completely uninventoried.

Northern Goshawks in Southeast have garnered the attention of government agencies, conservation organizations, and the environmental community nationwide. Kirchhoff and Padula (2010) include the Queen Charlotte subspecies on the Audubon Alaska WatchList because of its limited distribution and potential threats posed by commercial timber harvesting in breeding and nonbreeding seasons. It is a "species of greatest conservation need" in the State of Alaska's Wildlife Action Plan (Alaska Department of Fish and Game 2015a). The USFS considers the Queen Charlotte Goshawk a species of special management

Bob Armstrong

Northern Goshawk nesting in old-growth forest in Southeast Alaska.

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concern in the Tongass National Forest. This results from its year-round residency, the likelihood of its habitat being affected by land management activities, its negative response to habitat fragmentation, and its characteristic role as an ecological specialist (Iverson and Rene 1997).

In the mid-1990s, the conservation status of the Queen Charlotte Goshawk was the focus of much public and legal debate. The issue centered on the vulnerability of this goshawk to large-scale timber harvesting because of its association with mature and old-growth forests across much of its range. In the mid-1990s, the USFWS was petitioned to list the Queen Charlotte goshawk as endangered. The USFWS determination that listing was not warranted was challenged in court. In 2007, after a number of years of litigation, the USFWS determined that the Alaska and British Columbia portions of the Queen Charlotte goshawk population are distinct population segments. The USFWS also determined that listing was not warranted for the Alaska population, but that listing was warranted for the British Columbia population. In 2012, the USFWS published a final rule listing the British Columbia population of goshawks as threatened (US Fish and Wildlife Service 2012). In 2000, and reaffirmed in 2013, the Canadian government listed the Queen Charlotte goshawk as threatened because of continued logging of low-elevation, old-growth coniferous forests within its range and likely population declines (COSEWIC 2013).

According to the USFS, goshawks in Southeast require mature nest trees, typically in productive old-growth forests below 1,000 ft (305 m) elevation, and large use areas (9,000 to 48,000 acres [4,050 to 12,150 ha]) of mixed habitats (Iverson et al. 1996a). Goshawks in the Tongass use large tracts of land during the entire year (Iverson et al. 1996a, Flatten et al. 2001). A nesting area, defined as the area that includes all nest sites and alternative nest sites used by a pair or an individual within its breeding home range, can be as large as 1,987 acres (804 ha) (Titus and Lewis 2000). Nesting plots generally have more hemlock, higher canopy closure, and more multistory canopy structure than randomly selected plots of old-growth forest (Iverson et al. 1996a). Smith (2013) found that goshawks prefer medium- and large-tree old growth for nest areas in Southeast Alaska. Stick and bark nests are usually placed near the trunk on large conifer limbs, low in the forest canopy. Nest size depends on the number of years in use, but in Southeast Alaska is usually about 3 ft (0.9 m) in diameter (Squires and Reynolds 1997).

Goshawks select old-growth forest habitats over younger forests and nonforested areas (Smith 2013). Movement tracking (i.e. relocations) of radio-telemetered goshawks show higher frequency of occurrence in old-growth forests with high volume and medium volume than in any other habitat type. Selection for habitats did not occur in mature sawtimber, scrub forest, forests with small-tree old-growth, nonforest, or clearcut habitats. Goshawks also use riparian and beach-fringe habitats at a higher rate compared to the availability of those habitats (Iverson et al. 1996a).

CONSERVATION ISSUES

Currently, the USFS lists the goshawk as a species of special management concern in the Tongass National Forest. Extensive logging throughout coastal British Columbia has likely contributed to the diminished number of goshawks found in the Tongass (US Fish and Wildlife Service 2007). Similar trends may also be seen in some portions of the Tongass where timber harvest has significantly reduced the abundance and distribution of productive stands of old-growth forest (Lewis et al. 2004). Habitat loss in the goshawk's already limited range (coastal British Columbia and Southeast Alaska) has increased the difficulty of maintaining abundant, well-distributed populations of Queen Charlotte Goshawks in northern coastal rainforests. The ability of goshawk populations to survive and reproduce is closely tied to the maintenance of large, undisturbed tracts of productive (large-tree) old-growth forest throughout the Tongass National Forest (Smith 2013).

The goshawk's use of large areas of the forest during the entire year makes it a landscape species. Currently, a 100-acre (40-ha) buffer around known goshawk nests is required under the Tongass Land Management Plan (TLMP) (US Forest Service 1997). Unfortunately, this policy does not adequately protect goshawks in the Tongass for two main reasons. First, unless radio telemetry is used, it is unlikely that most goshawk nests will be located. Failure to locate nests makes it impossible to accurately define a buffer centered on a nest. Second, nesting areas can be nearly 2,000 acres (800 ha) in size (Iverson et al. 1996a, Flatten et al. 2001), much bigger than buffer zones presently specified in the TLMP. Therefore, if protecting nesting areas is the primary approach to goshawk conservation, larger nesting area buffers are needed, as concluded by Flatten et al. (2001). Rather than using a nest-by-nest conservation approach, the 1997 TLMP also included old-growth reserves and wildlife standards and guidelines.

In Southeast, the loss of old-growth forest habitat is the primary threat to goshawk populations (Iverson et al. 1996a, Iverson and Rene 1997, Flatten et al. 2001). Clearcut logging removes the most valuable habitat and replaces it with habitat types avoided by goshawks (Smith 2013). Clearcutting of old-growth forest stands likely affects goshawk use of those areas for at least 100 years (Iverson et al. 1996a). Widespread logging may also have indirect effects by diminishing prey habitats and populations (Iverson et al. 1996a, Smith 2013). Thrushes, grouse, and squirrels (common forest inhabitants that may be affected by timber harvesting) contribute up to 60% of prey during the goshawk breeding season (Lewis et al. 2004). Although goshawks are considered generalist predators and possess some adaptability to fluctuations in their prey base, large-scale habitat disturbance may diminish breeding success through changes in prey availability (Lewis et al. 2004).

Timber harvest is a primary threat to nesting populations. Goshawks prefer closed canopy forests, and harvest that reduces canopies below 40% may be especially detrimental (Squires and Reynolds 1997). The Tongass National Forest may contribute only half or less of the secure habitat recommended for breeding pairs, indicating that old-growth reserves and buffers alone are not enough to sustain a viable population. Project planning in land use designations (LUDs) that allow development should consider goshawk habitat effects to increase the long-term security of choice habitats, especially in areas most heavily logged such as North Prince of Wales Island (Smith 2013). Forest management practices that maintain the most old-growth forest, especially large-tree and medium-tree old-growth stands, will provide the most direct and indirect benefits to Tongass goshawks (Smith 2013).

MAPPING METHODS

The map shows the presumed breeding range of the Queen Charlotte Goshawk. This dataset was developed by the Committee on the Status of Endangered Wildlife in Canada for their assessment and status report on the goshawk (COSEWIC 2013).

This map also shows the median centers for known Northern Goshawk territories, based on analysis of alternate nest sites coded by territory name, provided by the USFS. Note that the territory locations presented are known to be incomplete due to unequal survey effort across the region.

MAP DATA SOURCES

- Median territory locations: Audubon Alaska (2015), based on Tongass National Forest (2014).
- Goshawk predicted breeding distribution: COSEWIC (2013).

Queen Charlotte Goshawk

Audubon ALASKA

The Northern Goshawk is a short-winged, highly maneuverable hawk of the accipiter group inhabiting boreal and mountain forests of North America, Europe, and northern Russia. In Southeast, the primary diet of the goshawk includes grouse, ptarmigan, red squirrels, songbirds, jays, and crows. The Queen Charlotte Goshawk is a subspecies endemic to coastal rainforests from Vancouver Island to northern Southeast. Because the species is associated with old-growth coniferous forests for nesting and hunting, the goshawk is particularly vulnerable to widespread conversion of old-growth habitats to clearcuts and younger-aged successional forests. A persistent goshawk population in the Tongass could serve as an indicator of old-growth forest health.

Territory location (median center of alternate nests)[1]

Queen Charlotte subspecies of Northern Goshawk, predicted breeding distribution[2]

1. Audubon Alaska 2015, based on Tongass National Forest 2014.
2. COSEWIC 2013.

0 50 miles
0 50 km

N

Map 5.8: Queen Charlotte Goshawk

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BALD EAGLE

Iain Stenhouse
Revised by Kathy Wells

The Bald Eagle (*Haliaeetus leucocephalus*) is the second largest raptor in North America with a wingspan of about 7 ft (2 m), second in size only to the California Condor (*Gymnogyps californianus*). The species is found nowhere else in the world. Adult Bald Eagles weigh 8 to 14 pounds (3.6 to 6.4 kilograms); female eagles are larger and heavier than males. Powerful fliers, they can reach speeds of more than 35 mph (56 kph) during level flight and between 75 to 99 mph (121 to 159 kph) in a hunting dive. Their favorite food is fish, but they also eat carrion, other birds, ducks, and small mammals such as muskrats. They are notorious for stealing fish from Ospreys (*Pandion haliaetus*).

For most Americans, Bald Eagles are highly prized for their aesthetic value, but the species was not always so esteemed. In Alaska, a bounty was offered for much of the first half of the 1900s to reduce eagles because they were considered an unwelcome predator of salmon. Records show that approximately 80% of the Bald Eagles for which bounties were paid came from Southeast Alaska, estimated at 128,000 individuals (Robards and King 1966). The bounty system was eventually eliminated by federal legislation to protect Bald Eagles in 1952 (Robards and King 1966). Despite considerable persecution during the first half of the 20th century, Alaska, particularly Southeast, has remained a stronghold for the Bald Eagle (US Fish and Wildlife Service 2001). The favorable conditions in Alaska are largely due to (1) the remote nature of most of the state; (2) a bountiful supply of salmon and other fish that makes up a major food source for the eagles; and (3) the extent of relatively undisturbed breeding and wintering habitat (Sidle and Suring 1986).

Bald Eagle populations across the entire United States suffered drastically from persecution, pollution (particularly from the pesticide DDT), and habitat loss in the mid- to late- 1900s (Buehler 2000). Populations of the species have rebounded since then, and have generally increased throughout much of North America since the 1980s. At that time, Alaska had the highest breeding density on record for Bald Eagles in North America (Hodges and Robards 1982), and individuals from Alaska were transplanted to various areas of the contiguous United States in reintroduction projects (Nye 1986).

Southeast Alaska supports the largest breeding population of Bald Eagles in North America (Jacobson and Hodges 1999), with the majority of breeding birds remaining resident year-round. Bald Eagles have been systematically surveyed in Southeast, first in 1967, again in 1977, then about every 5 years since 1982 (US Fish and Wildlife Service 2001). These surveys, conducted by USFWS, indicate that the Bald Eagle population in Southeast has increased considerably during the time of the study, but appears to have stabilized at around 25,000 individuals (Jacobson and Hodges 1999). The most recent wintering population estimate for Bald Eagles is 44,000, which in turn is almost half of the estimated global population of 100,000 individuals (Buehler 2000).

The abundance of Bald Eagles in Southeast varies dramatically between habitat types. Clusters of islands or broken shorelines show higher densities than continuous shorelines, and the lowest densities are found along steep, unforested fiords that terminate in glaciers (King et al. 1972). Considerably lower densities are observed on islands south of Sumner Strait than more optimal island habitats, such as on Admiralty Island (King et al. 1972).

The breeding Bald Eagle population is locally dense but widely distributed across coastal Southeast (Gabrielson and Lincoln 1959). At some times of the year the birds congregate, often in very large numbers, at specific locations where there is an abundance of food (Buehler 2000). The Chilkat Valley Bald Eagle Preserve, north of the city of Haines, supports the largest concentrations of Bald Eagles on record (more than 3,500 individuals at times). In fall, the birds are attracted by late ice-free conditions and a large late-spawning run of chum salmon (*Oncorhynchus keta*) (Hansen et al. 1984). In April each year, about 2,000 eagles congregate along the Stikine River Delta. This is the second-largest known concentration of Bald Eagles, and is the highest anywhere in spring. A second spring concentration of about 1,000 eagles occurs at Berner's Bay. All three of these areas are IBAs for the Bald Eagle.

Once an endangered species in the Lower 48 states, Bald Eagles are commonly observed throughout much of Southeast Alaska and the Tongass National Forest.

John Hyde

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To support their large heavy nests, Bald Eagles require tall, live mature trees with stout supporting branches. Bald Eagles generally build their nests in trees close to shore, with the average distance of nests from water only 121 ft (37 m) (Robards and Hodges 1976).

Industrial forestry has multiple potential influences on Bald Eagles, including reducing nesting habitat and perch sites, affecting salmon spawning streams, and increasing disturbance (Buehler 2000). Bald Eagles are especially sensitive to disturbance early in the breeding season, and activities associated with resource extraction, development, and recreation can result in failed or abandoned nests (Fraser et al. 1985). According to an Interagency Agreement between the USFS and USFWS, the USFS will attempt to regulate human disturbance within identified Bald Eagle use areas of the Tongass National Forest. The Forest-wide Standards and Guidelines of the TLMP prohibit timber harvest within 330 ft (100 m) of a Bald Eagle nest tree. It is not known, however, whether this buffer is adequate to provide sufficient space to prevent disruption of breeding activities and maintain nesting densities (Gende et al. 1998). If small buffer stands are left isolated, they are subject to greater windthrow, reducing their effectiveness, and do not necessarily include alternative nest or perch trees (Hodges 1982).

The Bald Eagle was specifically protected in the United States under the Bald Eagle Protection Act of 1940, which prohibited killing, harassment, or possession of eagles or parts thereof. The State of Alaska was initially exempted from the Bald Eagle Protection Act, but was finally included in 1952, after studies showed that foraging by Bald Eagles did not affect salmon numbers (US Fish and Wildlife Service 1995).

In 1973, with the introduction of the Endangered Species Act, the USFWS designated the Bald Eagle as endangered in most of the contiguous United States (except in Washington, Oregon, Minnesota, Wisconsin, and Michigan, where it was considered threatened). In 1995, the agency down-listed the Bald Eagle to threatened across the contiguous United States. In 2007, the Bald Eagle was deemed recovered and delisted. In Alaska, however, Bald Eagles were never listed under the Endangered Species Act.

CONSERVATION ISSUES

Habitat loss and disturbance associated with human activities (such as proximity of clearcut logging to nests, roads, pesticide use, lead contamination likely left behind by hunters and anglers, and resource development) are widely recognized as the greatest threats to Bald Eagle populations and many other birds of prey (US Fish and Wildlife Service 2001).

Organochlorine pesticides and other environmental contaminants pose a threat to many bird species by thinning eggshells and harming reproduction. The Bald Eagle, as a predator and scavenger that forages at the top of the food chain, is particularly susceptible to the accumulation of these pollutants (Buehler 2000). Pesticides are not known to be a major problem in Alaskan Bald Eagles, however (Wiemeyer et al. 1972, Sprunt et al. 1973). Instead, heavy metals may represent a greater threat to eagles in Alaska (US Fish and Wildlife Service 2001). For example, lethal concentrations of lead have been found in dozens of Bald Eagle carcasses in Alaska, and sublethal doses of mercury are commonly found in tissue samples of Bald Eagles from Alaska (US Fish and Wildlife Service 2001).

Bald Eagles are long-lived birds with a relatively low reproductive potential, a strategy common to most large birds of prey (Newton 1977). The species' longevity creates a considerable population lag time, such that even a major decline in productivity would take some time to appear at the population level (US Fish and Wildlife Service 2001). Currently, it is not clear whether Bald Eagle productivity in Southeast is high enough to maintain current population numbers in the region. The removal of large, old-growth trees in Southeast, particularly near saltwater shores, has clearly reduced nesting opportunities for Bald Eagles in the region. Although, to date, there has been no attempt to quantify the degree of habitat loss, the proximity of clearcuts is known to adversely affect the density of Bald Eagle nesting throughout the Tongass National Forest (Gende et al. 1998).

John Schoen

The most common nest sites for Bald Eagles in Southeast Alaska are in large, old-growth spruce and hemlock trees adjacent to the shoreline. However, this eagle has chosen to nest in a cottonwood.

Larger buffer zones of 656 ft (200 m) around trees with Bald Eagle nests have been recommended for areas scheduled for logging (Corr 1974), and one study suggested that buffers of at least 984 ft (300 m) are required to maintain Bald Eagle nesting densities in Southeast (Gende et al. 1998). In other regions of the country, buffer zones of 1,312 to 2,624 ft (400 to 800 m) have been recommended to better protect Bald Eagle nests from disturbance (Gende et al. 1998). In 1997, the USFS adopted a regulation to maintain a 984-ft (300-m) fringe of "mostly undisturbed" forest around beach and estuary habitat in the Tongass National Forest (US Forest Service 1997). This measure, which was designed to provide habitat for a range of wildlife species and human uses, resulted in improved protection for Bald Eagle nest and perch sites.

Bald Eagles are the national emblem of the United States, and Southeast Alaska encompasses the largest breeding density of Bald Eagles in the nation and the world. Therefore, Southeast and the Tongass National Forest play a significant role in the conservation network for the Bald Eagle in North America.

MAPPING METHODS

Point data of Bald Eagle observations from the Alaska Bald Eagle Nest Atlas, a compilation of nest surveys between 1962 and 2006. This includes point data digitized from maps and coordinates on data cards from decades of surveys, mostly in Southeast and Southcentral Alaska (Schempf 2013).

The following are IBAs designated for Bald Eagles: Berners Bay, Stikine River Delta, and Chilkat Bald Eagle Preserve. Of these, Stikine River Delta is a global IBA, and the other two sites are state-level IBAs.

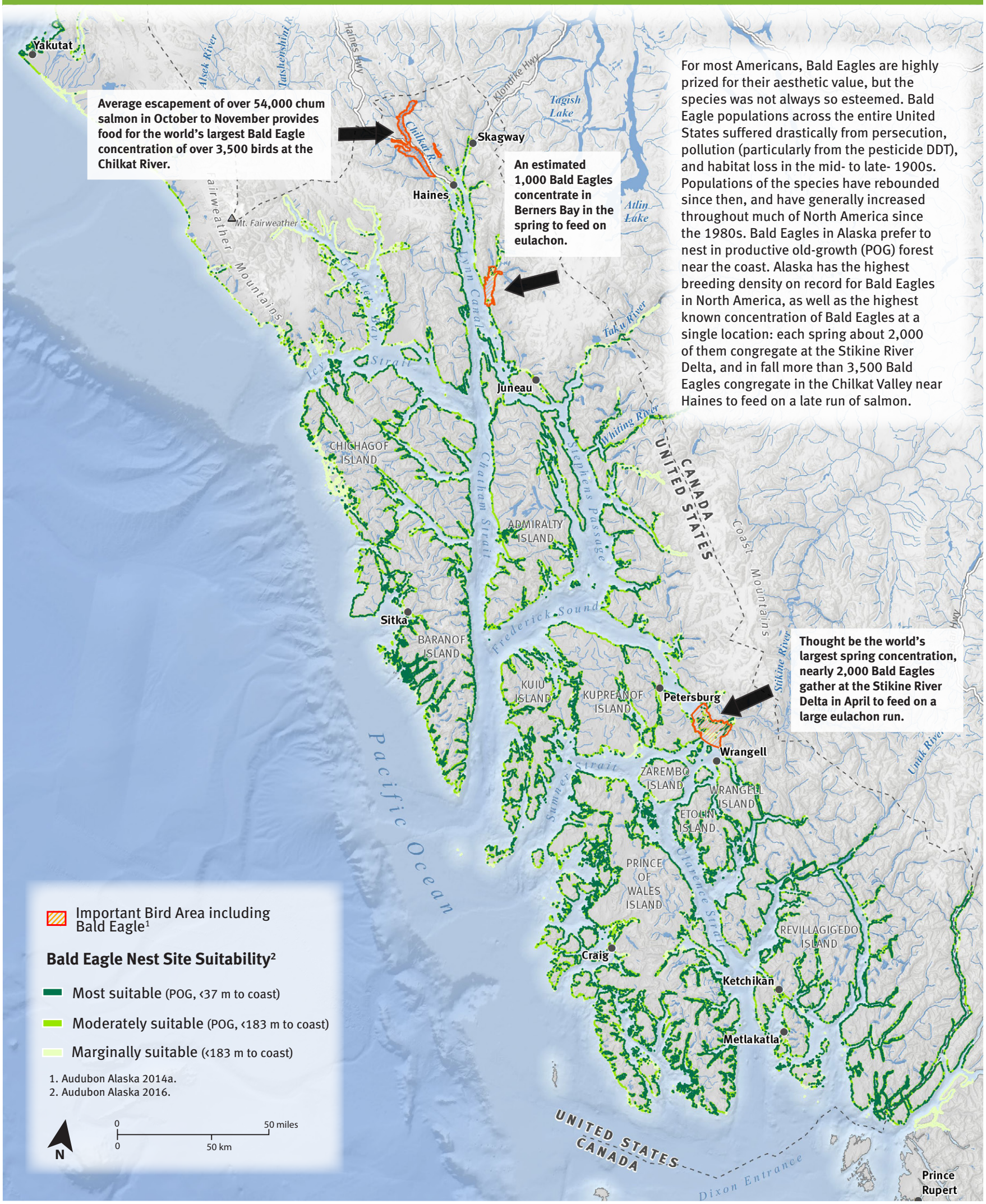
Based on an extensive survey of Southeast Alaska, the USFWS determined that Bald Eagle nests are typically associated with old-growth forests and close proximity to salt water (Hodges and Robards 1982). The average distance between nests and the nearest salt water was 120 ft (37 m), and 98% of nests were within 600 ft (183 m). These two buffers were combined with old-growth land cover types (US Forest Service 2008), creating most suitable (within 121 ft [37 m], old-growth), moderately suitable (within 600 ft [183 m], old-growth), and somewhat suitable (within 600 ft [183 m]) nesting habitats.

MAP DATA SOURCES

- Observation locations: Schempf (2013)
- Important Bird Area for Bald Eagles: Audubon Alaska (2014a)
- Nest site suitability: Audubon Alaska (2016).

Audubon ALASKA

Bald Eagle



For most Americans, Bald Eagles are highly prized for their aesthetic value, but the species was not always so esteemed. Bald Eagle populations across the entire United States suffered drastically from persecution, pollution (particularly from the pesticide DDT), and habitat loss in the mid- to late- 1900s. Populations of the species have rebounded since then, and have generally increased throughout much of North America since the 1980s. Bald Eagles in Alaska prefer to nest in productive old-growth (POG) forest near the coast. Alaska has the highest breeding density on record for Bald Eagles in North America, as well as the highest known concentration of Bald Eagles at a single location: each spring about 2,000 of them congregate at the Stikine River Delta, and in fall more than 3,500 Bald Eagles congregate in the Chilkat Valley near Haines to feed on a late run of salmon.

Map 5.9: Bald Eagle

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