

Geographic Distribution of Birds in Southeastern Alaska: An Analysis

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Study of the geographic distribution of birds in archipelagoes has become popular (5, 10, 13). However, few, if any, of the island groups studied have been recently glaciated, cool temperate in climate, and relatively little disturbed by human settlement. Southeastern Alaska has these characteristics; its avifauna has not been analyzed since 1936 (Swarth, 14). I will attempt to bring the subject up-to-date.

In southeastern Alaska, 254 bird species have been recorded (7, 9). However, the migrant and vagrant species recorded are too likely to be factors of observer locations and chance; therefore, only breeding species are analyzed here, following wise ornithological custom. I recently completed an annotated list of the birds of the Sitka district (21), but local lists for other areas had to be extracted from more general literature (3, 4, 7, 8, 9).

Figure 1 is a map of southeastern Alaska. The entire area is mountainous, with very little level land. The islands comprise the Alexander Archipelago; the mainland

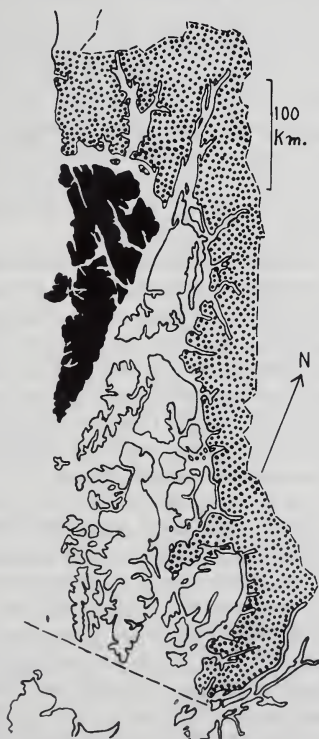


FIGURE 1. Southeastern Alaska with adjacent Canada. The international boundary is a dashed line. The northern end of the Queen Charlotte Islands shows at the lower left. In Alaska, the Sitka islands are shaded, the mainland coast stippled, and the eastern/southern islands unmarked.

coast rises to the Coast Range, along the icy crest of which lies the boundary with Canada (British Columbia). Many glaciers, of which a number reach tidewater, groove the mainland coast. On the islands, glaciers are small and don't extend to low elevations. Most of the region below an elevation of 700 meters is, or was until 20 years ago, covered with old-growth moist coniferous forest (14). Recent logging has left vast clearcut areas.

It must be clearly understood that knowledge of the breeding status of birds in southeastern Alaska, including Sitka, is scanty by modern standards. In several cases, a species is common in summer, but no one has yet recorded its nest or small young; most of these species I have called "breeding." More precisely, in 30 of the 158 species, the breeding data for at least one of the three areas are uncertain. On present information, it is not clear whether Admiralty Island would fit better with the Sitka Islands or with those to the south; I have classified it with the latter. I have classified a few small, near-shore islands, such as those in Glacier Bay, as part of the mainland for the present discussion. Until good data are available, which list the breeding birds of each island, an analysis such as this is tenuous.

The only earlier analysis was that by Swarth, which was based on even more primitive data than are now available. Swarth (14; abbreviated) summarized his analysis: "The fauna and flora of the Sitkan district are of recent establishment there; probably none of the island area was free of ice and occupied by any of this animal life prior to the close of Pleistocene time, and large sections at a much later date. The bird species are mostly derived from the coastal region to the southward; these southern species were the first arrivals and have spread over most of the district. A few came from the north; a few came through mountain passes and valleys from the east, and these are of limited distribution in the Sitkan district. The distribution of certain species and subspecies of birds and mammals suggests that the westernmost islands were the first to be cleared of ice and the first to be occupied." *Sitkan* district as used by Swarth and some other early authors corresponds approximately to southeastern Alaska plus the Queen Charlotte Islands as used in this paper.

Warner, Mathewes, and Clague (16) recently presented paleobotanical evidence that the Queen Charlotte Islands were partially ice-free during Wisconsin glacial time.

The nature of my calculations on routes of immigration should be understood and qualified. For each species I examined total range, range and nature of local subspecies, migration routes, and precise local habitat. For the last, my own field experience in most of southeastern Alaska, as well as most adjacent areas, was useful. Nonetheless, there were several species (for example, Common Raven, *Corvus corax*, and White-winged Crossbill, *Loxia leucoptera*) whose routes of immigration were only guesses.

Table 1 shows the numbers of species breeding, or probably breeding, in southeastern Alaska as a whole and when divided into 3 component districts: Mainland, Sitka district, and eastern/southern islands of Alexander Archipelago. (See Figure 1.) Twelve species breed on the southern islands and the mainland, but not in the Sitka district: Trumpeter Swan (*Cygnus buccinator*), Northern Goshawk (*Accipiter gentilis*), Spruce Grouse (*Dendragapus canadensis*), Herring Gull (*Larus argentatus*), Band-tailed Pigeon (*Columba fasciata*), Northern Pygmy-owl (*Glaucidim gnoma*), Olive-sided Flycatcher (*Contopus borealis*), Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), Yellow-rumped Warbler (*Dendroica coronata*), MacGillivray's Warbler (*Oporornis tolmiei*), Brown-headed Cowbird (*Molothrus ater*), Chipping Sparrow (*Spizella passerina*). Three species, Northern Fulmar (*Fulmarus glacialis*), Sandhill Crane (*Grus canadensis*), and Hawk Owl (*Surnia ulula*), breed on the southern islands, but neither on the mainland nor Sitka islands. Four species—Double-crested Cormorant (*Phalacrocorax auritus*), Brandt's Cormorant (*Phalacrocorax penicillatus*), Black Turnstone (*Arenaria melanocephala*), and Thick-billed Murre (*Uria lomvia*)—nest on the

TABLE 1. Distribution of breeding bird species in southeastern Alaska and the Queen Charlotte Islands

	Sitka islands	Eastern/southern islands	Mainland	Entire Alexander Archipelago	Entire south-eastern Alaska	Queen Charlotte Islands
Total species	85	93	144	100	158	76
Non-passeriform water and shore birds	33	32	50	37	62	30
Non-passeriform land birds	18	23	28	23	30	14
Passeriform birds	34	38	66	40	66	32

Sitka islands but neither on the mainland or southern islands. Three species, the Black-legged Kittiwake (*Rissa tridactyla*), Water Pipit (*Anthus spinoletta*), and Rosy Finch (*Leucosticte arctoa*), spend the summer on the Sitka islands and the mainland, but not on the other islands. Six marine birds nest on some of the outer islands of both the Sitka area and farther south, but not on the mainland: Fork-tailed Storm-petrel (*Oceanodroma furcata*), Leach's Storm-petrel (*Oceanodroma leucorhoa*), Common Murre (*Uria aalge*), Rhinoceros Auklet (*Cerorhinca monocerata*), Ancient Murrelet (*Synthliboramphus hypoleucus*), and Cassin's Auklet (*Ptychoramphus aleuticus*). Also, one land bird, the Western Screech Owl (*Otus kennicottii*), is found on several islands of the Alexander Archipelago (Baranof, Kupreanof, Prince of Wales, and Forrester) but not on the mainland. No less than 58 species (26 of them passeriform) breed on the mainland, but on none of the islands (Table 2). Farther away, 41 species nest in the

TABLE 2. Species which breed on the mainland of southeastern Alaska but not in the Alexander Archipelago.

American Bittern, <i>Botaurus lentiginosus</i>	Black Swift, <i>Cypseloides niger</i>
Northern Pintail, <i>Anas acuta</i>	Vaux's Swift, <i>Chaetura vauxi</i>
Blue-winged Teal, <i>Anas discors</i>	Downy Woodpecker, <i>Picoides pubescens</i>
Northern Shoveler, <i>Anas clypeata</i>	Western Wood-pewee, <i>Contopus sordidulus</i>
Gadwall, <i>Anas strepera</i>	Alder Flycatcher, <i>Empidonax alnorum</i>
American Wigeon, <i>Anas americana</i>	Hammond's Flycatcher, <i>Empidonax hammondi</i>
Redhead, <i>Aythya americana</i>	Say's Phoebe, <i>Sayornis saya</i>
Ring-necked Duck, <i>Aythya collaris</i>	Eastern Kingbird, <i>Tyrannus tyrannus</i>
Lesser Scaup, <i>Aythya affinis</i>	Violet-green Swallow, <i>Tachycineta thalassina</i>
Common Eider, <i>Somateria mollissima</i>	Bank Swallow, <i>Riparia riparia</i>
Barrow's Goldeneye, <i>Bucephala islandica</i>	Cliff Swallow, <i>Hirundo pyrrhonota</i>
Hooded Merganser, <i>Lophodytes cucullatus</i>	Black-capped Chickadee, <i>Parus atricapillus</i>
Rough-legged Hawk, <i>Buteo lagopus</i>	Mountain Chickadee, <i>Parus gambeli</i>
American Kestrel, <i>Falco sparverius</i>	Townsend's Solitaire, <i>Myadestes townsendi</i>
White-tailed Ptarmigan, <i>Lagopus leucurus</i>	Gray-cheeked Thrush, <i>Catharus minimus</i>
Ruffed Grouse, <i>Bonasa umbellus</i>	Bohemian Waxwing, <i>Bombycilla garrulus</i>
Sora, <i>Porzana carolina</i>	Northern Shrike, <i>Lanius excubitor</i>
Semipalmated Plover, <i>Charadrius semipalmatus</i>	Warbling Vireo, <i>Vireo gilvus</i>
Killdeer, <i>Charadrius vociferus</i>	Red-eyed Vireo, <i>Vireo olivaceus</i>
Lesser Yellowlegs, <i>Tringa flavipes</i>	Tennessee Warbler, <i>Vermivora peregrina</i>
Solitary Sandpiper, <i>Tringa solitaria</i>	American Redstart, <i>Setophaga ruticilla</i>
Wandering Tattler, <i>Heteroscelus incanus</i>	Northern Waterthrush, <i>Seiurus noveboracensis</i>
Least Sandpiper, <i>Calidris minutilla</i>	Common Yellowthroat, <i>Geothlypis trichas</i>
Common Snipe, <i>Gallinago gallinago</i>	Western Tanager, <i>Piranga ludoviciana</i>
Pomarine Jaeger, <i>Stercorarius pomarinus</i>	Golden-crowned Sparrow, <i>Zonotrichia atricapilla</i>
Parasitic Jaeger, <i>Stercorarius parasiticus</i>	Snow Bunting, <i>Plectrophenax nivalis</i>
Mew Gull, <i>Larus canus</i>	Red-winged Blackbird, <i>Agelaius phoeniceus</i>
Arctic Tern, <i>Sterna paradisaea</i>	Rusty Blackbird, <i>Euphagus carolinus</i>
Kittlitz's Murrelet, <i>Brachyramphus brevirostris</i>	Common Redpoll, <i>Carduelis flammea</i>

interior (northern British Columbia and southern Yukon) but not in southeastern Alaska. Thirty-two species, 19 of them marine, nest in southeastern Alaska but not in the interior. In the last 32 species, I have blurred the boundary by including 11 species which breed on the islands but not the mainland coast.

Altogether, this geographic tabulation shows a radical biogeographic separation between the mainland and the islands, with a modest separation between the Sitka islands and those to the east and south. Theoretical island biogeography (5, 6, 10, 13) would suppose, on consideration of geography, that Baranof Island, of the larger islands would have the fewest species of breeding birds, with Prince of Wales Island having the next fewest, because of their distances and separations from the mainland. This supposition is wrong so far as our inadequate data go. Present data are somewhat more numerous than those available to Swarth 49 years ago, but they still support Swarth's generalizations.

Briefly, the distribution of breeding bird species in southeastern Alaska exhibits the following patterns:

(1) Radical differences (73 species) between coast and interior, bounded by the Coast Range and marked climatic contrasts. The interior has a severe continental climate whereas the coast has a cool coastal climate.

(2) Radical differences (72 species) between the avifauna of the mainland coast and that of the Alexander Archipelago (see Tables 1 and 2). The boundary is composed of salt water channels of varying widths. As a complication, ecological formations on the islands are less varied than on the mainland; sea level glaciers, riparian cottonwood forests, and extensive fresh water marshes are lacking (17).

(3) Mild differences (22 species) between the avifauna of the eastern/southern islands and those to the west of Chatham Strait. Generally, however, the avifauna of the various islands is surprisingly uniform *inter se*. (See Table 1 and above.) Frederick Sound, Chatham Strait, and other salt water channels and fiords have been minor barriers to the spread of bird species.

(4) Ten species of sea birds nest only on peripheral, westerly islets; the geographic distribution of each of these extends far to the south and/or north to similar breeding islands. Presumably, the proximity of open-ocean feeding grounds is a necessity for these species.

(5) The Queen Charlotte Islands of northwestern British Columbia show moderate differences (33 species) from the eastern/southern islands of southeastern Alaska. Considering their greater spatial isolation than any of the islands of the Alexander Archipelago, their tendency toward a depauperate avifauna (Table 1) is slight, though clear, and the avifaunal demarcation less prominent than one would expect. Particularly, the Queen Charlottes have 3 species not breeding in southeastern Alaska, 5 additional species not found on the eastern/southern islands but lack 25 species found on the eastern/southern islands. Political geography and the paucity of my own field work on the coast of British Columbia have caused me to omit a consideration of the mainland and near-shore islands of that province. My list of breeding birds of the Queen Charlotte Islands was provided by Wayne Campbell (*in lit*).

Point two, above, was only suggested by Swarth (14), and indeed, data to make it did not exist in 1936. Using Swarth's terms, I calculate that of the 58 species which breed on the mainland but not on any of the islands of the Alexander Archipelago, the routes by which they spread to reach southeastern Alaska were:

- Probably from the north—15 species
- Probably from the interior, or east—37 species
- Probably from the south—6 species

This considerable addition to Swarth's thesis does not invalidate his historical

picture, but rather confirms it. Swarth listed 6 species which were confined to small areas on the mainland coast, existed on the coast in small numbers and had no coastal subspecies. Clearly, he said, they had arrived very recently, most of them from the east down the major river valleys (Taku and Stikine, chiefly). We can now expand the number of species from 6 to 58. Ecologically, nearly all of these species are found in riparian cottonwood forests (absent on the islands), fresh water marshes (rare and small on the islands), or glacier foreland tundra (absent on the islands except at unstudied high elevations).

It is interesting to contrast the origins, or probable routes of immigration for those southeastern Alaska species which are *not* confined to the mainland. Of the 14 species breeding only on the islands of the Alexander Archipelago, I calculate that 9 probably entered from the north, 5 from the south, and none from the east. Of the 87 species breeding *both* on the islands and the mainland, I calculate that 14 probably entered from the north, 56 from the south, and 15 from the east. The last group includes 5 song birds (Olive-sided Flycatcher, Yellow-rumped Warbler, MacGillivray's Warbler, Chipping Sparrow, and Brown-headed Cowbird) which are much commoner on the mainland and in the archipelago inhabit in small numbers only one or two of the most easterly islands.

Only one species, the Northwestern Crow (*Corvus caurinus*), is endemic to the humid northwest coast (4). However, two more species, the Rufous Hummingbird (*Selasphorus rufus*), and the Chestnut-backed Chickadee (*Parus rufescens*), have ranges that are only slightly more extensive than the humid, or coastal, coniferous forest (compare 15). At a different taxonomic level, 38 polytypic species have developed one or more subspecies along the humid northwest coast whose range (3) includes southeastern Alaska and/or the Queen Charlotte Islands. Of these, 27 cases involve a single subspecies whose range extends considerably north or considerably south of southeastern Alaska (a few north to Prince William Sound or south to northwestern California). A single case (the Northern Saw-whet Owl (*Aegolius acadicus*)) involves a subspecies confined to the Queen Charlottes, with the remainder of the species not racially differentiated, but widely distributed in southeastern Alaska and elsewhere (8). Eight cases consist of two northwest coast subspecies north of Washington—one confined to the Queen Charlotte Islands and/or the Alexander Archipelago and the other more widely distributed or found only on Vancouver Island and the adjacent southern coast of British Columbia. These eight are the Blue Grouse (*Dendragapus obscurus*, 3), Steller's Jay (*Cyanocitta stelleri*, 3), Brown Creeper (*Certhia americana*, 20), Hermit Thrush (*Catharus guttatus*, 11, 2), Savannah Sparrow (*Passerculus sandwichensis*, 18), Song Sparrow (*Melospiza melodia*, 3), Dark-eyed Junco (*Junco hyemalis*, 3), and Pine Grosbeak (*Pinicola enucleator*, 1). Finally, in 2 species there are in each found 2 subspecies confined to the area under study. In the Hairy Woodpecker (*Picoides villosus*) one subspecies occupies the whole of southeastern Alaska (plus a small part of the northern British Columbia coast), another, the Queen Charlotte Islands (12). In the Fox Sparrow (*Passerella iliaca*, 19), one subspecies occupies the Queen Charlottes and the Alexander Archipelago, another the mainland of southeastern Alaska.

Warner, Mathewes, and Clague (16) state that the Queen Charlotte Islands included a Wisconsin glacial refugium. In the species level analysis of bird distribution above, I see no evidence for or against such a history. The distribution of subspecies, however, is favorable. In 10 of the 11 species with localized subspecies, the geographic ranges and natures of the races suggest that the Queen Charlotte Islands may have been inhabited longer than southeastern Alaska. (By *nature* of the race is meant the size and/or color characteristics which distinguish it and their degree.)

A reasonable comparison may be made of the degree of differentiation of the southeastern Alaska avifauna with that of Newfoundland, at the opposite side of the

continent at about the same latitude. The land areas of the compared areas are similar, but Newfoundland is practically a single island rather than an archipelago, and has less topographic relief. There are 58 species differences of breeding birds between Newfoundland and the adjacent mainland or islands, and 9 subspecies which are peculiar to Newfoundland (8). Repeating from above, for the Alexander Archipelago plus the Queen Charlotte Islands, comparable figures are 74 and 13.

Further analysis of the southeastern Alaska avifauna seems unwarranted, pending further field study and collecting. Systematic collecting of certain groups of birds, especially of grouse, flycatchers and alpine birds, might cause major revisions in the concepts presented above.

Acknowledgments

I thank R. Wayne Campbell for providing me with an up-to-date list of the breeding birds of the Queen Charlotte Islands. Campbell, Daniel D. Gibson, Brina Kessel, Allan R. Phillips, and Winifred B. Sidle helpfully criticized an early draft of the manuscript.

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