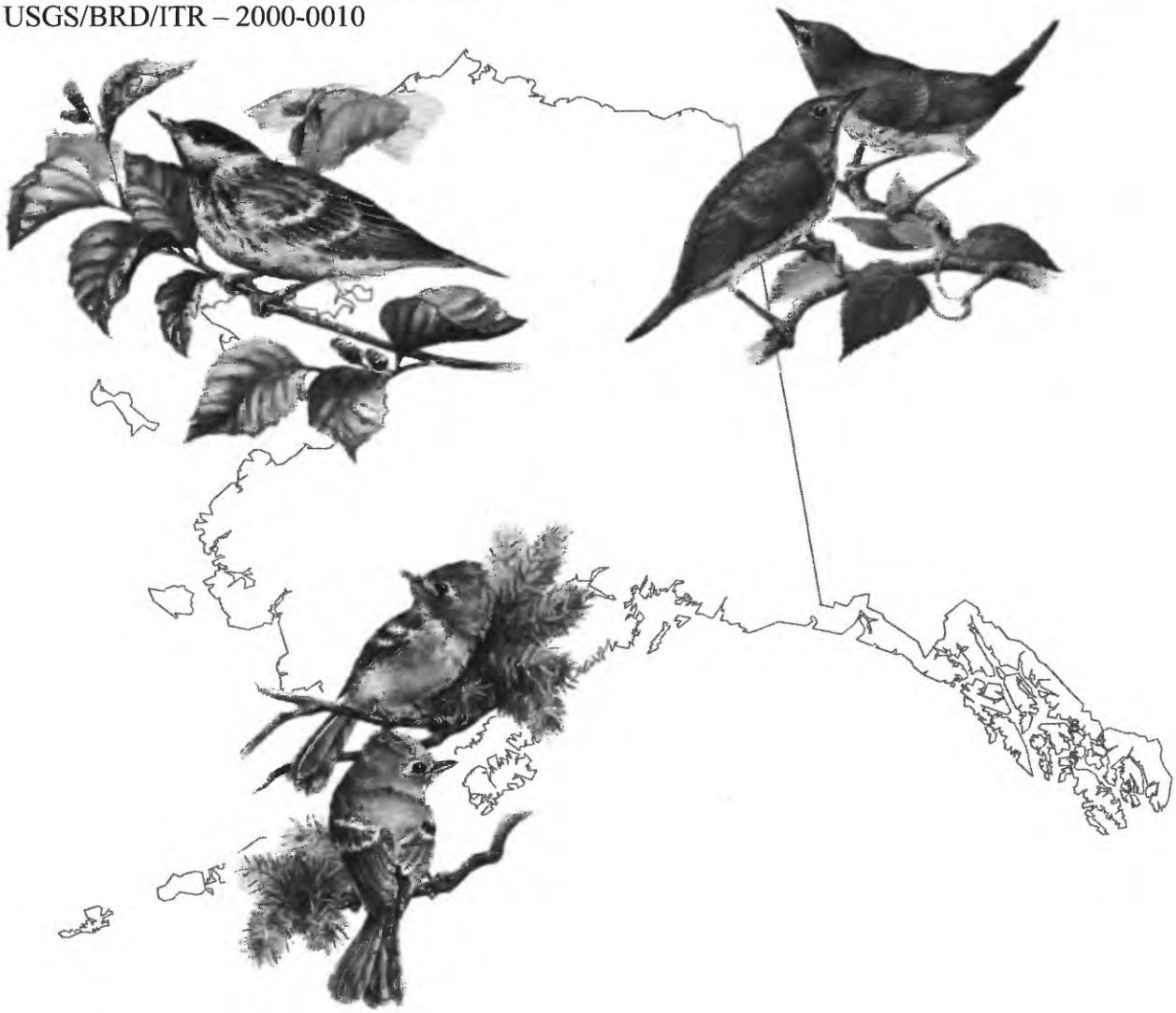
Breeding Bird Habitat Associations on the Alaska Breeding Bird Survey

Information and Technology Report
USGS/BRD/ITR – 2000-0010



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Cover illustrations by Debra Dubac: top left, Blackpoll Warbler (*Dendroica striata*); top right, Swainson's Thrush (*Catharus ustulatus*); and bottom, Pacific-slope Flycatcher (*Empidonax difficilis*); used with permission of the artist. Text illustrations by Bob Hinz, former U.S. Fish and Wildlife Service employee.

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Breeding Bird Habitat Associations on the Alaska Breeding Bird Survey

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Abstract: The Breeding Bird Survey (BBS) is the most widespread program used to monitor population of landbirds on the North American continent. Each BBS route, which is surveyed once a year, consists of 50 stops placed at 0.8-km (0.5-mi) intervals along a stretch of road. In recent years, the program in Alaska has greatly expanded; observers record more than 200 species on 75 BBS routes and, in a typical year, count about 35,000 individual birds. Although the BBS effectively tracks many bird populations on regional and continental scales, it does not record temporal changes in habitat that could account for bird population fluctuations. Therefore, we undertook a project to assess vegetation covertypes along roadside routes throughout Alaska. Our purposes were to determine bird-vegetation associations and classify vegetation covertypes to monitor future changes. A well-established classification scheme was used to assess vegetation covertypes along 62 roadside BBS routes in Alaska. We used bird count data from the BBS to determine the frequency of occurrence (percent of stops) of 48 landbird species (grouse, hummingbirds, woodpeckers, and passerines) in dominant vegetation types. We also calculated the average bird density (birds per stop) for three major cover classes (less than 30%, 30-60%, greater than 60%) of forest, shrub, or herbaceous vegetation covertypes. Data are depicted graphically to examine relationships between vegetation covertypes and bird density or occurrence within four biogeographic regions of the state. Abundance and occurrence information for each species in each biogeographic region are also presented. This information illustrates broad-scale bird-habitat associations and will serve as a foundation to compare future changes in Alaska's landscape.

Keywords: Alaska, Breeding Bird Survey, habitat, vegetation, landbirds, passerines, forest

Introduction

Interest in establishing a broad-scale monitoring effort for birds arose in the mid-1960's in response to a perceived decline in resident and migrant songbird populations throughout North America. In spring 1965, the U.S. Fish and Wildlife Service created 60 roadside point-count routes in Delaware and Maryland to test the efficacy of establishing a continent-wide monitoring program. The North American Breeding Bird Survey (BBS) officially began in the United States and Canada the following year. Coverage expanded throughout the contiguous United States and southern Canada for nearly a decade before the program extended intoYukon Territory, Northwest Territories, and Alaska. Currently, there are approximately 3,400 permanent routes established in North America (see http://www.mbr.nbs.gov/bbs/bbs.html).

The BBS had its Alaska inauguration in 1968 when Dr. Chandler Robbins (Patuxent Wildlife Research Center) surveyed three routes near Fairbanks. Interest in the BBS was slow to develop, and few routes were surveyed in Alaska between 1968 and 1981. In 1982, the Alaska Department of Fish and Game began promoting the BBS and substantially increased route coverage in the state. Coverage gradually increased and culminated with 38 routes being surveyed in 1992. The initiation of the Neotropical Migratory Bird Conservation Program (Partners in Flight) in Alaska greatly increased interest in conducting BBS routes; coverage has more than doubled since 1992, and about 75 routes are now surveyed annually in Alaska. Observers have recorded more than 200 species on BBS routes and, in a typical year, count about 35,000 individual birds.

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Bird counting procedures are standardized throughout the BBS program (see Peterjohn, 1994 for details). Each route consists of 50 stops placed at 0.8-km (0.5-mi) intervals along a 39.4-km (24.5-mi) stretch of road. Routes are surveyed once each year by an observer who is familiar with the sight and song of birds in the region. At each of the 50 stops, the observer records the number of individuals of each species heard or seen during a 3-min period; only birds detected within 0.4 km (0.25 mi) of the road are counted. Surveys begin 30 min before sunrise (no earlier than 0230 h in Alaska) and are completed within 4-5 h. In Alaska, 10 routes located along rivers are surveyed by boat and take more than 5 h to complete. Most Alaska routes are surveyed between the second and fourth weeks of June. Because of differences in the skills of observers, the same observer is encouraged to survey the same route for a number of years.

Although it effectively tracks many bird populations on regional and continental scales, the BBS does not record temporal changes in habitat that could account for bird population fluctuations. Training volunteers, guaranteeing consistency among volunteers, standardizing habitat classification methods, and budgeting time contribute to the difficulty in recording detailed habitat data at each stop. Therefore, in 1996-97, we assessed vegetation covertypes along roadside routes throughout Alaska to determine bird-habitat associations and to classify vegetation to monitor future changes. With this information, we can begin to assess the relationship between human-induced or naturally occurring changes in habitat and changes in bird populations. Although this dataset provides a basis for determining broad-scale distribution patterns for each species, it is unable to furnish a statewide, high-resolution picture of species distributions because information from across much of western Alaska is lacking. We do believe, however, that this information is valuable in illustrating bird-habitat associations and will serve as a foundation for future comparisons as the landscape of Alaska changes.

Methods

Vegetation Covertype Classification

For the vegetation covertype assessment, we adapted the five-level Alaska vegetation classification scheme of Viereck and others (1992). This system identifies vegetation communities in Alaska from the general (level I - gross structural components) to the specific (level V - species composition). Because of the difficulty involved with classifying vegetation to level V, and the questionable relationship between species-specific vegetation composition and bird-use patterns, we assessed vegetation covertypes on Alaska BBS routes to level III, the level that emphasizes the structural landscape (table 1).

At level I, primary vegetation types are divided into three major classes: forest, scrub, and herbaceous. Each vegetation type is further divided by structural features (e.g., percent canopy cover, height), species composition, and, for herbaceous vegetation, soil and water characteristics.

At level II, forests are categorized as needleleaf, broadleaf, or mixed. Needleleaf and broadleaf forests contain greater than 75% of needleleaf or broadleaf trees. In mixed forests, neither broadleaf nor needleleaf

Table 1. Alaska vegetation classification system (to level III) of Viereck and others (1992).

Level I	Level II	Level III
I. Forest	A. Needleleaf (conifer) forest	1. Closed needleleaf forest
		2. Open needleleaf forest
		3. Needleleaf woodland
	B. Broadleaf forest	1. Closed broadleaf forest
		2. Open broadleaf forest
		3. Broadleaf woodland
	C. Mixed forest	1. Closed mixed forest
		2. Open mixed forest
		3. Mixed woodland
II. Scrub	A. Dwarf tree scrub	1. Closed dwarf tree scrub
		2. Open dwarf tree scrub
		3. Dwarf tree scrub woodland
	B. Tall scrub	1. Closed tall scrub
		2. Open tall scrub
	C. Low scrub	1. Closed low scrub
		2. Open low scrub
	D. Dwarf scrub	1. Dryas dwarf scrub
		2. Ericaceous dwarf scrub
		3. Willow dwarf scrub
III. Herbaceous	A. Graminoid herbaceous	1. Dry graminoid herbaceous
		2. Mesic graminoid herbaceous
		3. Wet graminoid herbaceous (emergent)
	B. Forb herbaceous	1. Dry forb herbaceous
		2. Mesic forb herbaceous
		3. Wet forb herbaceous (emergent)
	C. Bryoid herbaceous	1. Mosses
		2. Lichens
	D. Aquatic (nonemergent) herbaceous	1. Freshwater aquatic herbaceous
		2. Brackish water aquatic herbaceous
		3. Marine aquatic herbaceous

trees are dominant; each contributes 25-75% of the total canopy. Level III forest classifications describe crown canopy coverage: closed (60-100% canopy cover), open (25-60% canopy cover), and woodland (10-25% canopy cover).

At levels II and III, scrub (hereafter, shrub) classes are based on shrub height and percentage of canopy cover. Level II shrub classes include dwarf tree and tall, low, and dwarf shrub. Dwarf tree shrub consists of communities with greater than 10% vegetative cover in tree species that will not, at that location, attain a height greater than 3 m. Tall shrub vegetation is greater than 1.5 m, and tall shrubs contribute greater than 25% total cover. Shrub communities with heights of 0.2-1.5 m (and provide greater than 25% cover) are low shrub. Dwarf shrub vegetation is characterized by prostrate shrubs (less than 20 cm) that make up greater than 25% of vegetation cover. Level III classifications for dwarf tree shrub are the same as those used for forests (closed, open, and woodland). Both tall and low shrub vegetation types are designated as closed (greater than or equal to 75% cover) or open (less than 75% cover) at level III. Level III distinctions of dwarf shrub are by taxonomic division and include dryas dwarf shrub, ericaceous dwarf shrub, and willow dwarf shrub.

Herbaceous vegetation is divided at level II into four classes: graminoid herbaceous, forb herbaceous, bryoid herbaceous, and aquatic herbaceous. Level III divisions for graminoid herbaceous and forb herbaceous are based on substrate moisture content (dry, mesic, and wet). Herbaceous bryoid vegetation is divided into two classes at level III: mosses and lichens. Relative salinity of surrounding water differentiates the three classes of aquatic vegetation: freshwater, brackish, and marine.

We also recorded the occurrence of unvegetated habitats, as described by Kessel (1979), that included beaches and tidal flats, coastal cliffs and block fields, inland cliffs and block fields, alluvia, and subterranean soil (e.g., cut banks). Water bodies were categorized as fluviatile, lacustrine, or near-shore (marine). Houses, buildings, parking lots, and other areas modified by humans were classified as disturbed. Burned and logged areas were classified according to their primary habitat (e.g., closed, low scrub) and were noted as being a burn or cut.

Vegetation Covertype Survey Methods

We conducted vegetation surveys on 62 Alaska BBS routes (tables 2, 3; figs. 1, 2) between 17 June and 10 October 1996 and August 1997. Nearly 95% of 3,100 stops were surveyed (location of some stops could not be accurately determined). To accurately locate stops, we used stop descriptions prepared by BBS observers and consulted with the observers when possible. To reduce variability in habitat determinations, all habitat surveys were conducted by one of two observers, with the majority being done by one observer.

Table 2. Southeastern Alaska BBS route locations.

Map no.[1]	Route no.	Route name	Route location
1	024	Ketchikan	Ketchikan
2	023	Craig	West Prince of Wales Island
3	123	Thorne Bay	East Prince of Wales Island
4	224	Zimovia Strait	North Wrangell Island
5	429	Zarembo	Zarembo Island
6	221	Mitkof Island	Petersburg
7	122	Sitka	Sitka
8	435	Chichagof Island	North Chichagof Island
9	411	Hoonah	Hoonah
10	021	Juneau	Juneau
11	025	Haines	Haines
12	425	Skagway	Skagway

[1]See numbers on figure 1 for route locations.

Covertype composition was determined during an approximate 5-min visit at each stop along a BBS route. Similar to bird counts in the BBS, the area within an approximate 400-m (0.25-mi) radius was surveyed. The area of each primary vegetation covertype present at a stop was estimated with 10% resolution. Most stops, therefore, contained multiple primary covertypes which (when summed) equaled 100%. For example, a stop could consist of 30% needleleaf forest, 20% mixed forest, 40% closed tall shrub, and 10% open low shrub. If a distinct covertype constituted less than 10% of the stop area, it was recorded as trace. For the open covertypes of dwarf tree woodlands and woodland forests, we assessed the percentage and type of understory vegetation to level II and included these estimates in total shrub cover calculations (when primary shrub existed, primary and secondary shrub estimates were summed to yield total shrub cover for a given stop). Although not presented here, we also sampled vegetation covertypes remotely using aerial photography.

BBS Covertype Distribution in Alaska Biogeographic Regions

Kessel and Gibson (1979) divided Alaska into six biogeographic regions (hereafter, bioregions) important in avian distribution patterns: Southeastern, Southcoastal, Southwestern, Central, Western, and Northern Bioregions. These divisions were based on

Table 3. Southcoastal, central, northern-western Alaska BBS route locations.

Map no.[1]	Route no.	Route name	Route location
Southcoastal			
13	321	Harlequin Lake	Yakutat
14	125	Yakutat	Yakutat
15	850	Copper River	Copper River Delta
16	050	Cordova	Cordova
17	216	Hope	North Kenai Peninsula/Turnagain Arm
18	319	Kachemak	Homer/Kachemak Bay
19	119	Anchor River	North Homer
Central			
20	903	McCarthy	McCarthy/East McCarthy Road
21	905	Chitina	Chitina/West McCarthy Road
22	052	Kenny Lake	Edgerton Highway
23	902	Nabesna	Nabesna Road/Wrangell/St. Elias National Park and Preserve
24	009	Chistochina	Glenn Highway/Tok Cutoff
25	054	Sourdough	Richardson Highway/N. Gakona Junction
26	007	Slana	Slana/Glenn Highway/Tok Cutoff
27	010	Northway	Alcan Highway, Alaska-Canada Border
28	008	Tower Bluffs	Alcan Highway/Tanacross
29	420	Mt. Fairplay	Taylor Highway
30	101	Chicken	Taylor Highway
31	001	Eagle	North Taylor Highway
32	002	Circle	North Steese Highway/Circle
33	003	Chatanika	Steese Highway/Chatanika River
34	041	Lake Salcha	Richardson Highway/Moose Creek
35	428	West Fairbanks	Murphy Dome Road
36	418	Manley Hot Springs	Manley Hot Springs/Elliot Highway
37	403	Caribou Mt.	South Dalton Highway
38	404	Coldfoot	Coldfoot/Dalton Highway
39	372	Dietrich Camp	Dalton Highway/South Brooks Range
40	431	Delta	Richardson Highway/S. of Delta Junction
41	901	Paxson Lake	Richardson Highway/Denali Highway
42	011	Maclaren	Maclaren River/East Denali Highway
43	012	Monahan	Denali Highway
44	115	Savage	Savage River/Denali National Park
45	015	Toklat	Toklat River/Denali National Park
46	313	Petersville	Petersville Road/Trapper Creek
47	030	Willow	West Hatcher Pass Road/Parks Highway
48	117	Hatcher Pass	East Hatcher Pass Road
49	053	Sheep Mt.	Glenn Highway
50	212	Lake Louise	Lake Louise Road/Glenn Highway
51	432	Fort Richardson	Fort Richardson
52	118	Swan Lake Rd.	North Kenai National Wildlife Refuge (NWR)
53	318	Seven Lakes	Skilak Lake Road/Kenai NWR
54	060	Katmai	Katmai National Monument
55	192	King Salmon	King Salmon/Naknek
56	180	Dillingham	Dillingham/Aleknagik
Northern-Western			
57	408	Galbraith Lake	Dalton Highway/North Brooks Range
58	409	Happy Valley	Dalton Highway
59	405	Council	Central Seward Peninsula
60	424	Salmon Lake	North of Nome
61	422	Nome	Nome
62	427	Teller	Nome-Teller Highway

[1] See numbers on figure 2 for route locations.

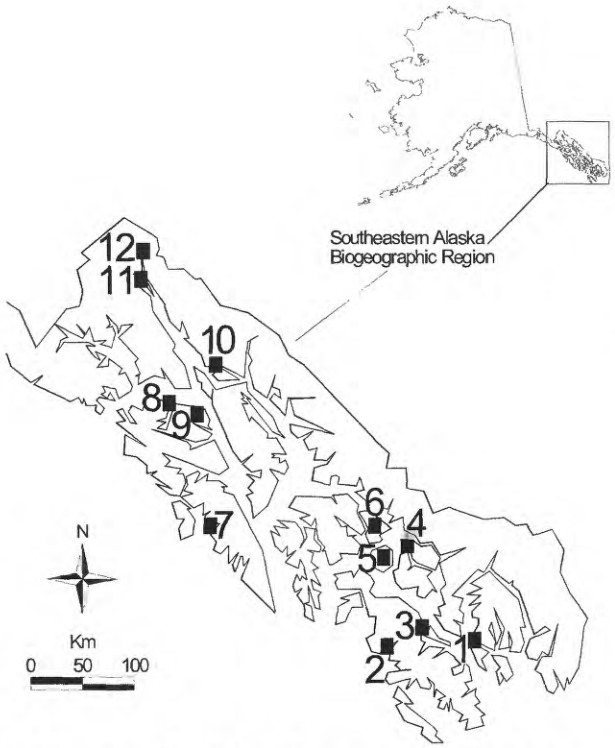


Fig. 1. Location of Breeding Bird Survey routes in the Southeastern Bioregion of Alaska.

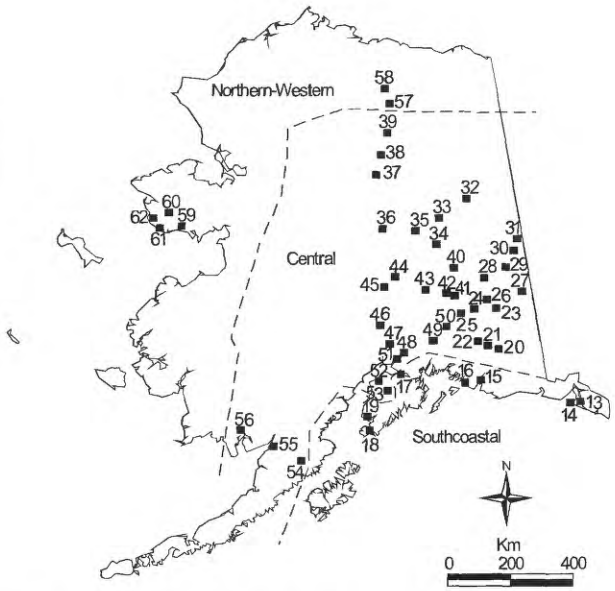


Fig. 2. Location of Breeding Bird Survey routes in Southcoastal, Central, and Northern-Western Bioregions of Alaska. Dotted line designates bioregions.

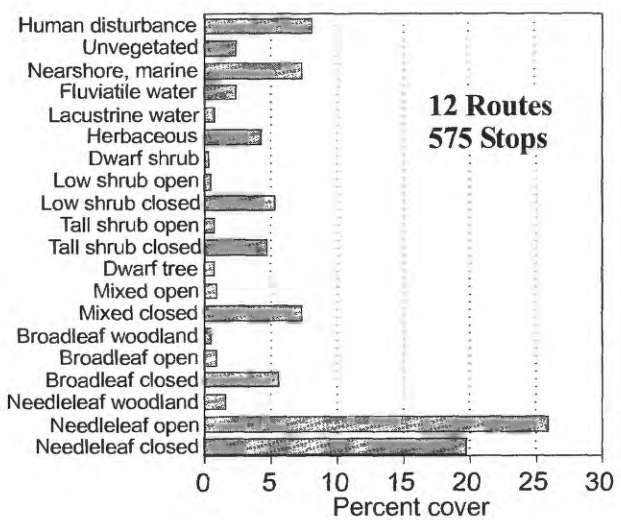


Fig. 3. Proportional representation of vegetation covertypes on southeastern Alaska BBS routes.

historical (e.g., geology, species evolutionary history, historical species ranges) and contemporary (e.g., habitat, current species ranges, and migration routes) factors. Due to limited BBS route coverage in the Southwestern Bioregion, we do not include it in this analysis. Because there are very few BBS routes in the Northern and Western Bioregions, and because they sample similar habitats (herbaceous and shrub), we combined them into one bioregion. Our division of Alaska, therefore, contains four bioregions: Southeastern, Southcoastal, Central, and Northern-Western.

Southeastern Alaska (fig. 3) is dominated by coastal needleleaf rainforest. Much of this forest is characterized by pure and mixed stands of mature Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*). Other species include western redcedar (*Thuja plicata*) in the south, and Alaska cedar (*Chamaecyparis nootkatensis*), lodgepole pine (*Pinus contorta*), and red alder (*Alnus rubra*; Viereck and Little, 1972). Within the forest, other human-induced and naturally occurring vegetation types, such as riparian shrub, muskeg, clearcut shrub, and young-growth stands, exist in lesser amounts. Mixed forests in the region are comprised of red alder and any one or more species of needleleaf trees. Shrub habitats usually result from clearcuts or roadside cuts, and it should be noted that no stops in this region are composed of greater than or equal to 60% shrub. Muskegs, despite being an important habitat type, are poorly represented on the Alaska BBS. Several southeastern BBS routes include urban and semi-urban areas, which are reflected in the human disturbance category of covertype. Cottonwood (*Populus* spp.) and deciduous shrub along mainland river corridors are also major vegetation types in the Southeastern Bioregion but are represented only on portions of the Haines route. We

surveyed vegetation covertypes on 12 southeastern Alaska routes (table 2).

Southcoastal Alaska (fig. 4) is also dominated by a coastal needleleaf rainforest of Sitka spruce and, to a lesser extent, western hemlock. Other conifers occurring in the Southeastern Bioregion do not range into, or are found in small numbers, throughout the Southcoastal Bioregion. Higher percentages of herbaceous and shrub habitats (as compared to the Southeastern Bioregion) were found mostly on the two Copper River Delta routes (Cordova and Copper River). Shrub habitats in the region are dominated by *Alnus* spp. and *Salix* spp. Unlike BBS coverage in the Southeastern Bioregion, routes in the Southcoastal Bioregion do not sample insular habitats. Due to restricted access, coastal spruce forests are undersampled in the Southcoastal Bioregion. We include seven Southcoastal Bioregion routes in this analysis (table 3).

The Central Bioregion, the largest region in the state, includes 37 BBS routes throughout the interior boreal forest and alpine tundra (table 3, fig. 5). The boreal forest is characterized by the presence of few tree species; white spruce (*Picea glauca*), paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and poplar (*Populus* spp.) occur on south-facing slopes and on well-drained uplands lacking permafrost. North-facing slopes, poorly drained lowlands, and permafrost areas are typically vegetated by black spruce (*Picea mariana*), tamarack (*Larix laricina*), and to a lesser extent, white spruce and paper birch. Dwarf tree forests and woodlands, and herbaceous covertypes are also found in these lowland areas. Tall and low shrub habitats occur on alpine tundra routes in the southern Alaska Range and in the northern Chugach Mountains.

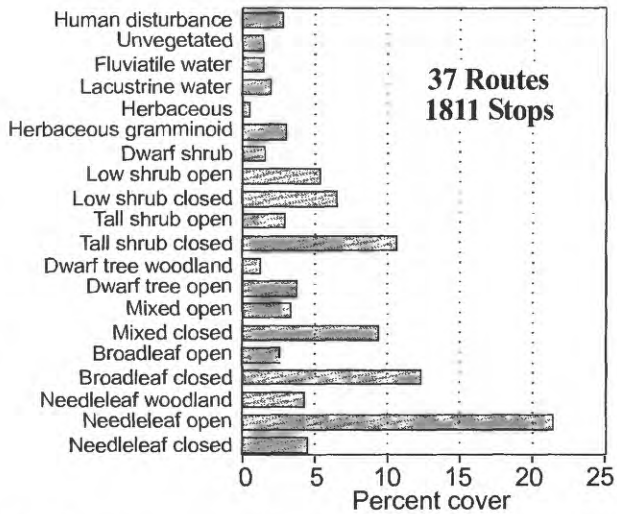


Fig. 5. Proportional representation of vegetation covertypes on central Alaska BBS routes.

The Northern-Western Bioregion consists of six routes, four on the Seward Peninsula and two along the Dalton Highway north of the Brooks Range (table 3). These routes are mostly upland shrub (*Betula nana*, *Salix* spp.) and herbaceous tundra habitats (fig. 6). Riparian areas on the Seward Peninsula, characterized by closed tall shrub, constitute a small area but contribute greatly to avian diversity. Although there are several river routes within the Yukon-Kuskokwim Delta, vegetation covertype data were not recorded on these routes.

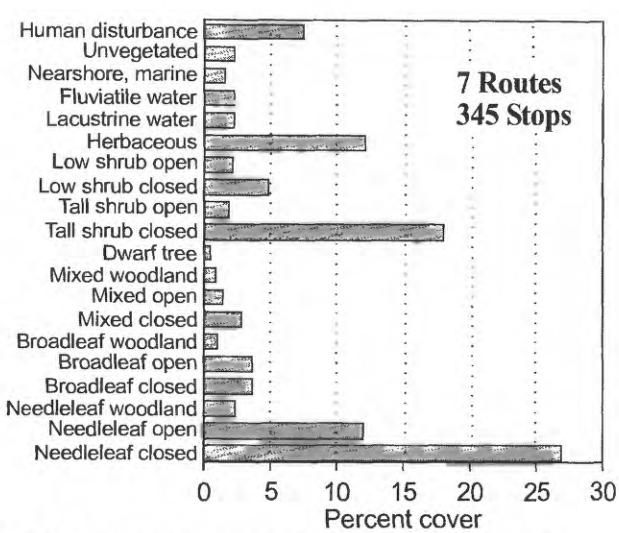


Fig. 4. Proportional representation of vegetation covertypes on southcoastal Alaska BBS routes.

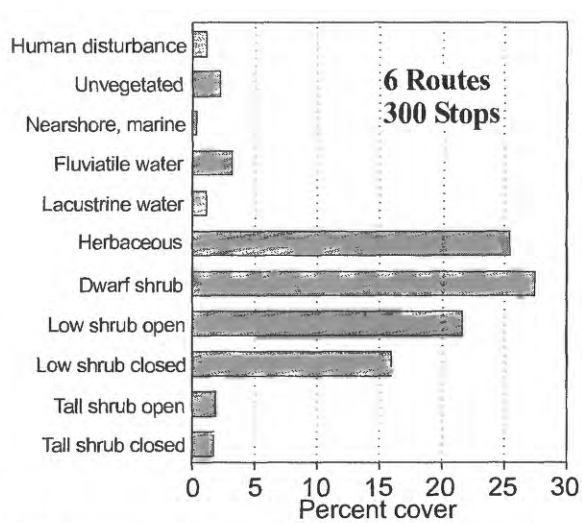


Fig. 6. Proportional representation of vegetation covertypes on northern-western Alaska BBS routes.

Data Presentation

Percent Occurrence Calculations

If greater than 60% of a vegetation covertype was at a stop, we defined the stop by the dominant covertype. Within each covertype, we counted the number of stops where a given species occurred, divided by the total number of stops of that covertype, and expressed this number as percent occurrence. Calculations were made for each bioregion. The major covertypes used for this calculation differed by bioregion (figs. 7a,c,e,g; for abbreviations, see table 4). In the Central Bioregion, we combined needleleaf woodland and dwarf tree woodland into one vegetation covertype for percent occurrence calculations. These data are presented graphically in the species accounts. For comparisons between bioregions, the abscissa (percent occurrence) of graphs is fixed for each species.

Density Calculations

We calculated total shrub and forest cover for each stop by using percent cover of primary and secondary vegetation covertypes. Secondary shrub cover within closed and open forest habitats was not included in total shrub cover calculations. Forest cover was estimated by summing closed and open forests of the appropriate type (e.g., closed and open needleleaf forests in the Southeastern Bioregion).

Forest covertypes differed across bioregions. We used only needleleaf forest covertypes to define forest cover in southeastern Alaska, whereas all forest types (needleleaf, broadleaf, mixed) were included in Southcoastal and Central Bioregions (figs. 7b,d,f). Although broadleaf forests exist in southeastern Alaska, they are not representative of the area's forests and are found along a few mainland rivers. Two southeastern BBS routes, Skagway and Haines, had extensive broadleaf cover and were found at the extreme northern portion of the bioregion. The broadleaf portions of these routes contained a suite of bird species that differed markedly from southeastern Alaska's needleleaf forests (e.g., American Redstart, Warbling Vireo, Yellow Warbler).

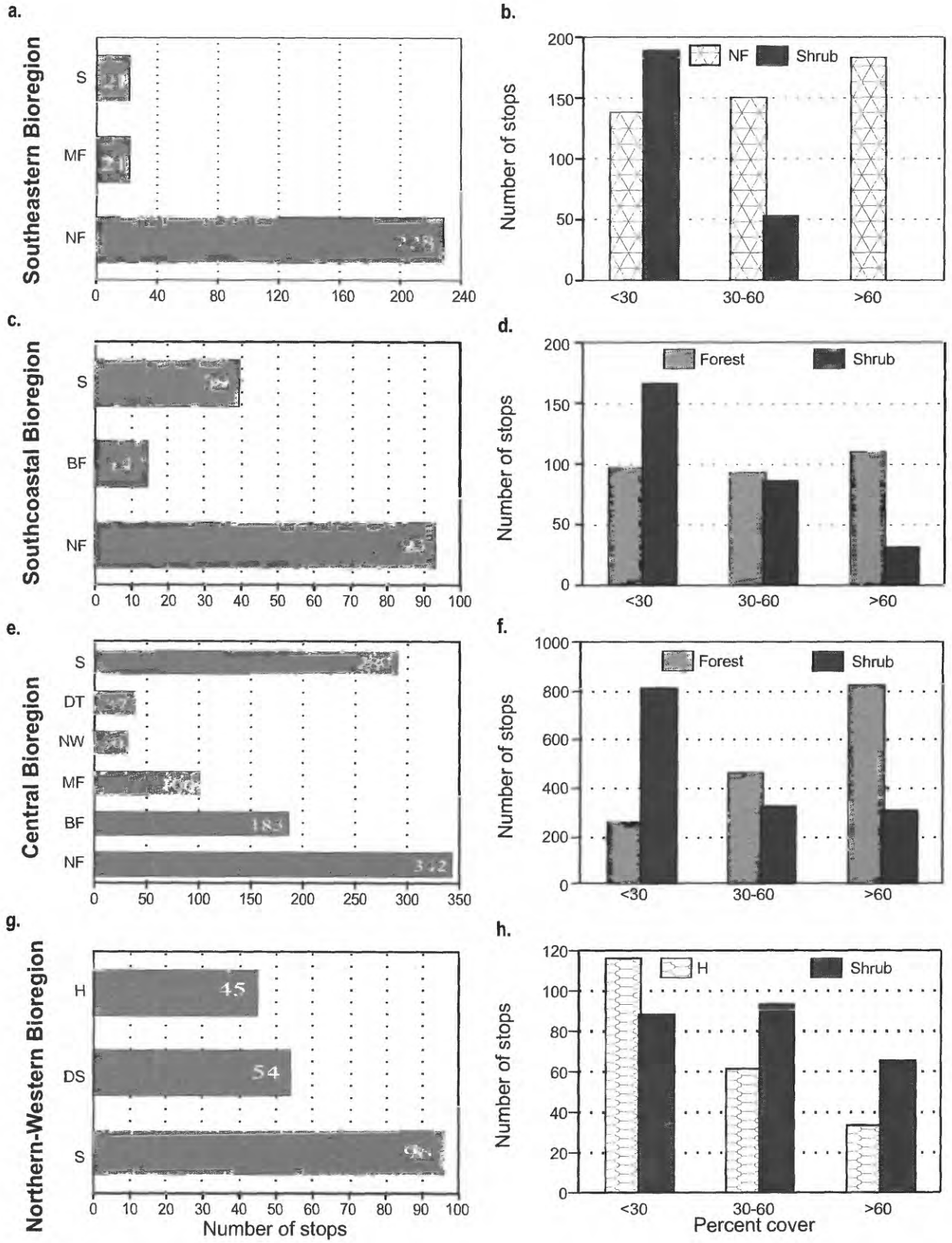
We calculated the average number of birds per stop on each route for four years of BBS data (1993-96, but not all routes were run every year). To examine the relationship between bird density and quantity of cover, we included several more years of bird count data than vegetation data so that any annual variability in vegetation due to differences in weather patterns could be minimized. We then calculated average bird density (birds per stop) for each cover class. All commonly occurring landbird species of the following groups were included: grouse, hummingbirds, woodpeckers, and passerines (excluding swallows). We combined counts from 10% incremental covertypes into three major cover classes (less than 30%, 30-60%, greater than 60%), but we did not include cover classes having less than 10 stops (e.g., greater than 60% shrub in the Southeastern Bioregion). We developed theoretical models of response to vegetation cover for bird species typically inhabiting forests, shrubs, or a mixture (edges) (fig. 8). The same models can be applied to herbaceous, shrubs, and their mixure. In this scheme, the same stop could contribute both shrub and forest components, which are depicted in the bird density figures (e.g., bird densities on a stop with less than 30% shrub and greater than 60% forest could be represented on both the left and right portions of the bird density figures). For each graph, the relationship between bird density and quantity of cover can be viewed separately for each vegetation type presented (e.g., needleleaf forest and shrub for the Southeastern Bioregion). Furthermore, viewing bird densities for both vegetation types simultaneously may clarify less conspicuous relationships between covertype and bird density (e.g., edge species). A brief study of figure 8 should aid in interpreting bird density figures.

Distribution Summaries

For each species, we present a summary distribution table by bioregion that includes percentage of routes on which the species occurs (percent routes), mean number of individuals per route each year (birds per route), and mean number of individuals per route for routes on which the species occurs (birds per route where present). To assess variability of bird density among routes in a bioregion, we calculated the standard error of route means (SEM) (calculated across years) for birds per route.

BBS Covertype Sample Sizes By Region

Sample sizes for percent occurrence and bird density calculations for each bioregion are depicted graphically in figures 7 a-h. Covertypes used in bird density calculations differed by bioregion. In the Southeastern Bioregion, we used needleleaf forest and shrub covertypes. In the Southcoastal and Central Bioregions, we combined all forest types (needleleaf, broadleaf, and mixed) into one category (percent forest). Bird density was also calculated for shrub covertypes. In the Northern-Western Bioregion, we used shrub and herbaceous covertypes. In all bioregions, shrub covertype included tall, low, open, and closed categories.



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Fig. 7. Vegetation covertypes assessed along Breeding Bird Survey routes in Southeastern, Southcoastal, Central, and Northern-Western Bioregions of Alaska. Numbers indicate sample size of stops in each covertype.

Table 4. Abbreviations used in this report.

Abbreviation	Definition
NF	Needleleaf forest
BF	Broadleaf forest
MF	Mixed forest
NW	Needleleaf woodland
DT	Dwarf tree
S	Shrub (tall, low, open, closed)
DS	Dwarf shrub
H	Herbaceous
SE	Southeastern Bioregion
SC	Southcoastal Bioregion
CE	Central Bioregion
N-W	Northern-Western Bioregion
SEM	Standard error of the mean

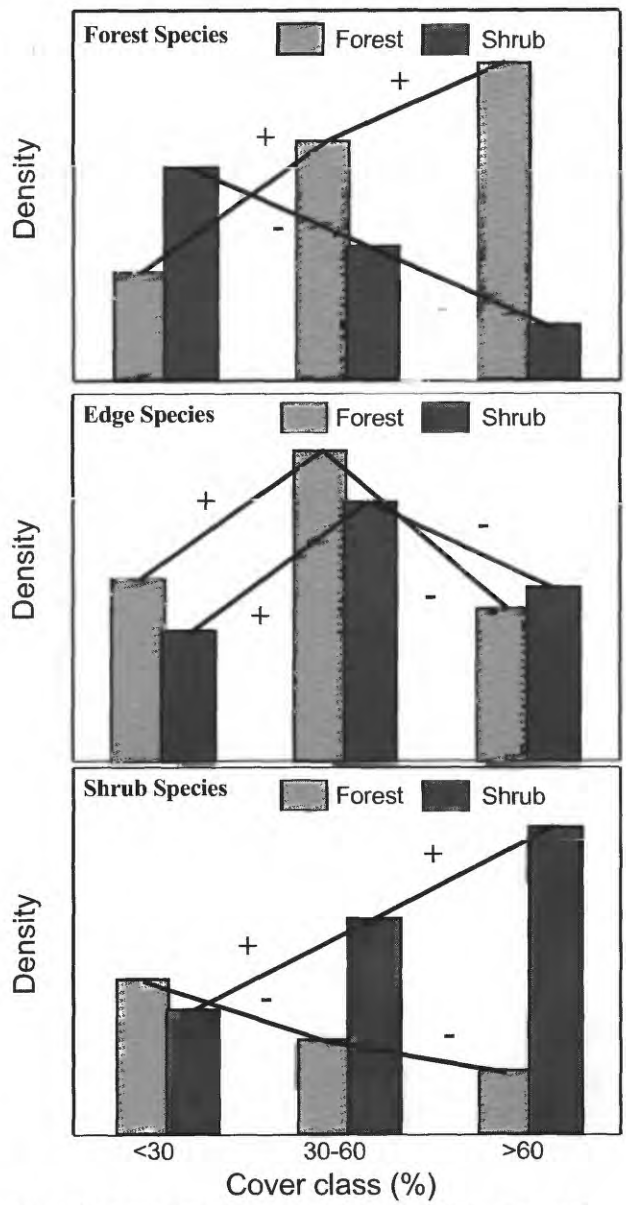


Fig. 8. Predicted distribution of species favoring shrub, edge, and forest covertypes.

Species Accounts

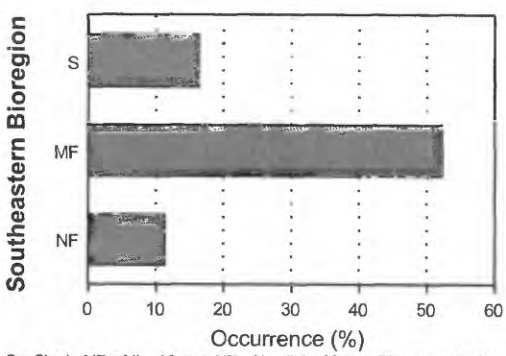
Blue Grouse

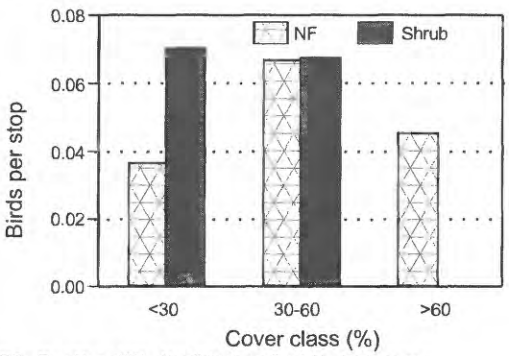
(Dendragapus obscurus)

Blue Grouse are uncommon in the Southeastern Bioregion. Generally, less than 2.0 birds per year are found on southeastern BBS routes except on the Zimovia Strait (14.7 birds per year) and Haines (9.3 birds per year) routes. Relatively high bird density in the 30-60% shrub and needleleaf classes indicates that forest edges may be important. Usually considered a coniferous species in southeastern Alaska, but high frequency in mixed forests on BBS routes suggests that these forests are suitable or, possibly, preferred. Also common in alpine shrub areas not sampled by the BBS.

Blue Grouse

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	58	3.0 (1.4)	5.2





S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

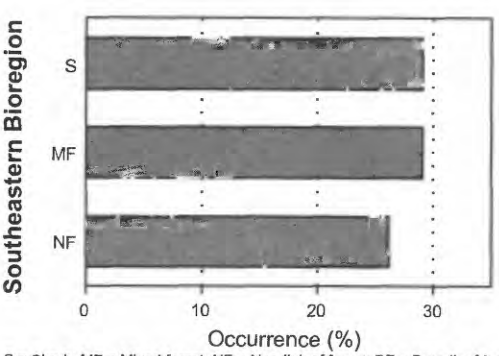
Rufous Hummingbird

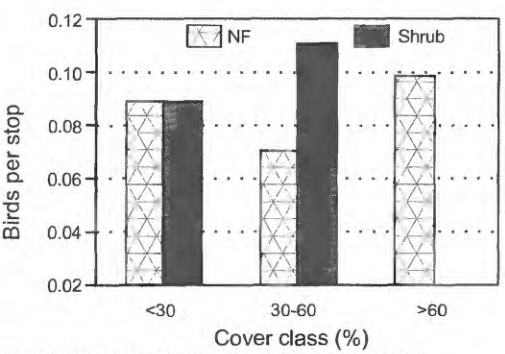
(Selasphorus rufus)

No obvious habitat affinities for Rufous Hummingbirds can be clearly determined from data presented here. Breeding Bird Survey data are likely unrepresentative because of this species' propensity to visit feeders. This species may be more common along forest edges and gaps. In the Southeastern Bioregion, densities were 7.3-9.5 birds per year on Sitka, Chichagof Island, Hoonah, and Zarembo routes but were lower elsewhere. Rufous Hummingbirds also occur in the Southcoastal Bioregion, but they are not typically recorded on BBS routes.

Rufous Hummingbird

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	92	4.3 (0.9)	4.6





S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Red-breasted Sapsucker

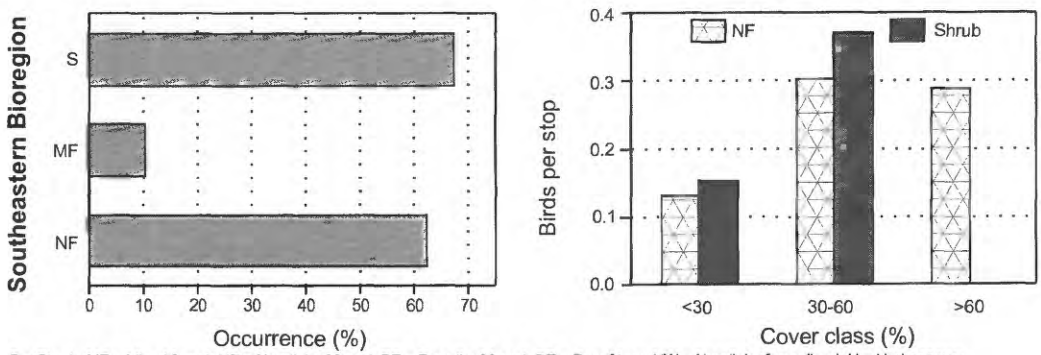
(Sphyrapicus ruber)

The Red-breasted Sapsucker is found throughout the Southeastern Bioregion but is rare to uncommon on Haines and Skagway routes. It is associated with needleleaf forests and edges, and highest densities (24.3-31.0 birds per year) are recorded on the Chichagof Island, Hoonah, and Zarembo routes. Red-breasted Sapsuckers are commonly observed along clearcut edges, which is reflected in high densities in shrub habitats. Increased detectability in and near clearcuts may inflate observations in shrub areas.

Although this species is found in the eastern portion of the Southcoastal Bioregion, it is rarely found on the southcoastal BBS.

Red-breasted Sapsucker

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	11.3	(3.1)	11.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

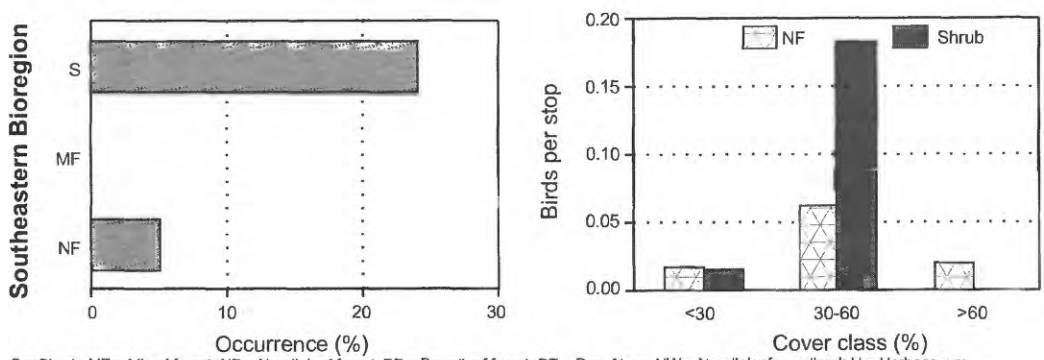
Downy Woodpecker

(Picoides pubescens)

Downy Woodpeckers are found on northern Southeastern Bioregion BBS routes; highest densities occur on the Chichagof Island routes (Hoonah-10.3 birds per year, Chichagof Island-6.0 birds per year). Increased detectability due to clearcuts on these routes may result in high numbers of observed woodpeckers. Low detections in other regions preclude analysis.

Downy Woodpecker

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	33	1.4	(0.9)	4.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

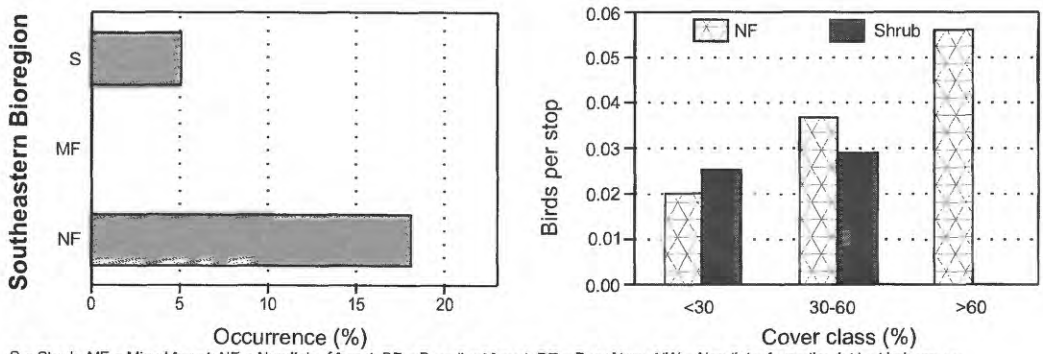
Hairy Woodpecker

(Picoides villosus)

In the Southeastern Bioregion, Hairy Woodpecker densities increase with increasing needleleaf forest cover. Hairy Woodpeckers occur on 10 routes, with the highest densities recorded on the Zarembo Island (6.3 birds per year). There are few observations of this species on BBS in other regions.

Hairy Woodpecker

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	83	1.6 (0.5)	1.9



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

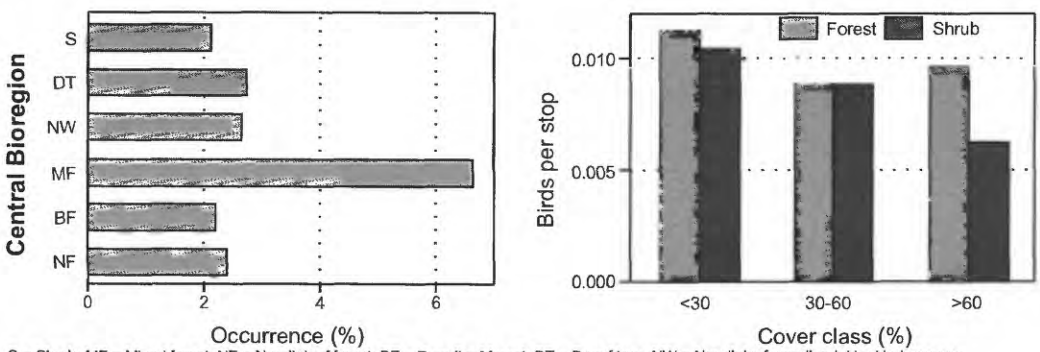
Northern Flicker

(Colaptes auratus)

This species was uncommonly found in all covertypes sampled on the central BBS; it is most common in mixed forests. Relatively high densities recorded in shrub habitats may result from edge effects. As with other woodpeckers, observations of Northern Flickers on Alaska BBS are infrequent.

Northern Flicker

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	49	0.5 (0.1)	1.4



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Olive-sided Flycatcher

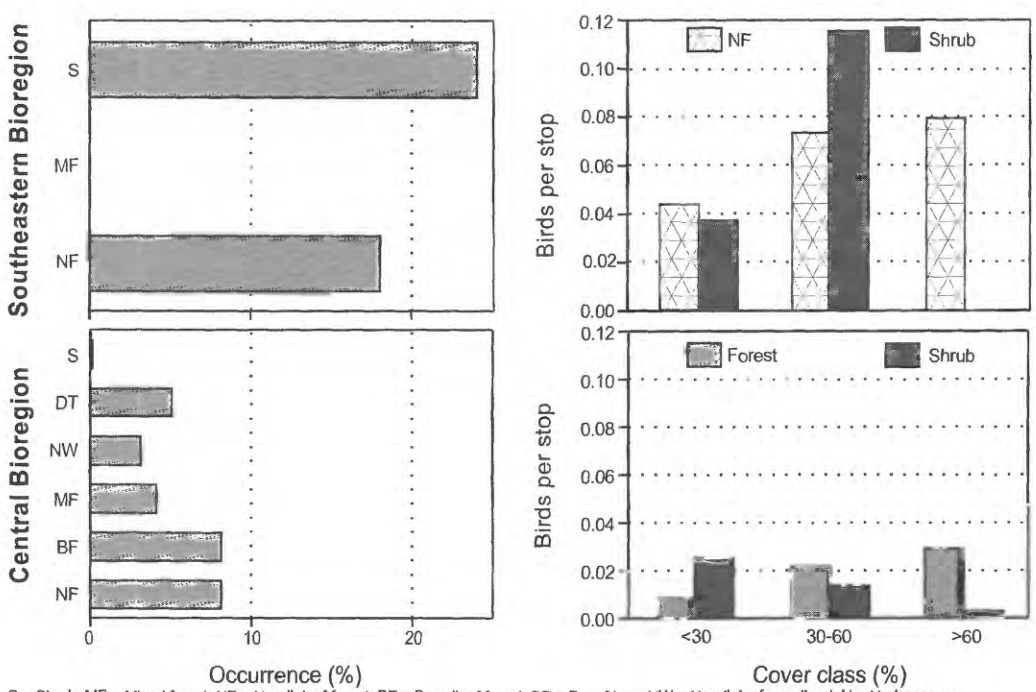
(Contopus cooperi)

Olive-sided Flycatchers occur on eight routes in the Southeastern Bioregion. Highest densities are recorded on the Chichagof Island (14.0 birds per year) and Zarembo (9.75 birds per year) routes. High density in the 30-60% cover class suggests a preference for forest edges, including clearcuts. Conversely, high density in shrub habitats may be inflated because of the increased detection distance. Possible preference for edge habitats merits further study in southeastern Alaska. This species is rarely recorded on the southcoastal BBS.

In the Central Bioregion, this species is recorded on 24 routes. It is most common on Kenai Peninsula's Swan Lake Road route (10.3 birds per year), which is a route of mostly broadleaf forests. Olive-sided Flycatchers are sparsely distributed elsewhere but usually associated with needleleaf forests. River routes in western Alaska have significant numbers, but those data are not included here. Additional monitoring efforts should be considered for this declining species. Use of forested habitats in the Central Bioregion differs from edge use in southeastern Alaska.

Olive-sided Flycatcher

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	67	3.0 (1.3)	4.5
Central	65	2.3 (0.1)	3.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Alder Flycatcher

(Empidonax alnorum)

Alder Flycatchers are uncommon breeders in the Southeastern Bioregion. They prefer shrub and are most common in willow (*Salix* spp.) and alder thickets. They are found mainly on the Haines and Mitkof Island routes, which are close to large mainland rivers that connect interior forests with the coast. Alder Flycatchers may use these corridors for access to coastal and island breeding sites.

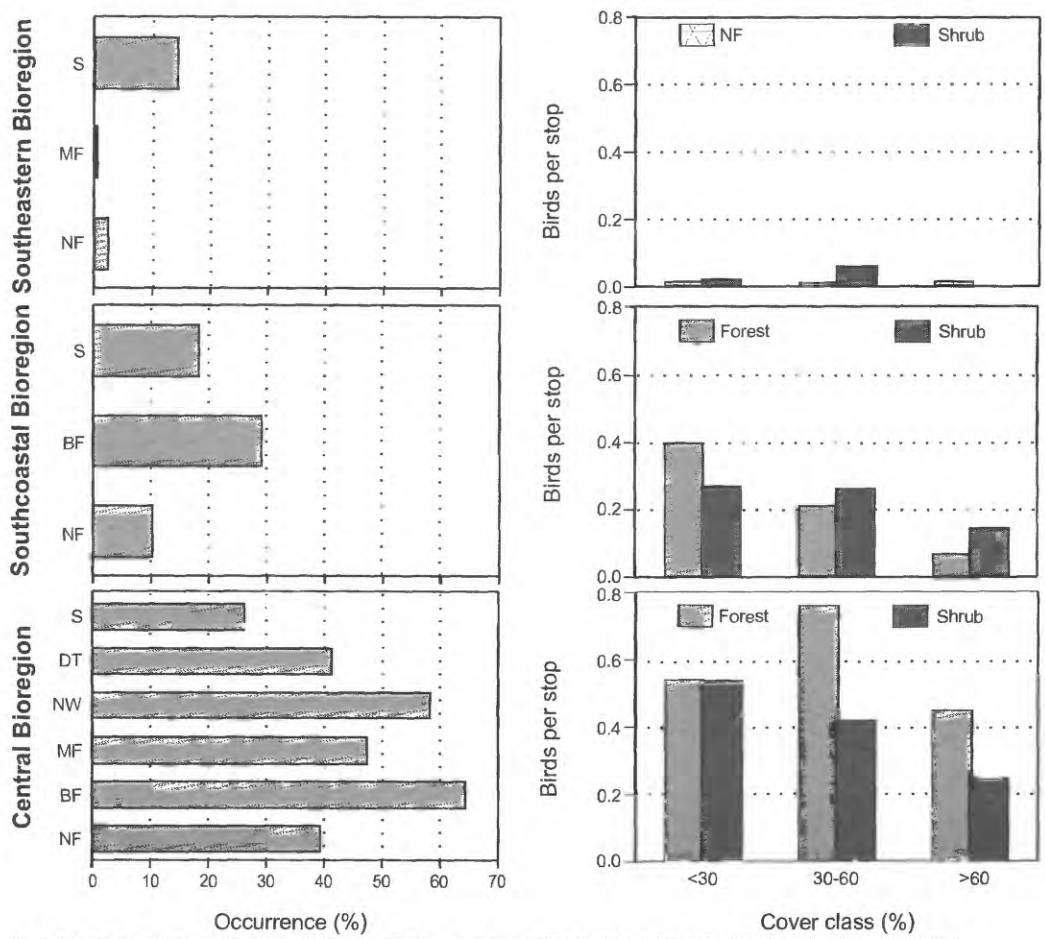
Alder Flycatchers breed locally in the Southcoastal Bioregion. High densities, and most records, occur on the Kachemak (30.7 birds per year) and Anchor River (30.5 birds per year) routes. They are most common in broadleaf and shrub habitats, including woodlands with a shrub component. Data suggest a preference for areas with some, mainly broadleaf, tree canopy.

In the Central Bioregion, Alder Flycatchers are common breeders and were observed on 35 routes. They are found in and near broadleaf forests and shrubs. High density in 30-60% forest cover suggests a preference for forest edges or areas with some tree canopy. Highest densities were recorded on the Petersville Road (89.0 birds per year) and Fort Richardson (77.0 birds per year) routes.

Alder Flycatchers are uncommon to rare on northern-western BBS routes; they are recorded occasionally on Seward Peninsula routes.

Alder Flycatcher

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	25	0.8	(0.5)	3.0
Southcoastal	100	11.1	(5.1)	11.1
Central	95	22.1	(3.5)	24.0
Northern-Western	17	0.4	(0.4)	2.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Hammond's Flycatcher

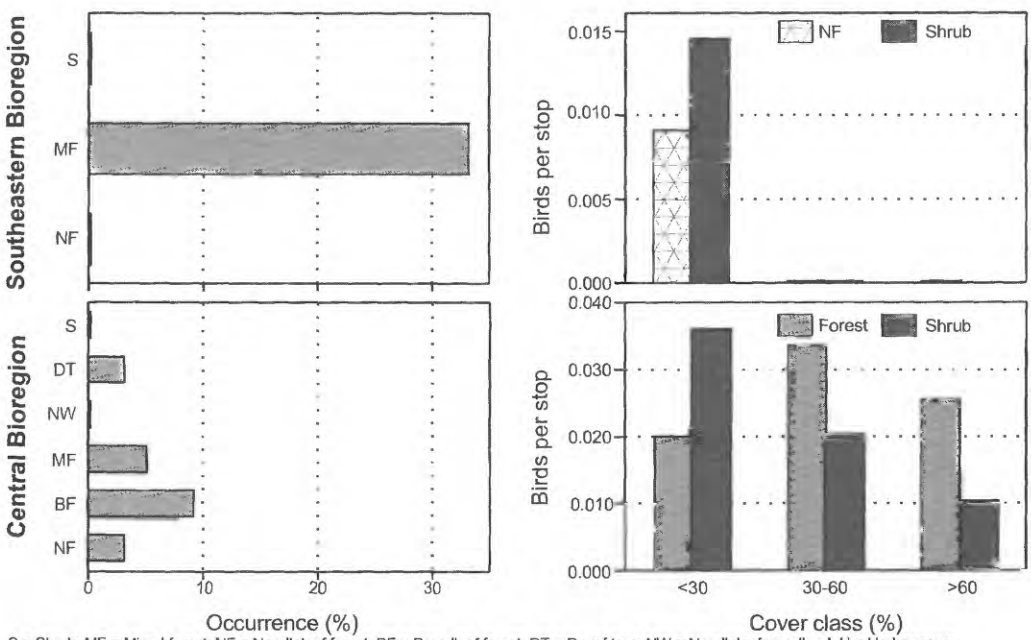
(Empidonax hammondii)

Although Hammond's Flycatchers are uncommon in the Southeastern Bioregion, they are regularly recorded on the Haines and Skagway routes in association with riparian cottonwood corridors (B.A. Andres, author observation).

This species is recorded on only eight routes in the Central Bioregion, all of which are in the eastcentral portion of the region. Highest densities were observed on the Eagle (19.5 birds per year) and Chicken (10.0 birds per year) routes. In Alaska, Hammond's Flycatchers appear to be most common in broadleaf and mixed forests.

Hammond's Flycatcher

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	34	0.6	(0.5)	3.9
Central	22	1.3	(0.6)	6.2



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Pacific-slope Flycatcher

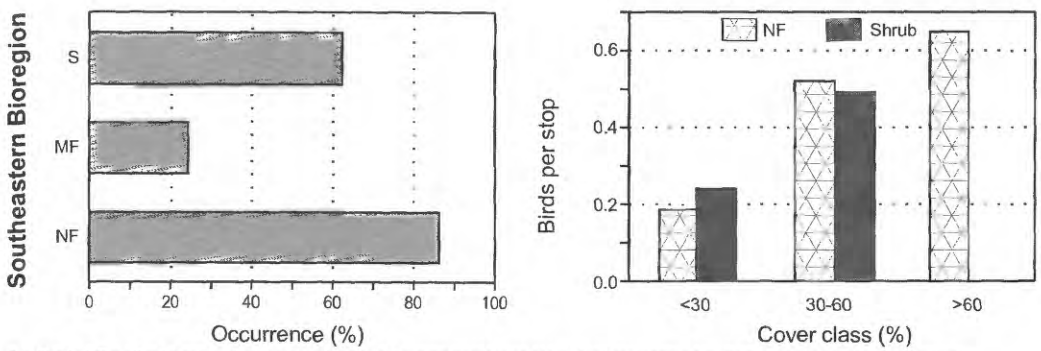
(Empidonax difficilis)

Pacific-slope Flycatchers are common to abundant throughout mainland and insular southeastern Alaska but found in much lower densities in the northern portion of the region (less than 3 birds per route on the Haines and Skagway routes). In the Southeastern Bioregion, highest densities occur on heavily forested routes, especially on the Hoonah (45.7 birds per year) route. Flycatchers are densest where needleleaf forest cover is greater than 60%, but this species may require gaps and areas with well developed understory.

This species is recorded in low numbers on Yakutat area routes in the Southcoastal Bioregion.

Pacific-slope Flycatcher

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	100	19.1 (4.3)	19.1



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

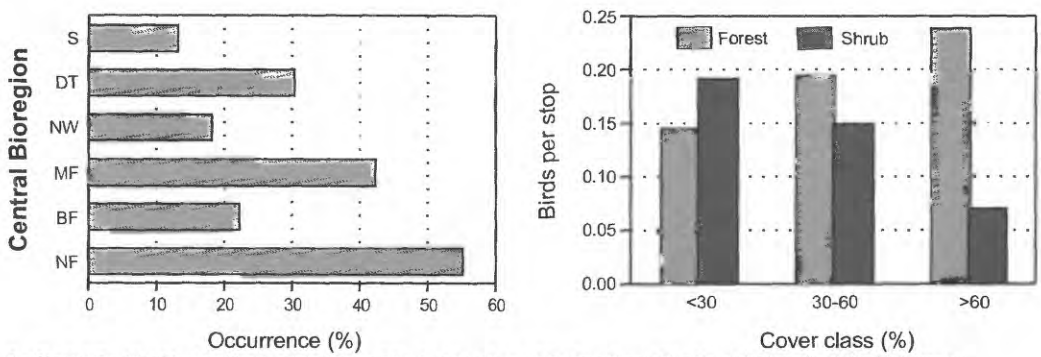
Gray Jay

(Perisoreus canadensis)

This species is widely distributed on central BBS routes and occurs on 35 routes in the region. Highest density is on the Northway route (28.7 birds per year). Gray Jays are closely associated with closed and open needleleaf and mixed forests; they are less common in broadleaf forests. Highest densities occur on stops with heavy forest cover.

Gray Jay

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	95	9.5 (1.3)	10.0



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Steller's Jay

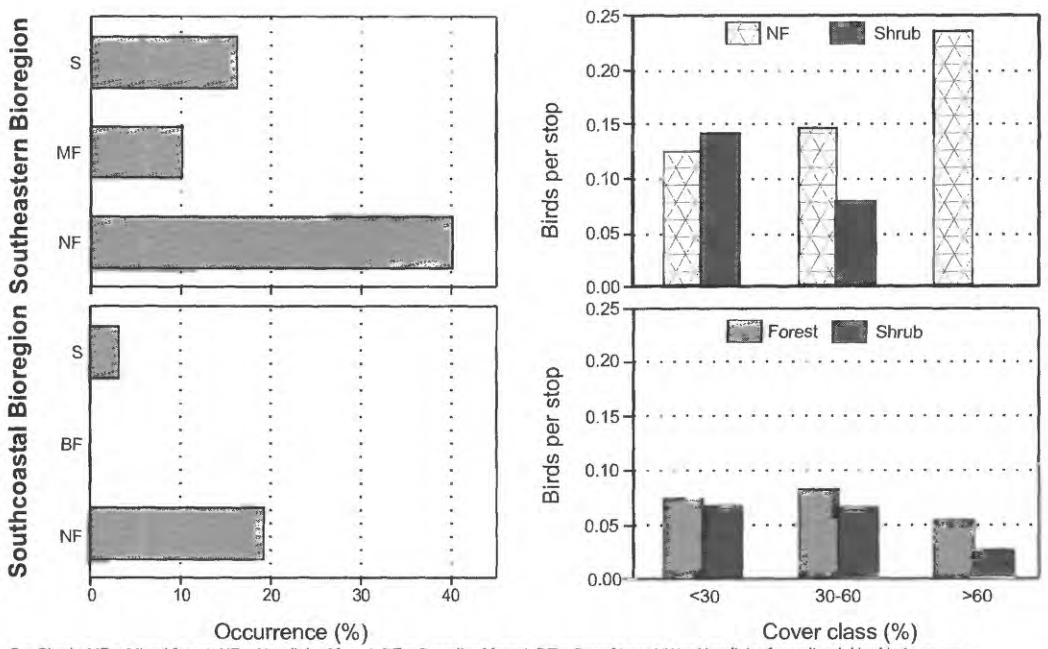
(Cyanocitta stelleri)

Steller's Jays are closely associated with needleleaf forests where they occur in Alaska. They are found on all routes in the Southeastern Bioregion; the highest density (20.3 birds per year) is recorded on the Zarembo route. High densities are associated with greater than 60% needleleaf cover.

Steller's Jays are evenly distributed in low numbers throughout the Southcoastal Bioregion, except on the Hope route where it is absent. Habitat affinities in the Southcoastal Bioregion are not as well defined as those in the Southeastern Bioregion, but distribution in Alaska mostly follows the distribution of Sitka spruce.

Steller's Jay

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	100	7.6 (1.8)	7.6
Southcoastal	86	3.1 (1.0)	3.6



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Steller's Jay

Black-billed Magpie

(*Pica hudsonia*)

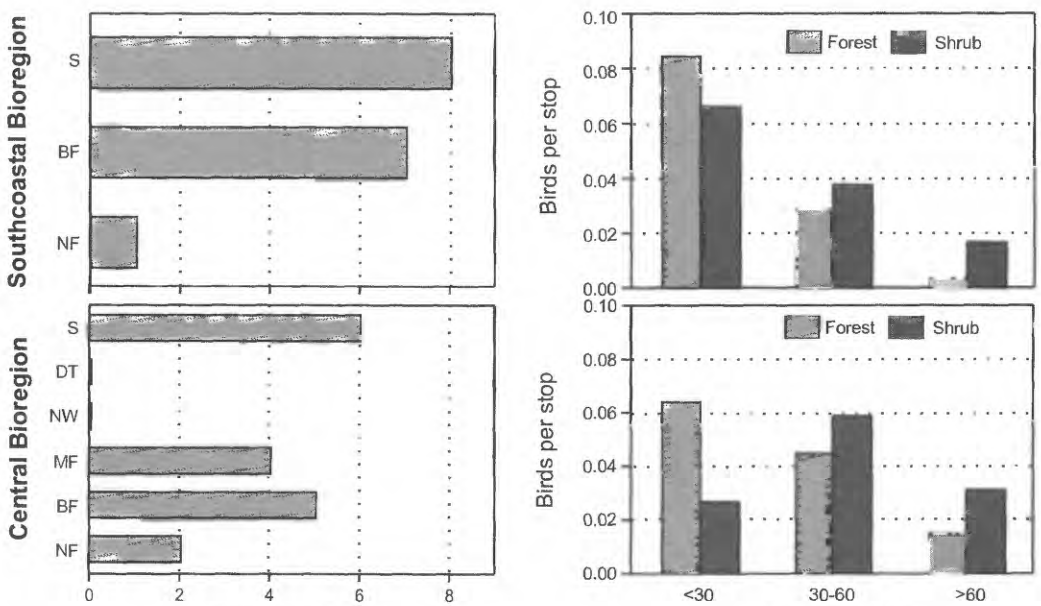
Black-billed Magpies occur only sporadically on the southeastern BBS.

In the Southcoastal Bioregion, this species was found in low densities on four routes. It is most common on the Kachemak (10.5 birds per year) route. Densities on all other routes are less than 3.3 birds per year. It is found in more open habitats of mainly broadleaf forests and shrubs.

Only two routes in the Central Bioregion have greater than five birds per year; the Sheep Mountain (25.3 birds per year) and Hatcher Pass (14.0 birds per year) routes are in the extreme southern portion of the bioregion and are located near the coastal mountain range. In this region, Black-billed Magpies favor open forest and shrub habitats.

Black-billed Magpie

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southcoastal	57	2.4	(1.4)	4.3
Central	24	1.5	(0.8)	6.2



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Black-billed Magpie

Northwestern Crow

(*Corvus caurinus*)

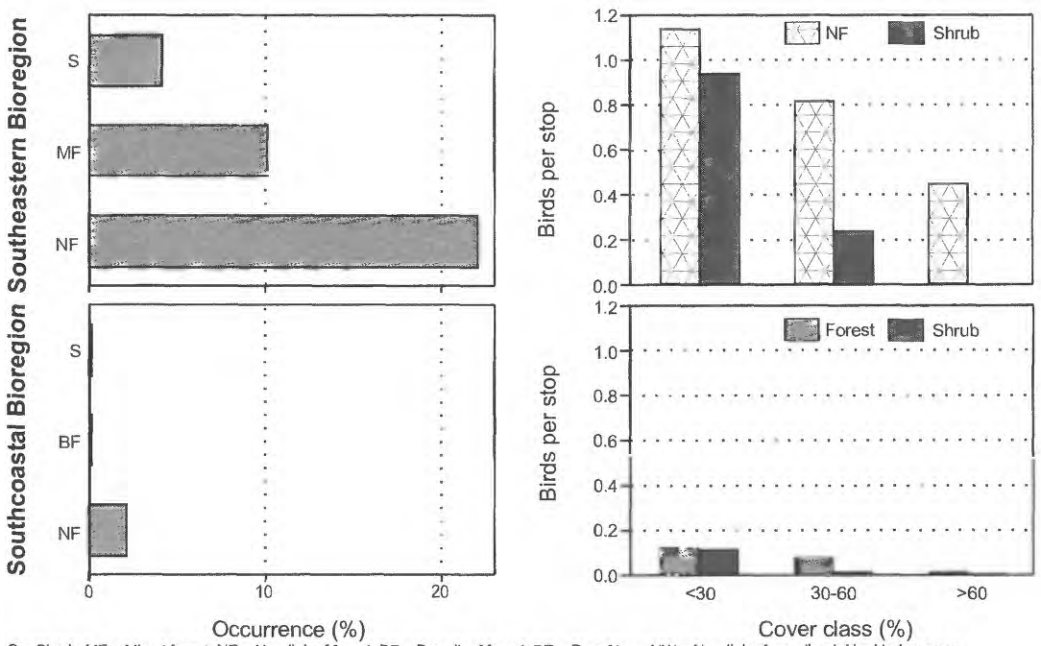
This species is associated with shoreline and tidewater areas, often in flocks, and is rare inland.

In the Southeastern Bioregion, Northwestern Crows are common, especially near shore and in proximity to towns and cities. The shoreline routes of Zimovia Strait (106.0 birds per year) and Sitka (90.0 birds per year) have the highest densities. Inland routes have few observations. High occurrence in needleleaf habitat is due to shoreline routes with heavy forest cover. High density in low (less than 30%) shrub and forest cover probably reflects tidal foraging.

In the southcoastal BBS, this species is uncommon to rare. Northwestern Crows occur on only three routes in the region. The Kachemak route (13.0 birds per year) has the highest density. Densities are less than seven birds per year on the other two routes where they occur (Cordova, Anchor River).

Northwestern Crow

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	100	34.8 (10.1)	34.8
Southcoastal	43	3.1 (1.9)	7.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Crow

Common Raven

(Corvus corax)

Habitat affinities for this species are difficult to detect from BBS data. Most detections are likely birds flying over the observer. Foraging opportunities may dictate occurrence of this species at any locale.

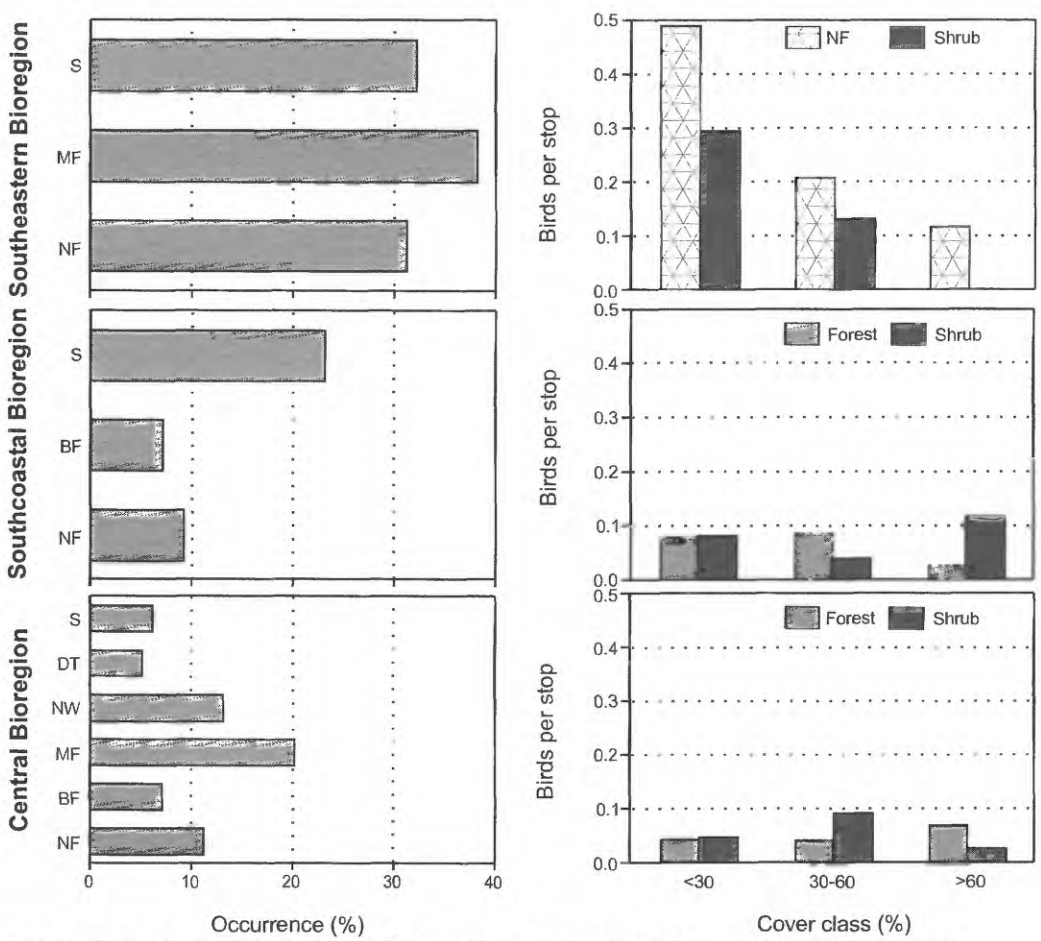
Highest densities in the Southeastern Bioregion occur on the Sitka (58.5 birds per year) and Juneau (32.7 birds per year) routes, possibly because of increased nesting and foraging sites in urban areas and the proximity of the routes to the coast. Common Ravens are less common in remote regions and smaller towns. Densities are lower on inland routes.

In the Southcoastal Bioregion, Common Ravens occur on all routes but in low numbers. They are most common on the Cordova (9.0 birds per year) route. They are associated mostly with shrub habitats in this region.

In the Central Bioregion, Common Ravens occur on 34 routes but in low densities (less than five birds per year). One exception is on the King Salmon route, where high numbers of birds (22.5 birds per year) are probably due to the route's proximity to the coast and the abundance of food.

Common Raven

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	13.2	(4.7)	13.2
Southcoastal	100	3.1	(1.1)	3.1
Central	92	2.6	(0.6)	2.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

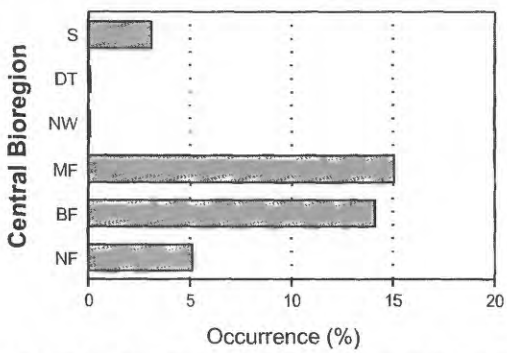
Black-capped Chickadee

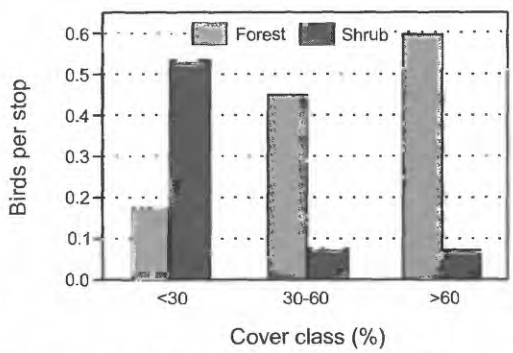
(*Poecile atricapilla*)

Black-capped Chickadee is mostly a broadleaf forest species. Despite being very common in much of the Central Bioregion, detection rates are low on the Alaska BBS, probably because of their inconspicuous behavior during the breeding season and the lateness of the survey. Only 11 routes average more than one individual per year. Highest densities occur on the Dillingham (16.3 birds per year) and Fort Richardson (16.0 birds per year) routes. Needleleaf forest observations are probably in proximity to broadleaf or mixed forests. Highest densities occur where forest cover is greater than 60%.

Black-capped Chickadee

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	57	2.0 (0.7)	3.6





S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Black-capped Chickadee

Chestnut-backed Chickadee

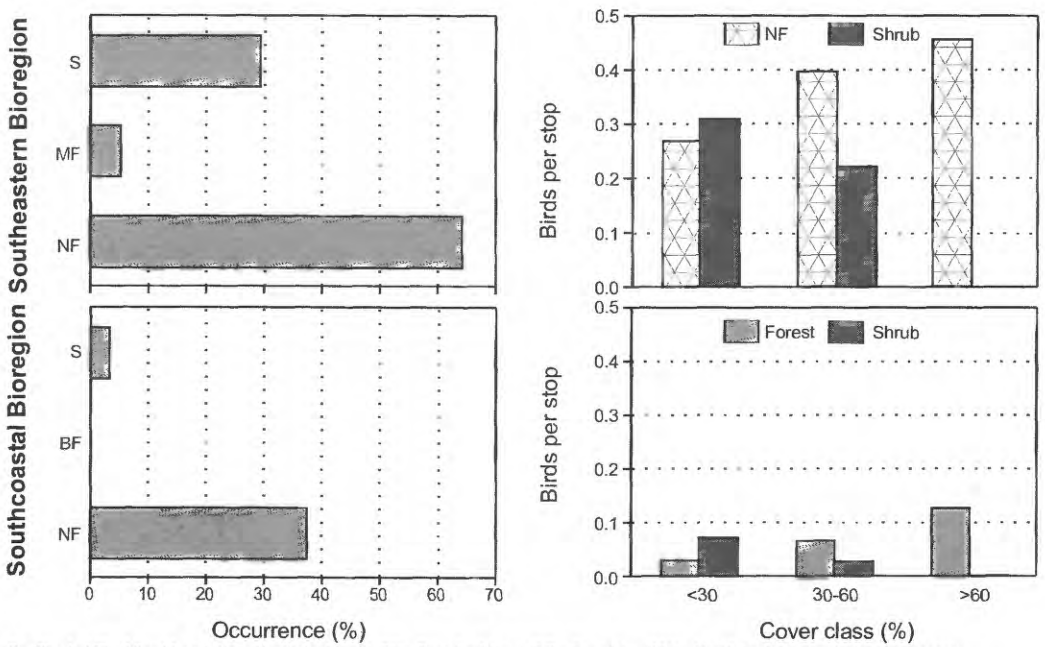
(*Poecile rufescens*)

Chestnut-backed Chickadee is a needleleaf forest species of coastal Alaska. In the Southeastern Bioregion, densities were positively correlated with percent cover of needleleaf forest. Detections in shrub were possibly due to the proximity to forest. Highest densities occur on the Zimovia Strait (55.7 birds per year) and Zarembo (38.5 birds per year) routes. Chestnut-backed Chickadees are found in all coniferous covertypes in the Southeastern Bioregion (B.A. Andres, unpub. data).

In the Southcoastal Bioregion, this species is fairly common and occurs on four routes. Highest densities were on the two Yakutat routes (8.5-9.3 birds per year). In this region, Chestnut-backed Chickadees are present in dense needleleaf forests but rare in shrub habitats.

Chestnut-backed Chickadee

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	16.4	(4.5)	16.4
Southcoastal	57	3.3	(1.6)	5.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Boreal Chickadee

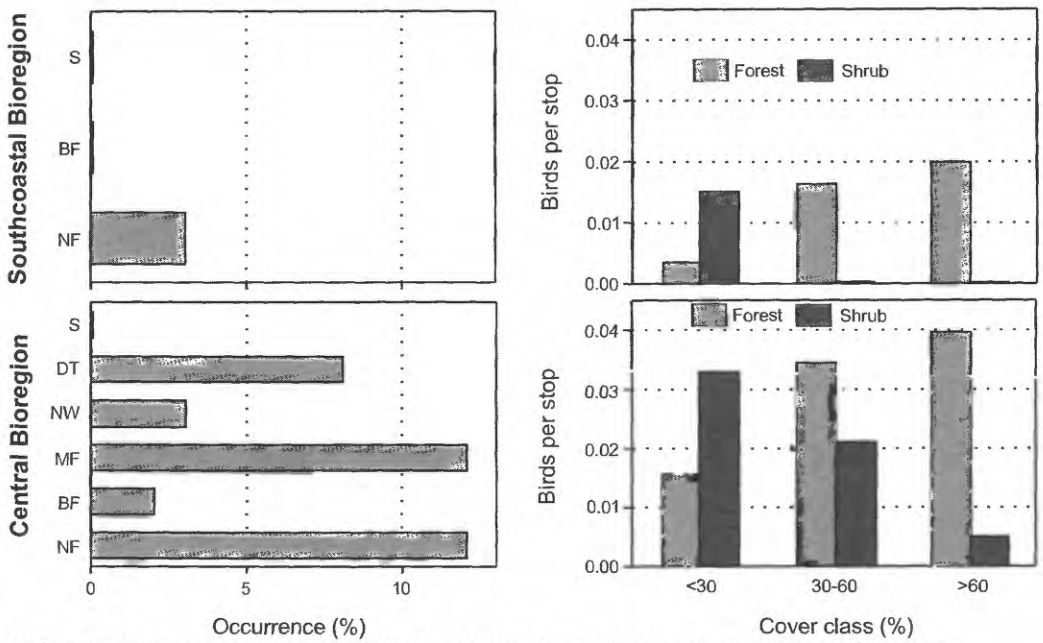
(*Poecile hudsonica*)

Boreal Chickadees occur sporadically on the southcoastal BBS, almost exclusively in needleleaf forests.

This species is widely distributed in the Central Bioregion but in low numbers (usually less than five birds per year). It is most common in needleleaf habitats (dwarf tree and forest) and mixed forests. Boreal Chickadees prefer heavy forest cover and are rare in shrubby habitats and broadleaf forests. As with Black-capped Chickadees, detection rates on the Alaska BBS are low, potentially because of their inconspicuous behavior during the breeding season and the lateness of the BBS. Highest density is recorded on the McCarthy (seven birds per year) route.

Boreal Chickadee

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southcoastal	43	0.6	(0.3)	1.4
Central	68	1.5	(0.3)	2.2



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Brown Creeper

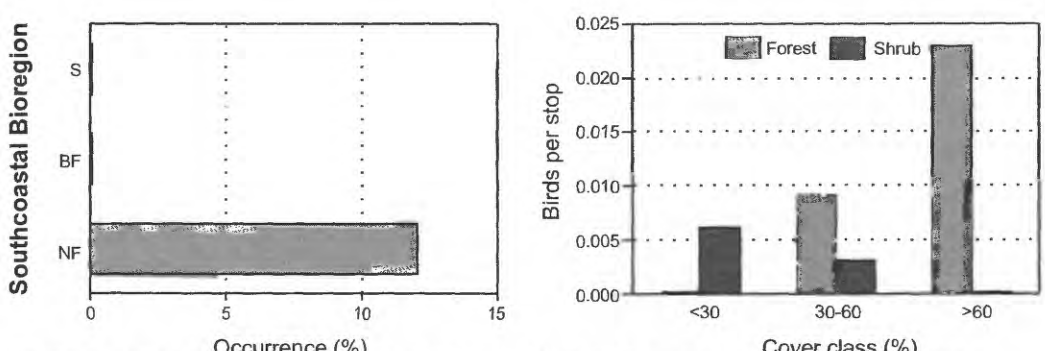
(*Certhia americana*)

This species is rarely recorded on the Southeastern BBS despite its widespread occurrence there. Point count data from the Southeastern Bioregion show it to be most common in old-growth, needleleaf forests (B.A. Andres, unpub. data).

Brown Creepers are recorded on only three routes in the Southcoastal Bioregion. Detections on these routes are very low (less than two birds per year). Although Brown Creepers are found exclusively in needleleaf forests on the BBS, they are known to nest in cottonwoods (B.A. Andres, author observation).

Brown Creeper

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southcoastal	43	0.5 (0.3)	1.1



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Winter Wren

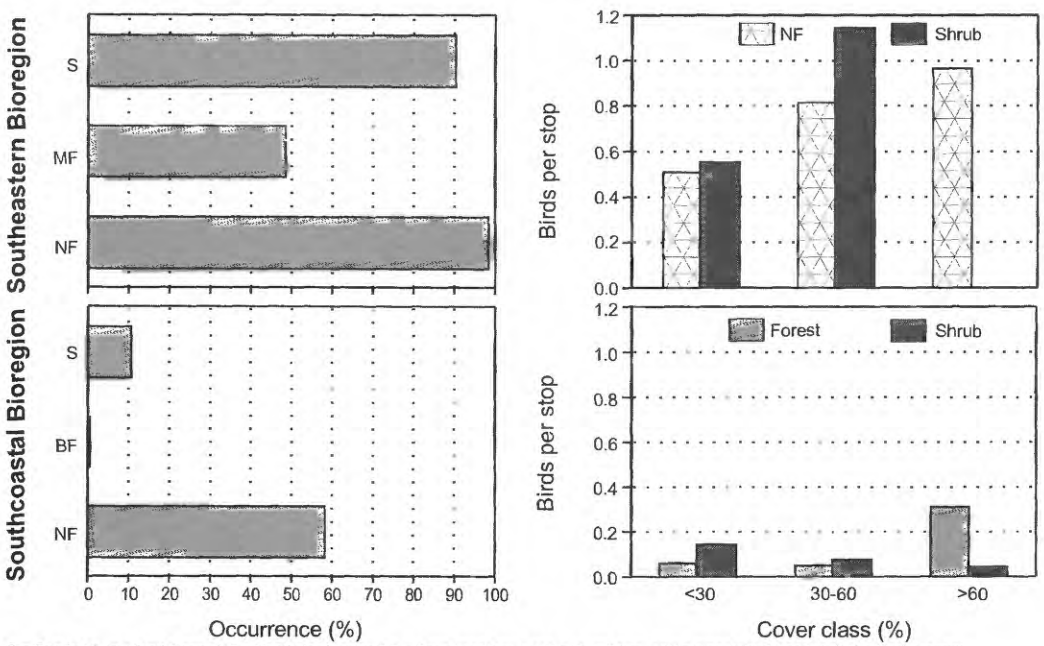
(Troglodytes troglodytes)

Winter Wrens are abundant in the Southeastern Bioregion. Generally, the Winter Wren is a species of dense needleleaf forest, but it is also conspicuous in clearcuts (P.A. Cotter, author observation). The presence of downed timber and developed understory may be important for this species, which the wren can find in both forest and clearcut areas. Loud song makes it a particularly obvious species to detect, especially in clearcut shrub.

In the Southcoastal Bioregion, it is most common in the east. It occurs mainly in needleleaf forests. Highest densities are recorded on the Yakutat area routes: Harlequin Lake (27.7 birds per year) and Yakutat (17.0 birds per year). Winter Wrens are less common to absent in other areas of the region.

Winter Wren

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	32.8	(5.3)	32.8
Southcoastal	71	6.5	(4.3)	11.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Golden-crowned Kinglet

(Regulus satrapa)

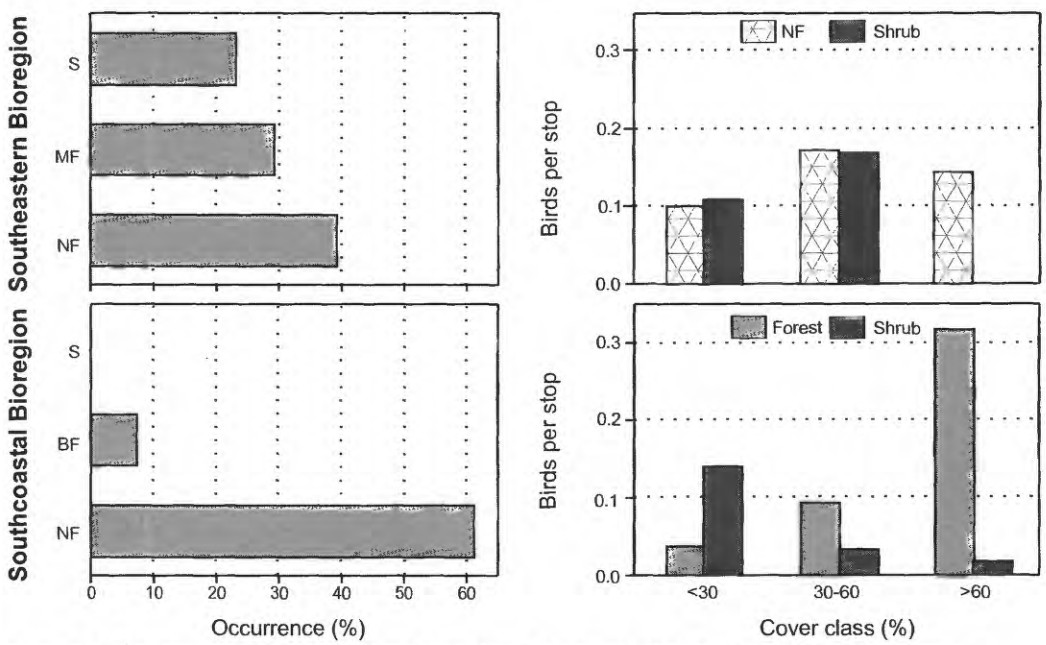
In the Southeastern Bioregion, the Golden-crowned Kinglet appears to occur in lower densities than does the Ruby-crowned Kinglet, but this may reflect detectability difference and/or roadside bias. It is reported on all southeastern BBS routes; densities range from 2.5 to 9.5 birds per year. In this region, Golden-crowned Kinglets are associated with needleleaf and mixed forests. High density on edges may be an artifact of detectability and not density.

In the Southcoastal Bioregion, this species is found in closed, predominantly needleleaf forests. It occurs near Yakutat and on Kenai Peninsula routes; it is absent on Cordova and Copper River routes. Highest densities are recorded on the Yakutat (22.0 birds per year) and Harlequin Lake (17.3 birds per year) routes, where they are found almost exclusively in Sitka spruce stands. There is a strong, positive association between Golden-crowned Kinglet density and percent needleleaf cover.

Golden-crowned Kinglets rarely occur on three routes in the Central Bioregion.

Golden-crowned Kinglet

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	100	6.1 (0.7)	6.1
Southcoastal	86	6.7 (3.4)	9.4



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Ruby-crowned Kinglet

(Regulus calendula)

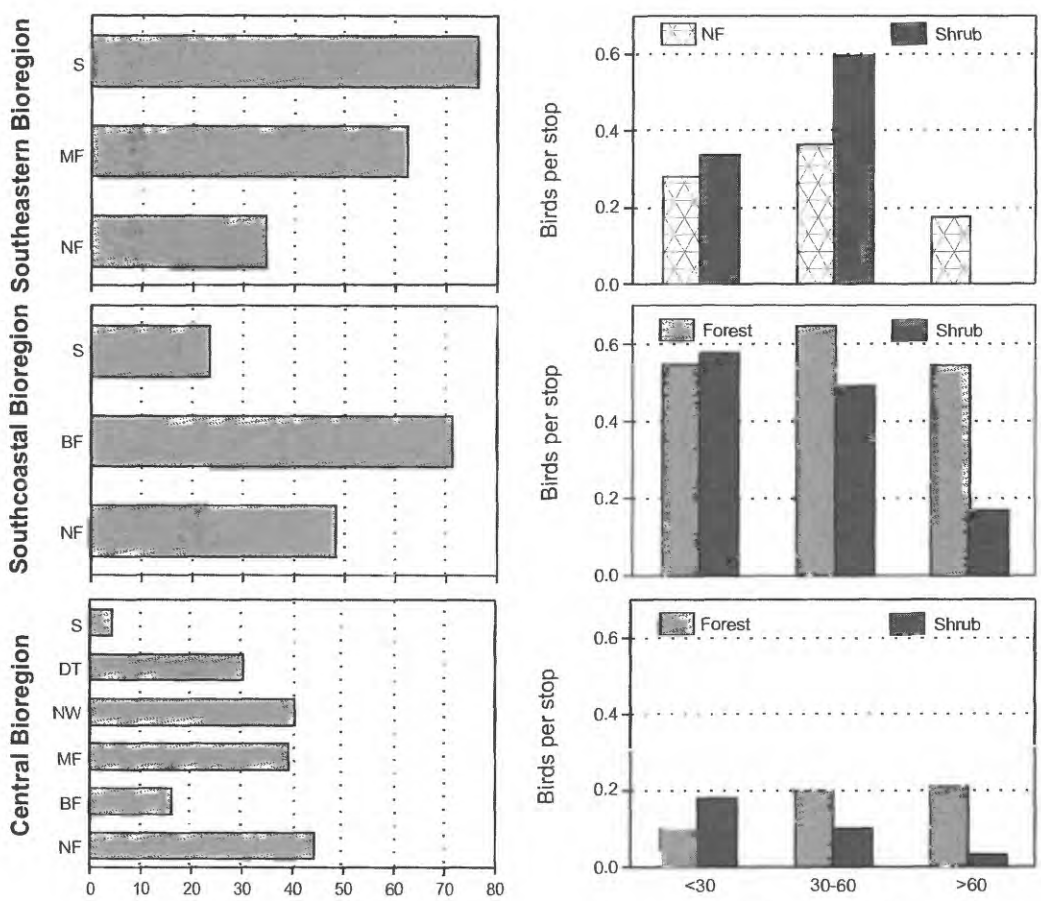
Ruby-crowned Kinglets are more common in the northern rather than the southern part of the Southeastern Bioregion. Highest densities are recorded on the Hoonah (32.7 birds per year) and Haines (30.5 birds per year) routes. High density in 30-60% cover suggests a preference for forest edges.

In the Southcoastal Bioregion, Ruby-crowned Kinglets occur on all routes, with highest densities recorded on the Anchor River (40.3 birds per year) and Kachemak (38.5 birds per year) routes. The lowest density is recorded on the Copper River route, which has the least amount of forest and highest amount of shrub of all southcoastal routes. The Ruby-crowned Kinglet appears to prefer more open habitats in both the Southeastern and Southcoastal Bioregions than does the Golden-crowned Kinglet.

Ruby-crowned Kinglets are widely distributed throughout the Central Bioregion. Highest densities are found on routes in the eastern portion of range: Sourdough (33.0 birds per year), Tower Bluffs (26.3 birds per year) and Chatanika (26 birds per year) routes. Density is positively associated with forest cover and negatively associated with amount of shrub cover. High frequencies of occurrence in dwarf tree, needleleaf woodland, mixed, and needleleaf forest habitats suggest a preference for coniferous trees. Presence of coniferous trees, regardless of size, is likely more important than the quantity of shrub.

Ruby-crowned Kinglet

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	92	13.1	(3.1)	14.3
Southcoastal	100	25.3	(4.8)	25.3
Central	78	7.2	(1.4)	9.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Arctic Warbler

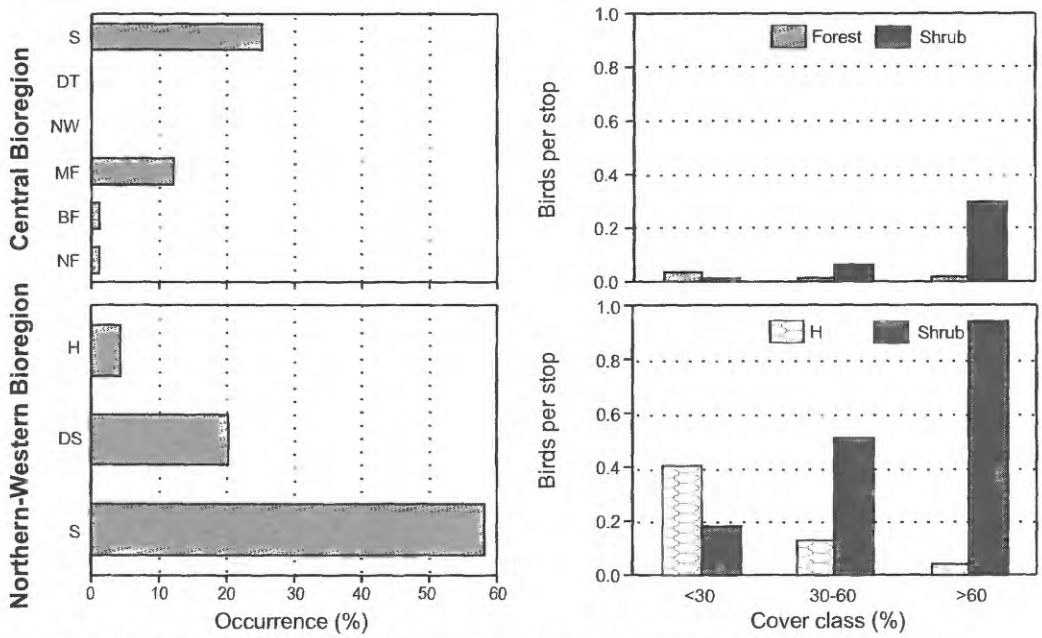
(Phylloscopus borealis)

The Arctic Warbler is typically a shrub species, but it is also found in the Central Bioregion in forests near the boreal forest-tundra transition zone. It is common on high elevation routes in the Alaska Range (Maclaren route – 75.5 birds per year) and along the Glenn Highway (Sheep Mountain route – 21.7 birds per year). Mixed forest observations on the Alaska BBS are mostly from Dillingham (13.0 birds per year) and may reflect individuals inhabiting small patches of shrub within mixed forest.

The Arctic Warbler is common in riparian shrub thickets in western Alaska; however, it is absent on northern routes. In the Northern-Western Bioregion, Arctic Warblers are most common along the Nome River on the Salmon Lake route (76.0 birds per year) and on the Council route (31.0 birds per year). There is a strong positive association between percent shrub cover and density of birds in western Alaska.

Arctic Warbler

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	22	3.9 (2.1)	17.8
Northern-Western	83	21.2 (12.1)	31.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Gray-cheeked Thrush

(*Catharus minimus*)

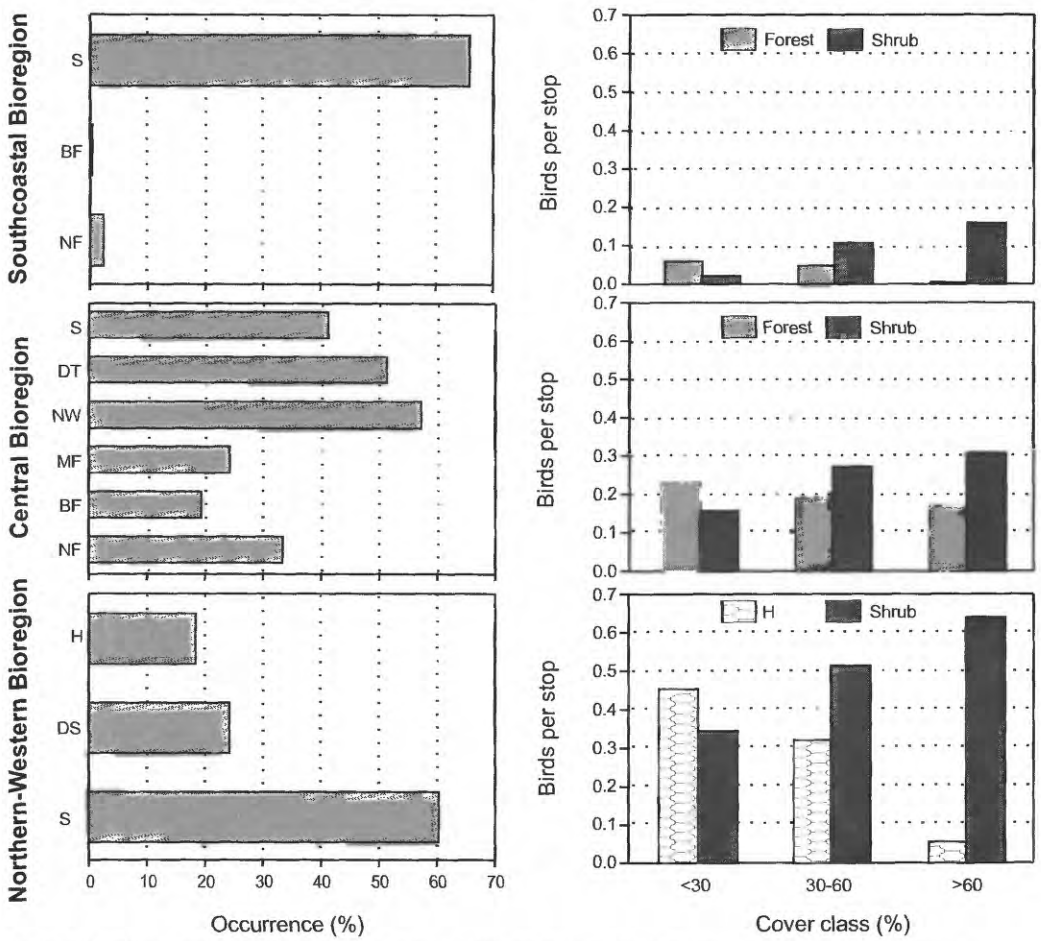
This species occurs on four Southcoastal Bioregion routes but only rarely on three of the routes. It is fairly common on the Copper River Delta (15.3 birds per year) route. This route crosses the river delta and consists mostly of lowland shrubs.

Gray-cheeked Thrushes are found in a variety of shrub and forest habitats on 28 routes in the Central Bioregion, although they are usually associated with tall shrub. In the Central Bioregion, they are fairly common in open habitats of needleleaf woodland and dwarf tree. Highest densities occur on the Sourdough (51.7 birds per year), King Salmon (41.7 birds per year) and Mt. Fairplay (36.5 birds per year) routes.

Gray-cheeked Thrushes occur on only four routes in the Northern-Western Bioregion, which are all on the Seward Peninsula. They are found mostly in upland tall shrub and riparian areas. The Council and Salmon Lake routes near Nome have the highest densities, with nearly 50 birds per year. They are common along river routes in the Yukon-Kuskokwim Delta.

Gray-cheeked Thrush

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southcoastal	57	2.5	(2.1)	4.3
Central	84	10.0	(2.2)	12.9
Northern-Western	67	20.3	(9.0)	30.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Swainson's Thrush

(*Catharus ustulatus*)

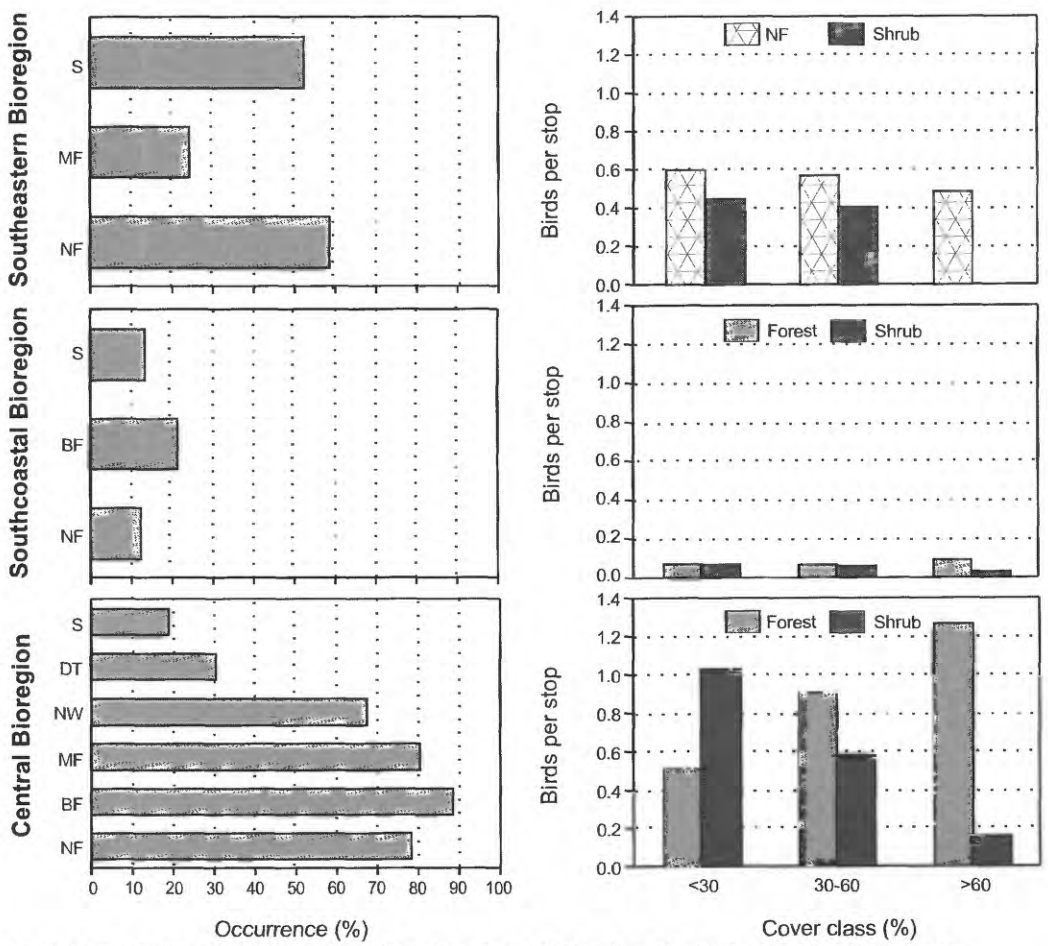
This species is common in shrub and needleleaf habitats throughout the Southeastern Bioregion; it is also found in second-growth forest stands. Highest densities are recorded on the Sitka (62.3 birds per year), Thorne Bay (44.7 birds per year), and Craig (43.7 birds per year) routes.

In the Southcoastal Bioregion, the Swainson's Thrush is found in low densities on five routes. Highest densities are recorded on the Hope (9.3 birds per year) and Cordova (6.3 birds per year) routes. It occurs in all cover types, but highest densities occur in forests; it is uncommon to rare in shrub habitats.

Swainson Thrushes are recorded on 35 routes in the Central Bioregion. This species is common in a variety of forested habitats, especially broadleaf forests. It is most common on the Chatanika River, Circle, and Chitina routes (greater than 100 birds per year). Unlike the Southeastern and Southcoastal Bioregions, there is a strong, negative relationship between bird density and percent shrub cover in the Central Bioregion.

Swainson's Thrush

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	24.0	(5.4)	24.0
Southcoastal	71	0.4	(0.4)	1.4
Central	95	42.8	(5.9)	46.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Hermit Thrush

(*Catharus guttatus*)

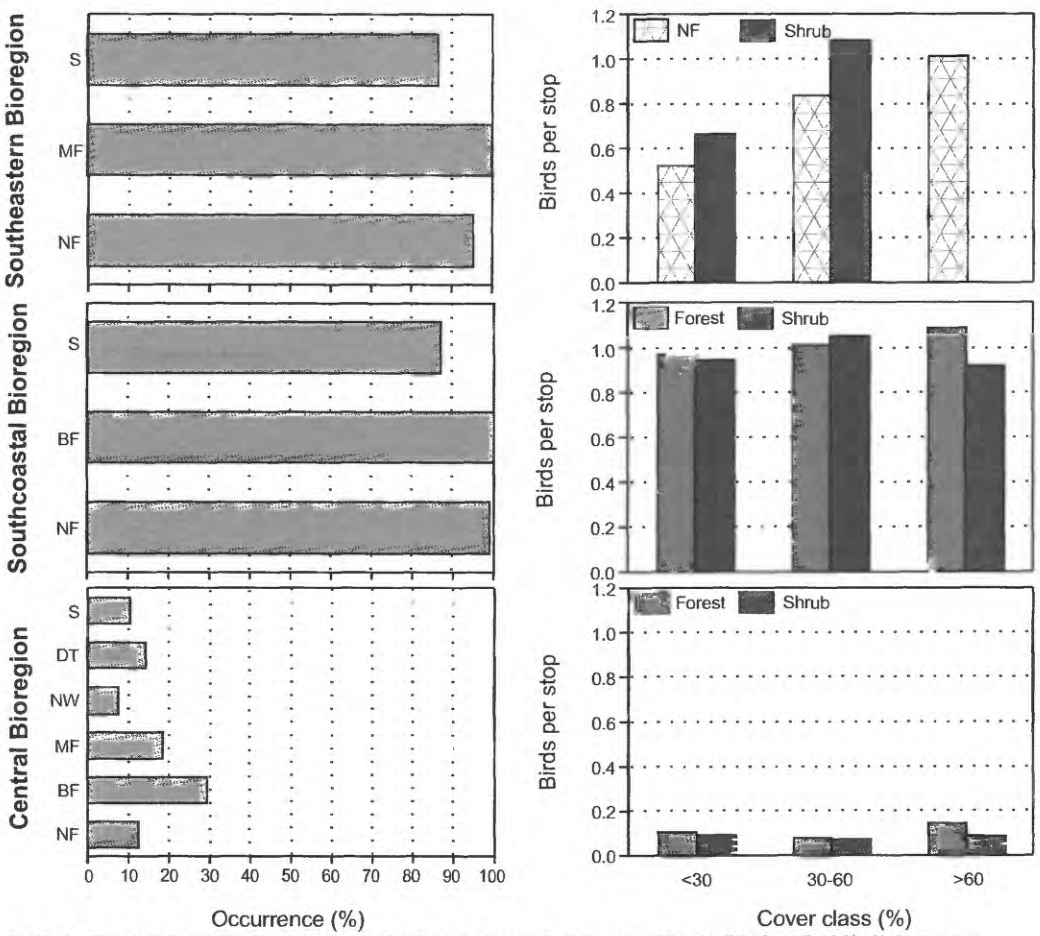
This species is a generalist in the Southeastern Bioregion; it is found in all covertype classes. Density increases as woody plant cover, either forest or shrub, increases. Highest densities occur on Hoonah (63.5 birds per year) and Zarembo (62.5 birds per year) routes. Lowest densities (less than 20 birds per year) were recorded on the Ketchikan and Chichagof Island routes.

Hermit Thrushes are abundant on all routes in the Southcoastal Bioregion in a variety of covertypes. Densities range from 34.0 to 72.0 birds per year.

In the Central Bioregion, Hermit Thrushes occur on 22 routes, usually at lower densities (less than 15 birds per year) than in the Southeastern and Southcoastal Bioregions. Highest density was recorded (46.0 birds per year) on the Tower Bluffs route. The Hermit Thrush shows a strong affinity for broadleaf forests in the Central Bioregion.

Hermit Thrush

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	37.1	(4.8)	37.1
Southcoastal	100	48.5	(5.4)	48.5
Central	68	3.9	(1.4)	6.9



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

American Robin

(*Turdus migratorius*)

The American Robin is ubiquitous in all Alaska biogeographic regions. It occurs in most habitats sampled by the BBS.

On southeastern BBS routes, American Robins are common to abundant and are found in nearly all habitats sampled. Highest densities are recorded on the Sitka (77.5 birds per year) and Zimovia Strait (46.7 birds per year) routes. There is a strong negative relationship between percent forest cover and density. Robins are much less common in roadless areas in the Southeastern Bioregion than on the BBS (B.A. Andres, unpub. data). High frequency of occurrence of robins on the BBS may reflect a roadside bias.

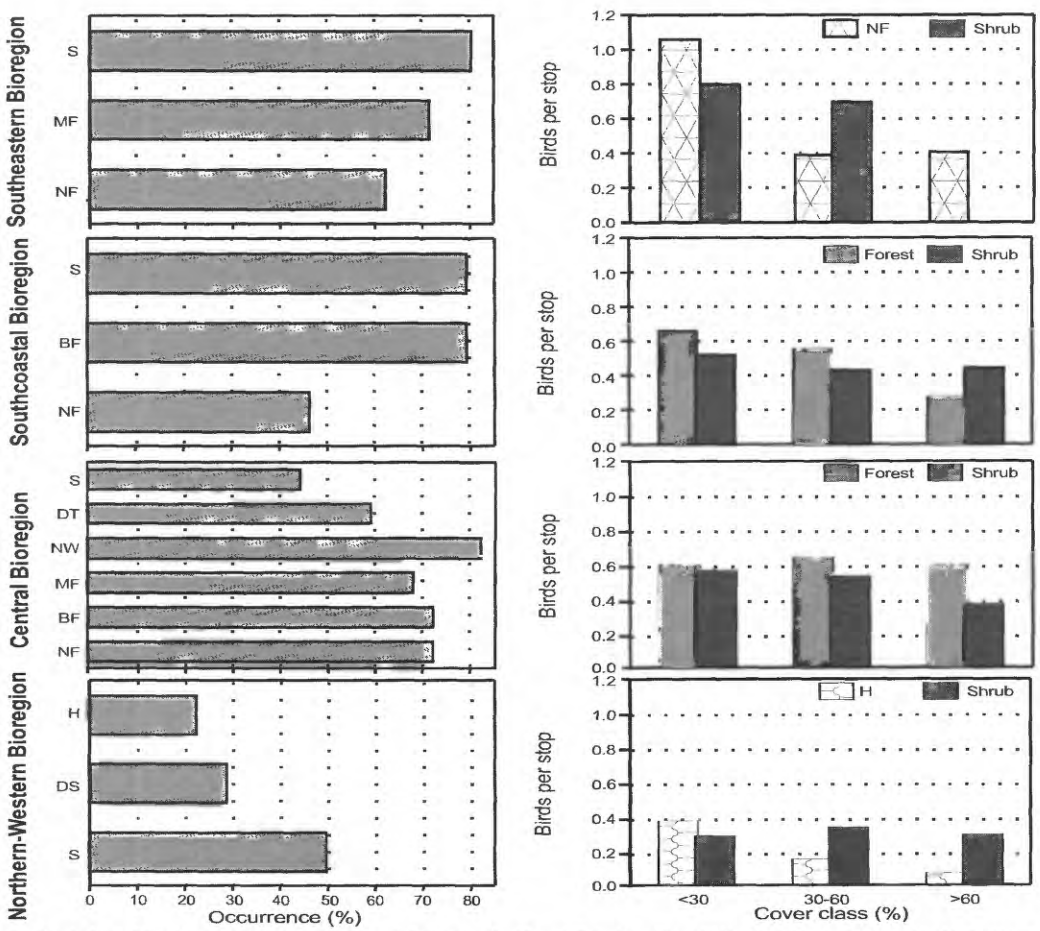
Robins are found on all seven routes in the Southcoastal Bioregion. Highest densities were recorded on Kachemak (46.7 birds per year) and Copper River (32.0 birds per year) routes. Density is negatively associated with increasing forest cover.

In the Central Bioregion, the American Robin is ubiquitous and occurs on all routes. Highest densities were recorded on Northway (90.0 birds per year), King Salmon (73.5 birds per year), and Sheep Mountain (62.3 birds per year) routes. It appears to be more closely associated with forest cover in the Central Bioregion than in the Southeastern or Southcoastal Bioregions.

American Robins are fairly common on western routes but nearly absent on northern routes (one bird per year on Happy Valley route). Highest densities occur on Council (31.5 birds per year) and Nome (25.0 birds per year) routes. They occur mainly in tall, riparian shrub.

American Robin

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	32.2	(5.2)	32.2
Southcoastal	100	23.2	(5.0)	23.2
Central	100	29.8	(3.4)	29.8
Northern-Western	83	13.8	(5.3)	16.6



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Varied Thrush

(Ixoreus naevius)

This species is common in coastal and interior forests. It occurs on nearly all routes in the Southeastern, Southcoastal, and Central Bioregions.

It is widely distributed and very common in the Southeastern Bioregion. Highest density (117.5 birds per year) is recorded on the Hoonah route. Habitat preferences are difficult to determine from BBS data due to its ubiquity, but shrub understory appears important.

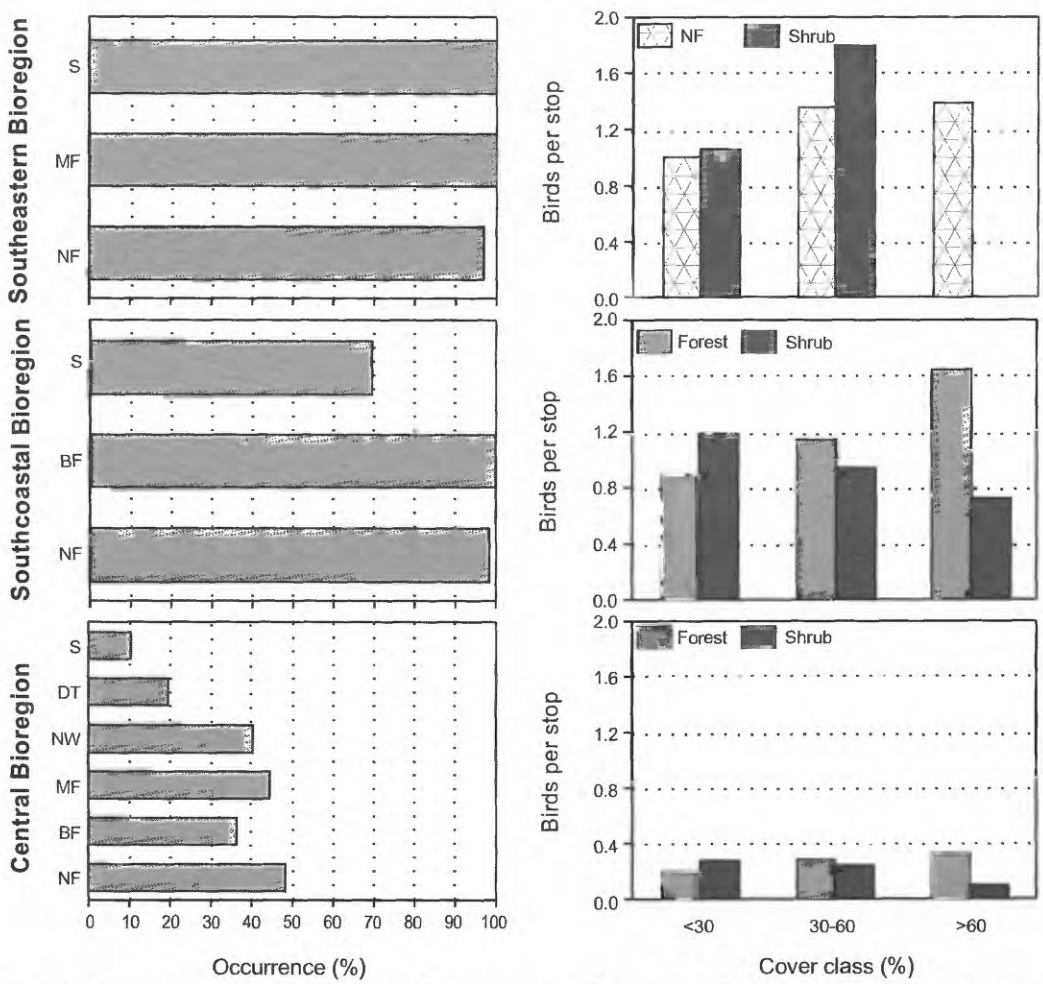
The Varied Thrush is one of the most common species detected on the southcoastal BBS. It is common to abundant on all routes (29.0-110.0 birds per year). Highest density (110.0 birds per year) is recorded on the Harlequin Lake route; lowest densities occur on Cordova and Copper River routes. Densities were positively related to percent forest cover. BBS data do not suggest preference for needleleaf or broadleaf forest.

Varied Thrushes are found at lower densities in the Central Bioregion than in the Southeastern and Southcoastal Bioregions; however, it is found throughout forested areas within the Central Bioregion. High densities are recorded on the Katmai (52.7 birds per year) and Chistochina (35.0 birds per year) routes.

This species is occasionally observed on western Alaska BBS routes in closed, medium to tall, shrub thickets (B.A. Andres, author observation).

Varied Thrush

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	54.6	(7.7)	54.6
Southcoastal	100	55.9	(10.3)	55.9
Central	95	12.3	(1.9)	13.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

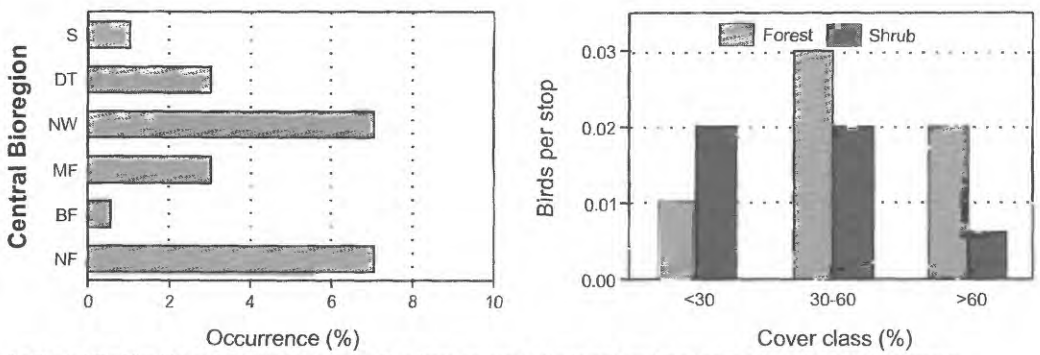
Bohemian Waxwing

(Bombycilla garrulus)

Bohemian Waxwings occur on 15 routes in the Central Bioregion but always in low numbers (less than 5.5 birds per year). They are most common in needleleaf habitats and usually occur in open forest and woodlands. A coniferous component of forest is likely necessary for nesting.

Bohemian Waxwing

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	41	0.9 (0.3)	2.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Orange-crowned Warbler

(Vermivora celata)

High densities of Orange-crowned Warblers in southeastern needleleaf forests are possibly due to a thin strip of broadleaf shrubs and trees, mainly alders (*Alnus* spp.), that borders roads. This strip is often less than 10% of the stop area and is not included in the covertype data.

In the Southeastern Bioregion, highest densities are recorded on the Craig (64.3 birds per year) and Haines (57.5 birds per year) routes. High densities along the Haines route reflect the presence of deciduous shrubs and trees along the Chilkat River.

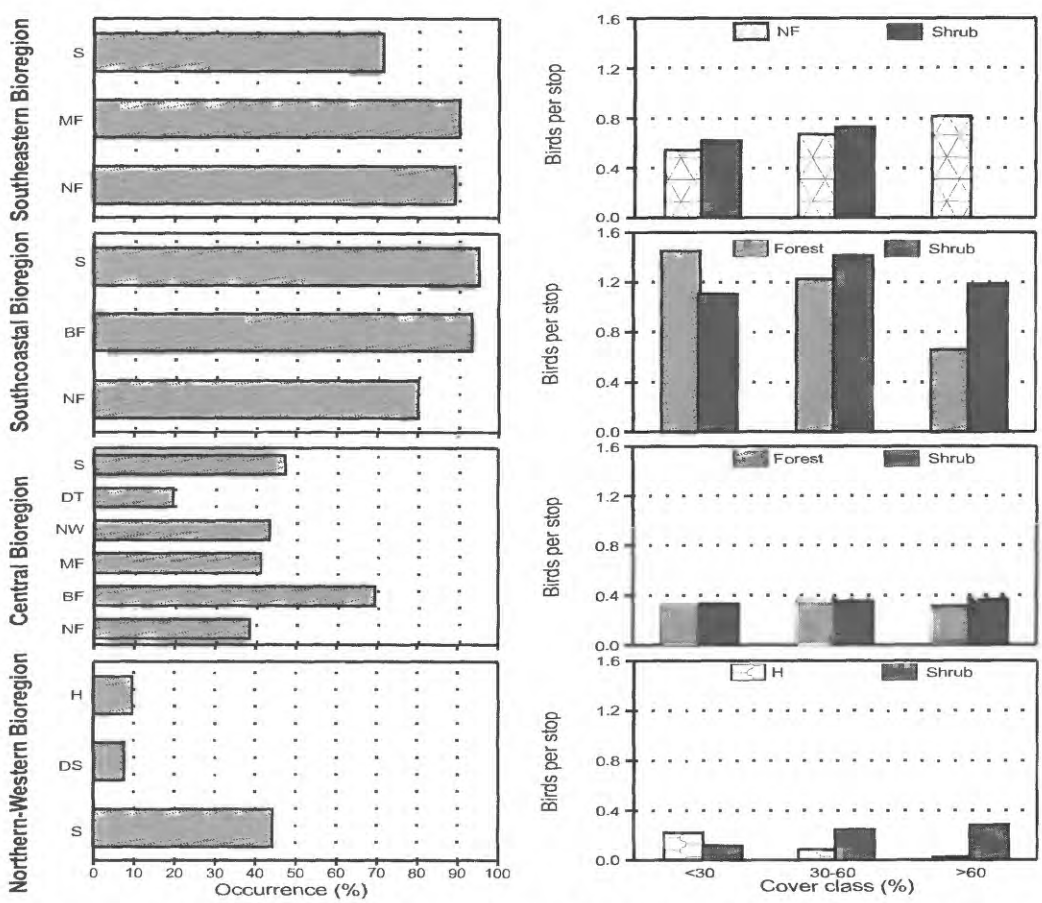
In the Southcoastal Bioregion, the Orange-crowned Warbler is an abundant edge species. The Anchor River and Kachemak routes average 80-90 birds per year. It is common on all other routes (greater than 40 birds per year). This species is usually associated with broadleaf forests and shrubs but is also associated with coniferous forest edges where shrub habitat exists.

In the Central Bioregion, the Orange-crowned Warbler is most common in broadleaf forests. Highest densities are recorded on the Manley Hot Springs (48.7 birds per year) route, a route with a high precentage of early successional broadleaf forest. High densities also occur on Hatcher Pass (47.7 birds per year), Fort Richardson (46.3 birds per year) and Katmai (41.3 birds per year).

The Orange-crowned Warbler is found on only four routes in the Northern-Western Bioregion, all of which are on the Seward Peninsula. It is associated closely with tall and low shrubs in riparian areas. Highest densities are recorded on the Nome (23.5 birds per year) and Salmon Lake (16.3 birds per year) routes.

Orange-crowned Warbler

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	33.2	(5.5)	33.2
Southcoastal	100	55.3	(7.9)	55.3
Central	95	16.0	(2.3)	17.4
Northern-Western	67	8.5	(4.0)	12.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Yellow Warbler

(Dendroica petechia)

This species is rare on southeastern Alaska island BBS routes; it is more common on the mainland. Highest densities are recorded on the Haines (8.7 birds per year) and Skagway (6.3 birds per year) routes due to a prevalence of deciduous shrub and forest habitats along river corridors.

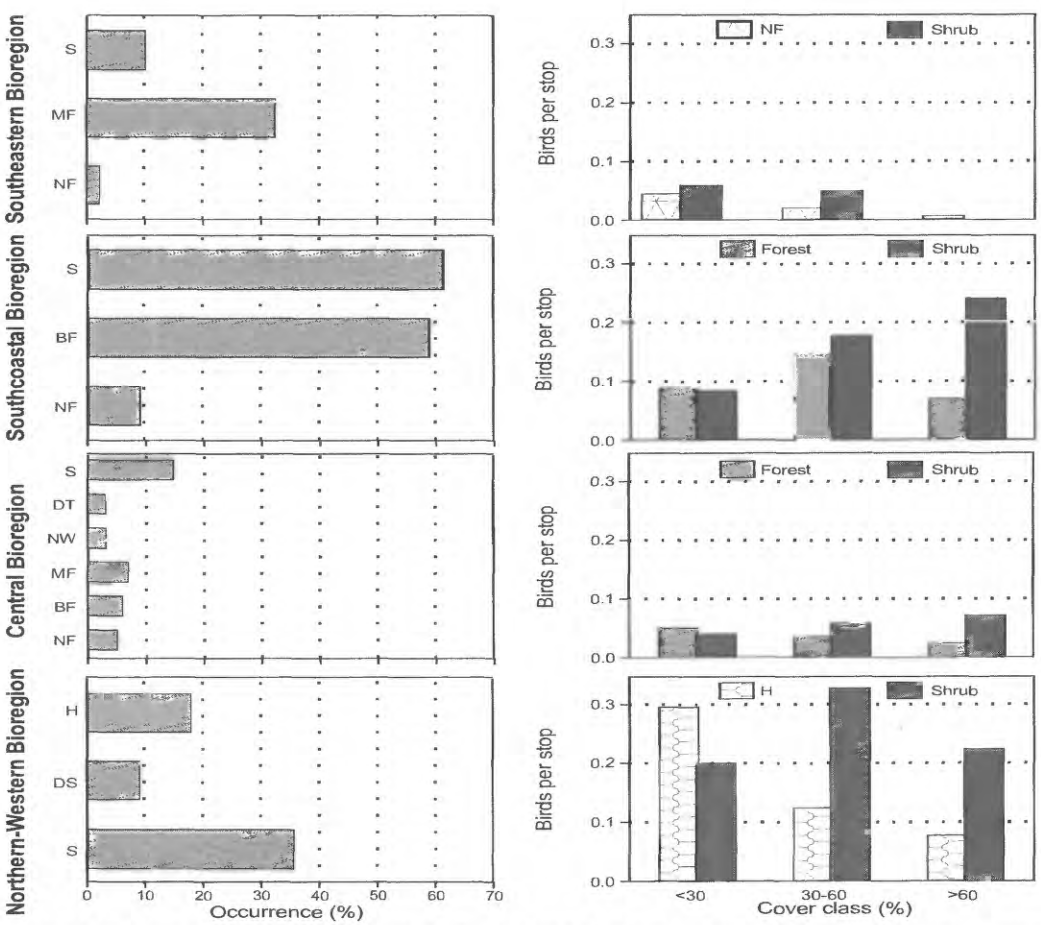
In the Southcoastal Bioregion, highest densities are on Copper River (13.7 birds per year) and Hope (9.0 birds per year) routes. All other routes have occurrences of less than 6.0 birds per year. Yellow Warblers occur at higher elevations on the Hope route in tall shrub and open forests with tall shrub understory. Similarly, Yellow Warblers are also found in tall shrub habitats on the Copper River Delta.

This species is uncommon on the central BBS due to its affinity to riparian habitats. Of the 28 routes where it is recorded, only 15 routes have more than one individual. Highest densities occur on the King Salmon (14.3 birds per year) and Paxson Lake (10.0 birds per year) routes. Densities on river routes exceed 25 birds per year.

In the Northern-Western Bioregion, Yellow Warblers are absent on northern routes but occur on the four western routes. Highest density is recorded on the Council (35.3 birds per year) route. In this region Yellow Warblers are found mainly in riparian tall shrub.

Yellow Warbler

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	67	2.0	(0.8)	3.0
Southcoastal	100	5.5	(1.7)	5.5
Central	76	2.1	(0.5)	2.9
Northern-Western	67	10.5	(5.4)	15.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Yellow-rumped Warbler

(Dendroica coronata)

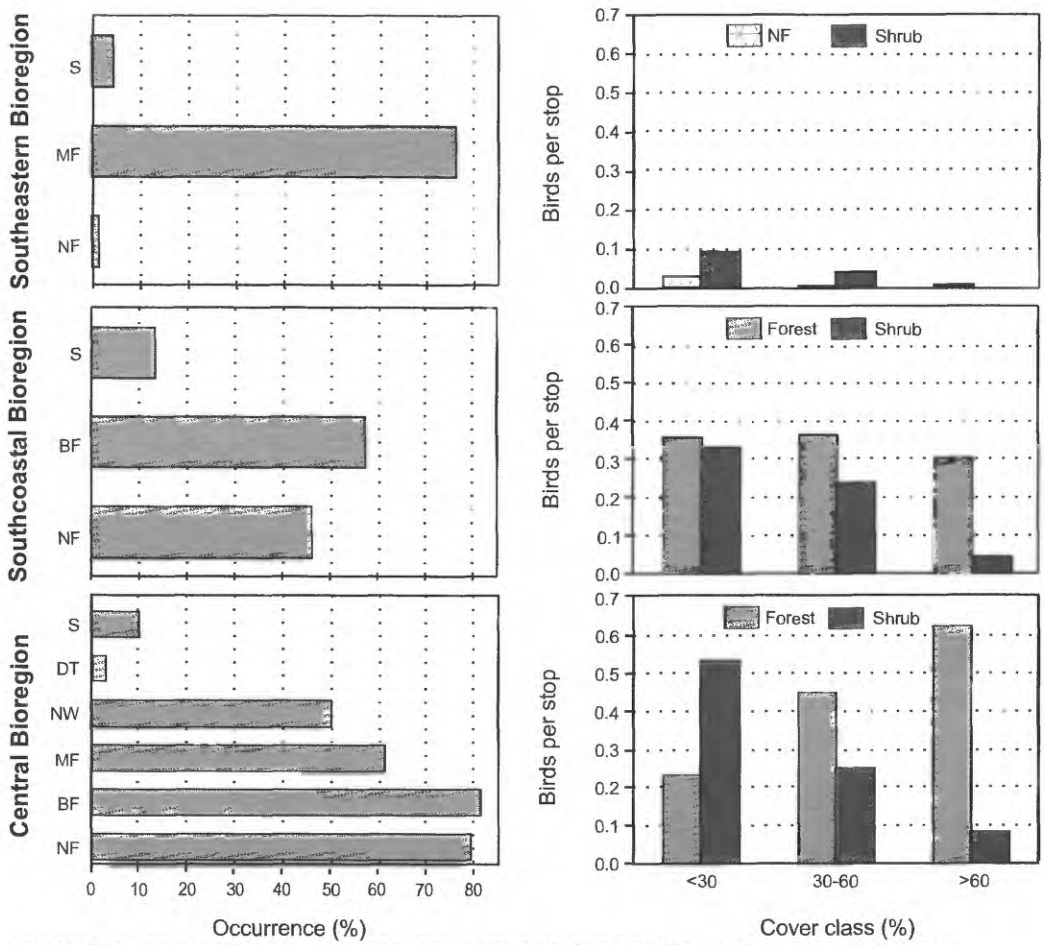
In the Southeastern Bioregion, this species is recorded on both the Haines and Skagway routes in association with mixed forests. It is rare or absent elsewhere in the region.

Yellow-rumped Warblers are common in the western portion of the Southcoastal Bioregion, especially on Kenai Peninsula; they are uncommon elsewhere in the region. Highest densities are recorded on the Anchor River (33.5 birds per year) and Kachemak (28.7 birds per year) routes. It is mostly a forest species and rare in shrub habitats.

In the Central Bioregion, this species is found in broadleaf, needleleaf, and mixed forests. Density is positively associated with percent forest cover. Habitat requirements in Alaska may differ from conspecifics in the southern portion of range. It occurs on 34 routes; highest densities occur on the Fort Richardson (66.0 birds per year), Swan Lake Road (54.5 birds per year), and Hatcher Pass (45.0 birds per year) routes.

Yellow-rumped Warbler

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	17	3.0	(2.1)	18.0
Southcoastal	71	14.9	(5.0)	21.0
Central	92	20.9	(2.8)	23.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Townsend's Warbler

(Dendroica townsendi)

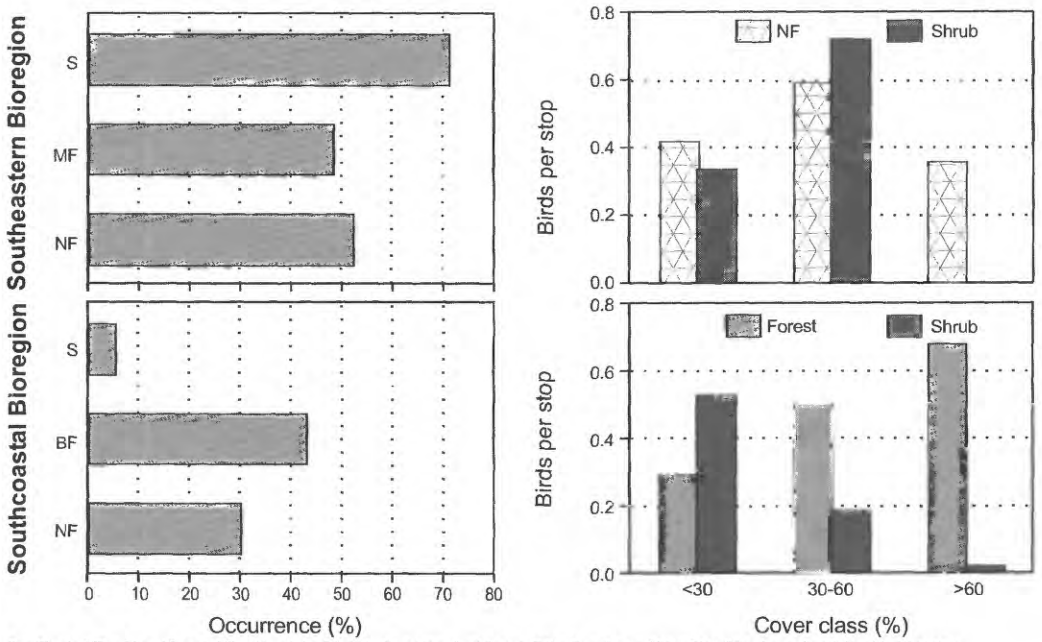
Townsend's Warblers are common throughout needleleaf forests of the Southeastern Bioregion. Highest densities are recorded on the Thorne Bay (50.3 birds per year) and Chichagof Island (50.0 birds per year) routes. High density in 30-60% cover suggests a preference for open forests, forest gaps, and woodland and muskeg edges.

This species is extremely rare to undetected on Copper River Delta routes and Yakutat routes in the Southcoastal Bioregion; however, it is abundant in forests on the Anchor River, Kachemak, and Hope routes (39.0-71.0 birds per year). Density is positively associated with increasing forest cover.

Townsend's Warblers are rare on routes in the Central Bioregion.

Townsend's Warbler

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	92	16.3 (5.3)	22.4
Southcoastal	57	22.1 (11.0)	38.6
Central	5	0.04 (0.04)	0.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

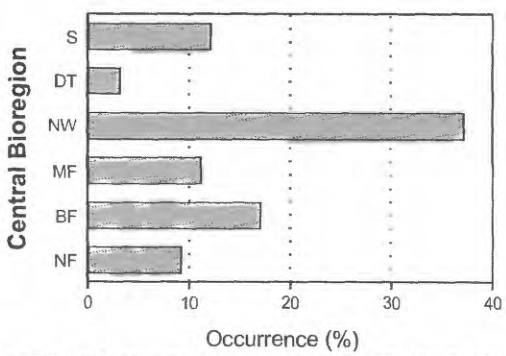
Blackpoll Warbler

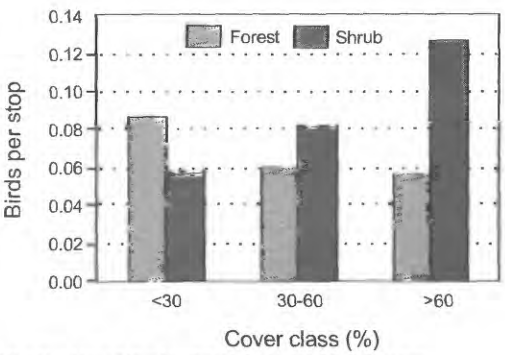
(Dendroica striata)

Blackpoll Warblers are found mostly in central Alaska, especially in needleleaf woodland habitats. Although this species is found in most other major covertypes, it seems to prefer shrub with a small percentage of forest overstory. It is also known to occur in broadleaf woodlands. Alaska BBS data show a positive relationship between density of Blackpoll Warblers and percent cover of needleleaf woodland on routes where they occur. In the Central Bioregion, Blackpoll Warblers are most common on the Lake Louise (32.0 birds per year), King Salmon (29.5 birds per year) and Sheep Mountain (26.3 birds per year) routes, although rare to common elsewhere in the region.

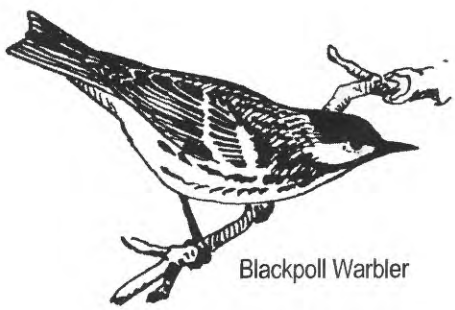
Blackpoll Warbler

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Central	59	3.9 (1.4)	6.7





S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.



Blackpoll Warbler

Northern Waterthrush

(*Seiurus noveboracensis*)

This species occurs in low numbers along river corridors on the Haines and Skagway routes in the Southeastern Bioregion. It is rare or absent elsewhere in the region.

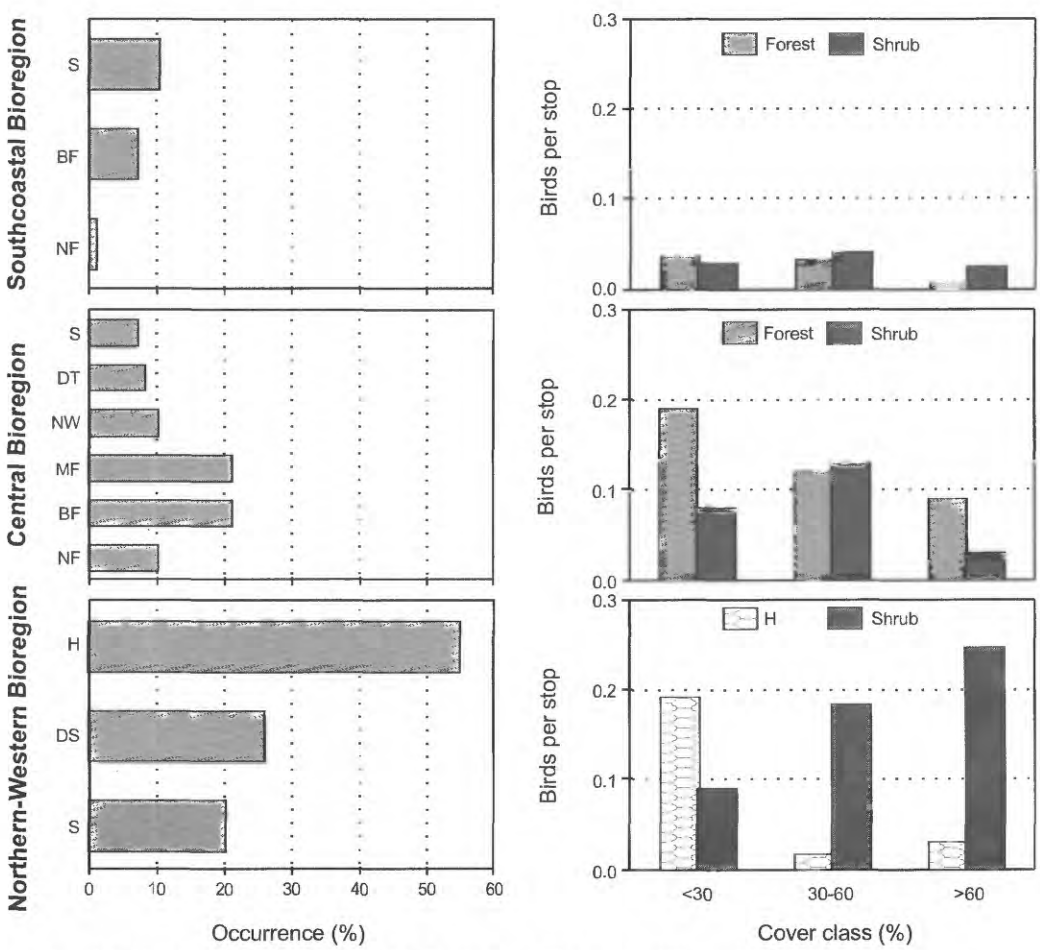
Northern Waterthrushes are uncommon to rare in the Southcoastal Bioregion but occur on four routes. Highest density is recorded (7.0 birds per year) on the Anchor River route; densities are less than 2.0 birds per year elsewhere in the bioregion.

In the Central Bioregion, this species is widely distributed and occurs on 32 routes. The Petersville (52.3 birds per year) and Chistochina (19.7 birds per year) routes have the highest densities. It is most common in wet, shrubby habitats; it may prefer broadleaf and mixed forest edges.

In the Northern-Western Bioregion, this species occurs on three western routes but is absent on northern routes. Densities range up to 20.0 birds per year (Council route); other routes have less than 10 birds per year. High densities recorded in narrow, riparian shrub areas result in high percent occurrence value for herbaceous habitat in the western region.

Northern Waterthrush

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	17	0.2 (0.2)	1.4
Southcoastal	57	1.3 (1.0)	2.4
Central	86	4.6 (1.5)	5.3
Northern-Western	50	5.8 (3.2)	11.7



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub. .

Wilson's Warbler

(Wilsonia pusilla)

Wilson's Warblers are common in the northern Southeastern Bioregion; they are less common in the south. Highest densities are recorded on the Haines (38.3 birds per year) and Sitka (28.5 birds per year) routes. Very low numbers are recorded on the Ketchikan, Thorne Bay, and Zarembo routes. Wilson's Warblers' use of red alder probably accounts for the high percent occurrence in mixed forests.

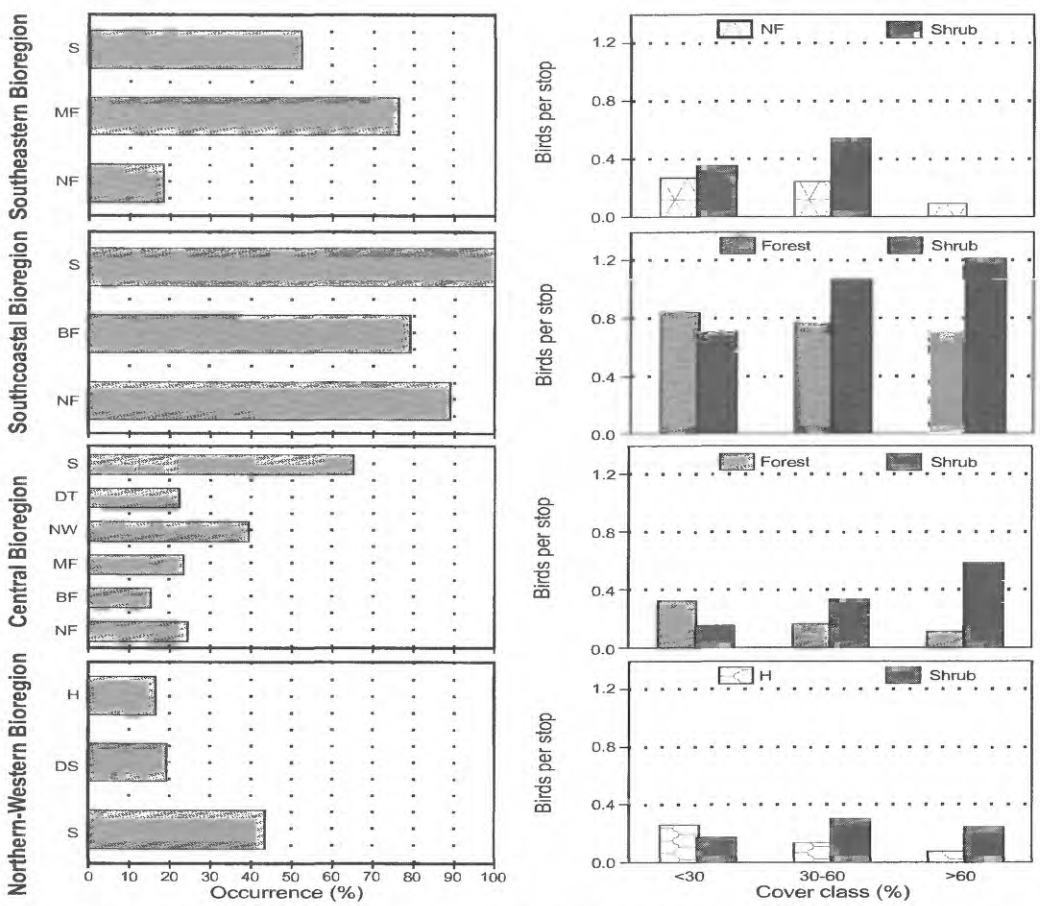
In the Southcoastal Bioregion, Wilson's Warblers are common to abundant. Density is positively related to percent shrub cover. Wilson's Warblers are evenly distributed throughout the region, and highest densities occur on the Anchor River (61.7 birds per year) route.

In the Central Bioregion, density is positively associated with increased shrub cover. Wilson's Warblers occur on 32 routes; highest densities occur on the Sheep Mountain (52.3 birds per year) and Northway (41.5 birds per year) routes. They are found most often in shrub habitats without canopy in the Central Bioregion; in the Southeastern and Southcoastal Bioregions, this species most often occurs in shrub habitats with a canopy.

In the Northern-Western Bioregion, Wilson's Warblers occur on four Seward Peninsula routes but are absent on northern routes. Highest densities found on the Council route (21.3 birds per year). Wilson's Warblers occur in both riparian and upland shrub in this bioregion.

Wilson's Warbler

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	11.6	(3.7)	11.6
Southcoastal	100	40.3	(2.9)	40.3
Central	86	12.1	(2.2)	14.4
Northern-Western	67	10.2	(3.5)	15.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

American Tree Sparrow

(*Spizella arborea*)

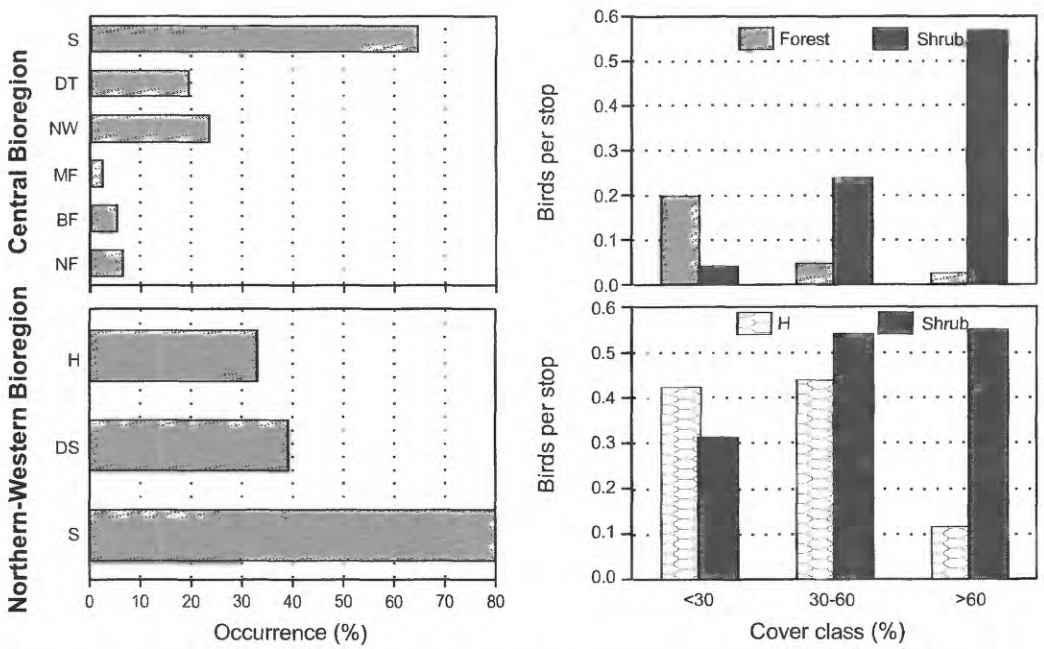
This species is very rare on southeastern BBS routes.

In the Central Bioregion, this species is found in the highest densities on the King Salmon route (70.0 birds per year) and southern Alaska Range routes (Maclaren – 60.0 birds per year, Savage – 36.5 birds per year). It is nearly absent in forested areas, although present in woodland and dwarf tree covertypes. There is a stong positive relationship between bird density and increasing shrub cover.

American Tree Sparrows are common in the Northern-Western Bioregion and occur on all routes. Densities range from 9.3 to 26.5 birds per year; four routes have more than 20.0 birds per year. This species requires some shrub cover; it is absent on stops lacking shrubs.

American Tree Sparrow

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Central	57	7.6	(2.7)	13.8
Northern-Western	100	19.5	(2.9)	19.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub. .

Savannah Sparrow

(*Passerculus sandwichensis*)

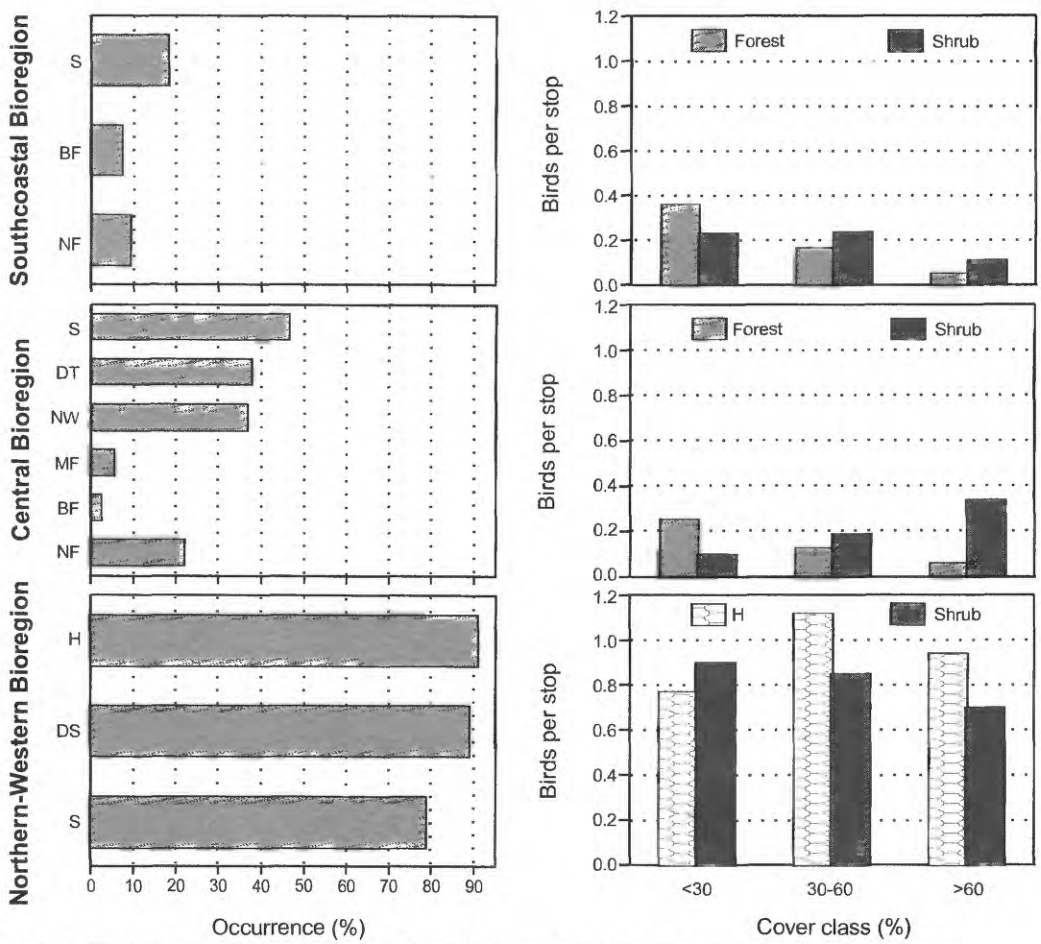
This species is common in the western portion of the Southcoastal Bioregion with the highest densities recorded on the Anchor River (25.7 birds per year) and Kachemak (17.5 birds per year) routes. Densities are less than 10.0 birds per year elsewhere. Highest densities are associated with edges in the Southcoastal Bioregion.

In the Central Bioregion, Savannah Sparrows are widely distributed and occur on 32 routes. Highest densities are recorded on upland tundra routes with extensive shrub cover, especially on the Toklat (45.5 birds per year) and Savage (26.0 birds per year) routes in Denali National Park.

Savannah Sparrows are found in high numbers on all six routes in the Northern-Western Bioregion; highest densities occur on the Happy Valley (61.7 birds per year) and Nome (53.7 birds per year) routes. These routes have extensive areas of low shrub interspersed with herbaceous tundra.

Savannah Sparrow

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southcoastal	100	10.4	(3.2)	10.4
Central	86	7.8	(1.5)	9.3
Northern-Western	100	40.6	(4.2)	40.6



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub. .

Fox Sparrow

(Passerella iliaca)

Fox Sparrows occur on all routes in the Southeastern Bioregion, often in shrubs and along forest edges. They are most common on island routes at Sitka (17.5 birds per year) and Craig (15.0 birds per year). They are also found in fairly high densities on the Haines route (10.0 birds per year).

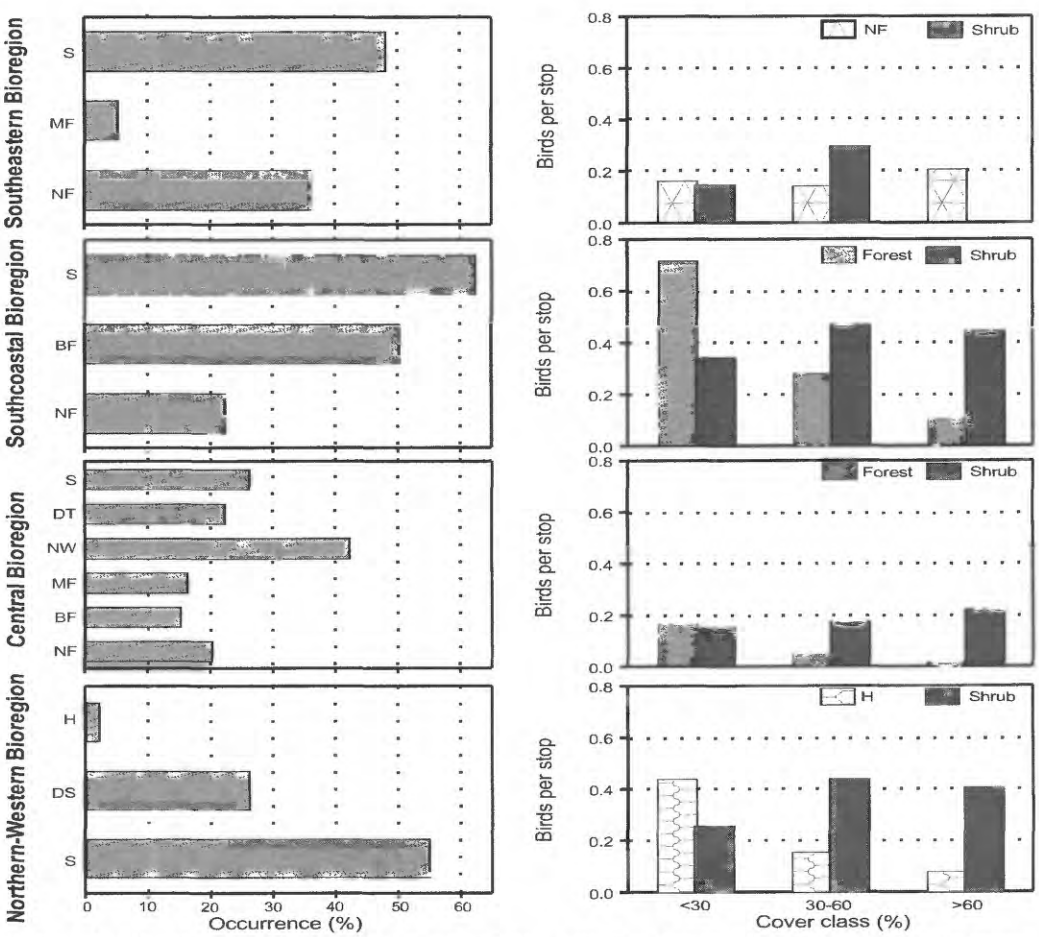
In the Southcoastal Bioregion, this species is most common on western Kenai Peninsula routes (Kachemak – 33.5 birds per year and Anchor River – 31.0 birds per year). There is a strong negative association with increasing forest cover; in contrast to the Southeastern Bioregion, this species is more likely to occur in the Southcoastal Bioregion in shrubs lacking overstory. Highest concentrations are recorded on shrubby stops along these routes. Elsewhere in the bioregion, densities are 7.3-15.7 birds per year.

In the Central Bioregion, this species is found mostly in shrub and woodland habitats; density is negatively associated with increasing forest cover. Fox Sparrows occur on 31 routes, with most routes having fewer than 10.0 birds per year. Highest densities are found on the Lake Louise (39.0 birds per year), Sheep Mountain (32.3 birds per year), and Mt. Fairplay (27.7 birds per year) routes.

In the Northern-Western Bioregion, Fox Sparrows are found in tall shrub thickets, especially along riparian corridors and in moist valley bottoms. Fox Sparrows appear to prefer taller, denser shrubs than other (*Zonotrichia*) sparrows (B. A. Andres, author observation). Fox Sparrows occur regularly on Seward Peninsula routes (14-30 birds per year) but are rare on northern routes (1.5 birds per year on Happy Valley route).

Fox Sparrow

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	7.7	(1.5)	7.7
Southcoastal	100	16.8	(4.1)	16.8
Central	84	6.9	(1.7)	8.5
Northern-Western	83	15.2	(5.0)	18.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Song Sparrow

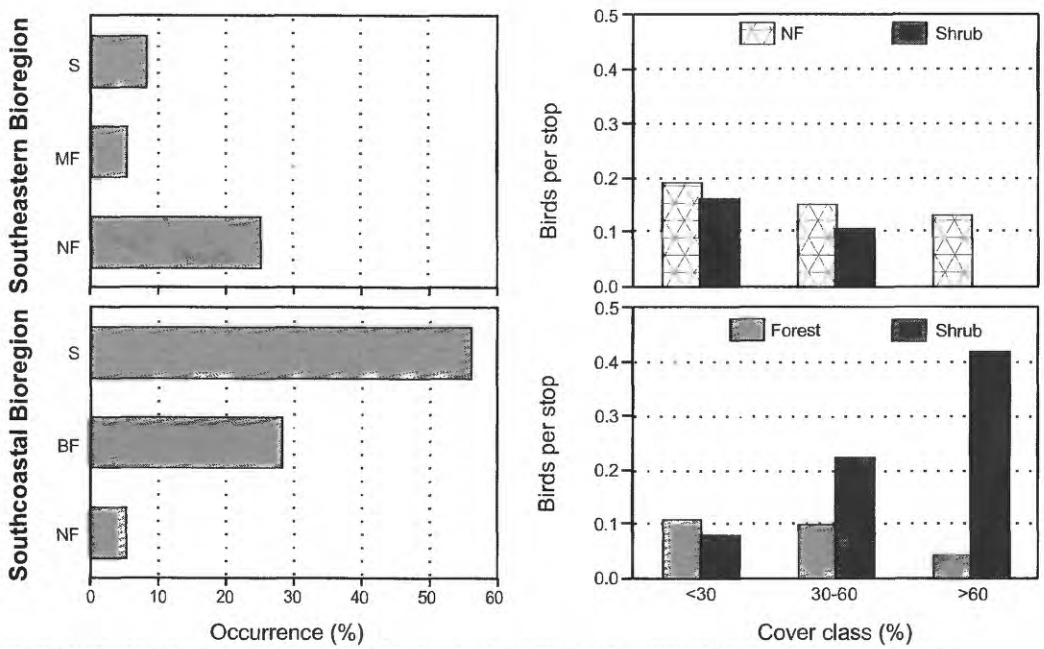
(Melospiza melodia)

Song sparrows are distributed throughout most of the Southeastern Bioregion. Highest density is recorded on the Sitka route (21.5 birds per year). In this region, sparrows often inhabit herbaceous fringe of forested areas, especially along marine shorelines (P.A. Cotter, author observation).

In the Southcoastal Bioregion, Savannah Sparrows are common on only two routes, the Cordova (22.0 birds per year) and Copper River (24.0 birds per year) routes. These routes contain the highest quantity of shrub cover in the region. They are also found in shrub and open shrub habitats throughout the Copper River Delta. Song Sparrows are rare, or undetected, on all other southcoastal routes.

Song Sparrow

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	83	7.4 (1.8)	8.9
Southcoastal	86	6.9 (4.2)	8.0



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Song Sparrow

Lincoln's Sparrow

(Melospiza lincolnii)

This species is generally associated with shrubby areas and wetlands.

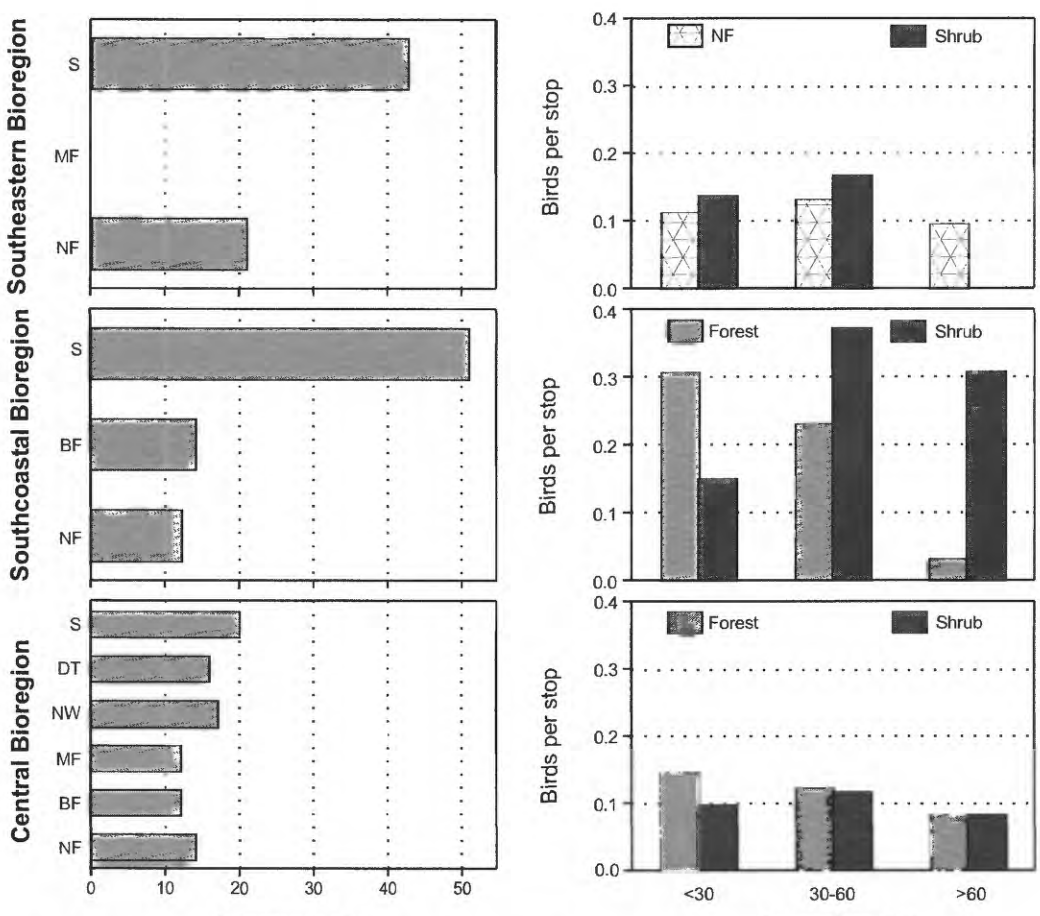
The Lincoln's Sparrow is a fairly common shrub inhabitant in the Southeastern Bioregion. Detections in needleleaf habitat are probably of birds that use canopy gaps and muskegs. It favors edges and wet areas. Highest densities are recorded on the Mitkof Island (14.7 birds per year) and Haines (14.0 birds per year) routes. Densities are less than 10 birds on all other southeastern routes.

Lincoln's Sparrows are found on all routes in the Southcoastal Bioregion except Hope. They usually reside in shrub habitats, often in association with water or wet herbaceous habitats. Detections are relatively low throughout the bioregion; densities range from 6.5 to 19.3 birds per year. Highest densities are found at Yakutat and Copper River Delta, which are routes where wet sedge-shrub meadows are prevalent.

In the Central Bioregion, Lincoln's Sparrows are recorded on 29 routes; most routes (23) have fewer than 10 individuals per year. Highest densities are recorded on the Petersville (46.3 birds per year), Eagle (14.5 birds per year) and Mt. Fairplay (14 birds per year) routes. The Petersville route is characterized by expanses of wet herbaceous areas and muskegs.

Lincoln's Sparrow

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	92	5.9 (1.5)	6.5
Southcoastal	86	9.9 (2.5)	11.5
Central	78	5.1 (1.4)	6.7



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

White-crowned Sparrow

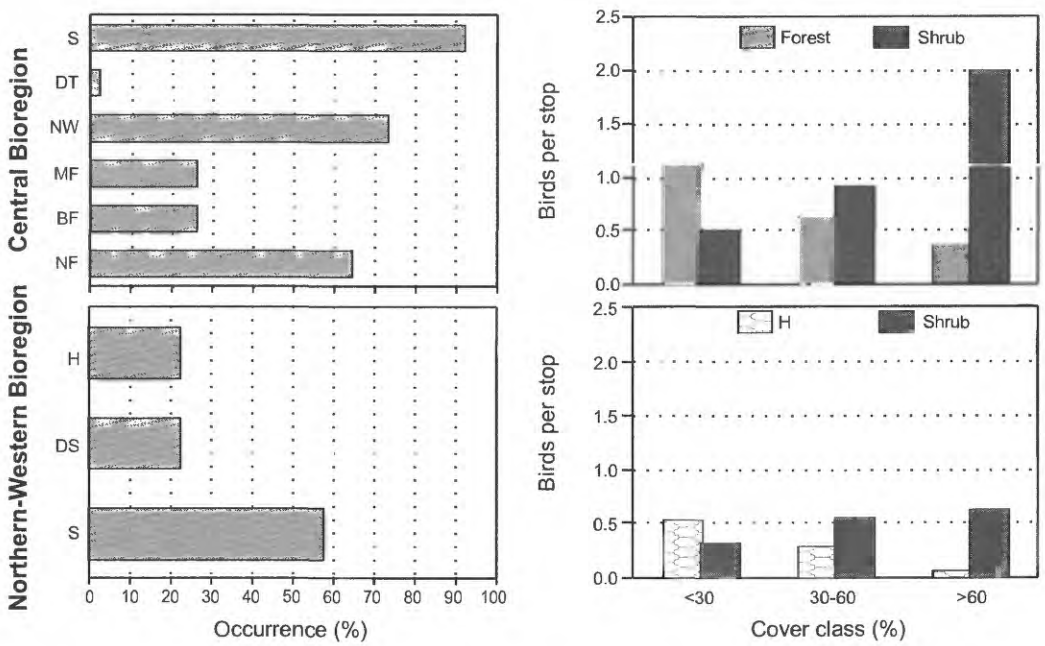
(Zonotrichia leucophrys)

In the Central Bioregion, this species is found in shrubs. It occurs in high numbers on shrub-tundra routes and on forest routes with a high percentage of primary shrub coverage. Density is positively related to increasing shrub cover and negatively related with increasing tree cover. White-crowned Sparrows occur on 36 routes in the Central Bioregion; 13 routes average more than 50 individuals per year. Highest densities are recorded on the Savage (84.3 birds per year) and Sheep Mountain (76.7 birds per year) routes.

In the Northern-Western Bioregion, sparrow density increases with increasing shrub coverage. Highest densities are recorded on Seward Peninsula routes: Salmon Lake (37.5 birds per year), Nome (31.3 birds per year), and Council (26.5 birds per year). They are less common on northern routes. Density is negatively related to percentage of increases in the herbaceous cover.

White-crowned Sparrow

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Central	97	36.3	(4.0)	38.4
Northern-Western	100	20.3	(5.5)	20.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Golden-crowned Sparrow

(Zonotrichia atricapilla)

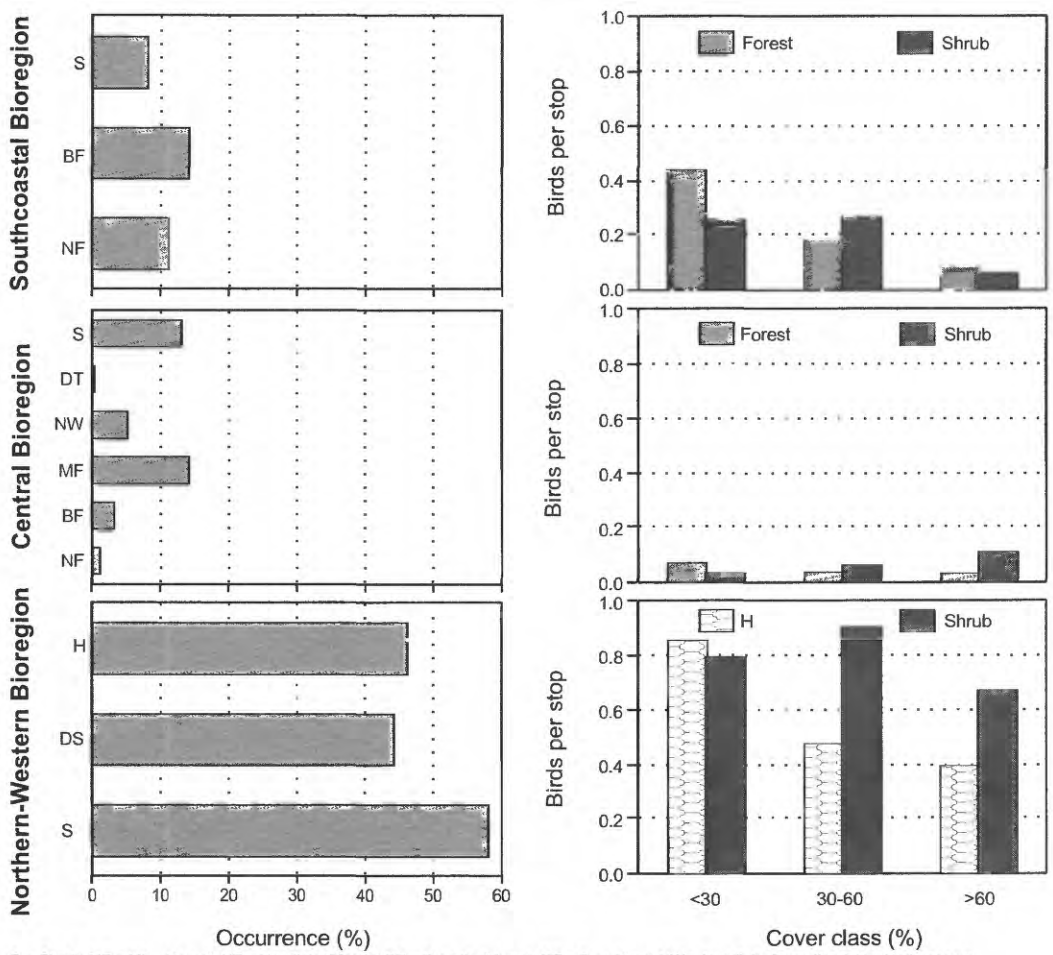
In the Southcoastal Bioregion, this species is found only on Kenai Peninsula. It is most common on the Kachemak (39.3 birds per year) and Anchor River (18.7 birds per year) routes. Fairly high densities are recorded on the alpine shrub portion of the Hope route (16.3 birds per year). Golden-crowned Sparrows are usually found in shrub but also occur in areas with some overstory. They do not occur on Copper River Delta or Yakutat routes.

Golden-crowned Sparrows are observed in alpine shrub habitats of the Alaska Range and Chugach Mountains and the shrub-tundra transition zone routes in the southwestern portion of the Central Bioregion. In this region, highest densities (29-30 birds per year) are recorded on the Hatcher Pass and Dillingham routes. Moderate densities are recorded on the Katmai (12.0 birds per year) and King Salmon, Toklat, and Petersville (5.0-7.0 birds per year) routes.

In the Northern-Western Bioregion, Golden-crowned Sparrows occur in high densities (33.4-75.3 birds per year) on all four Seward Peninsula routes in western Alaska, especially in areas with open, tall shrub thickets. They are absent on northern routes.

Golden-crowned Sparrow

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southcoastal	43	10.6 (5.7)	24.8
Central	30	2.4 (1.2)	8.5
Northern-Western	67	39.5 (12.4)	53.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub. .

Dark-eyed Junco

(Junco hyemalis)

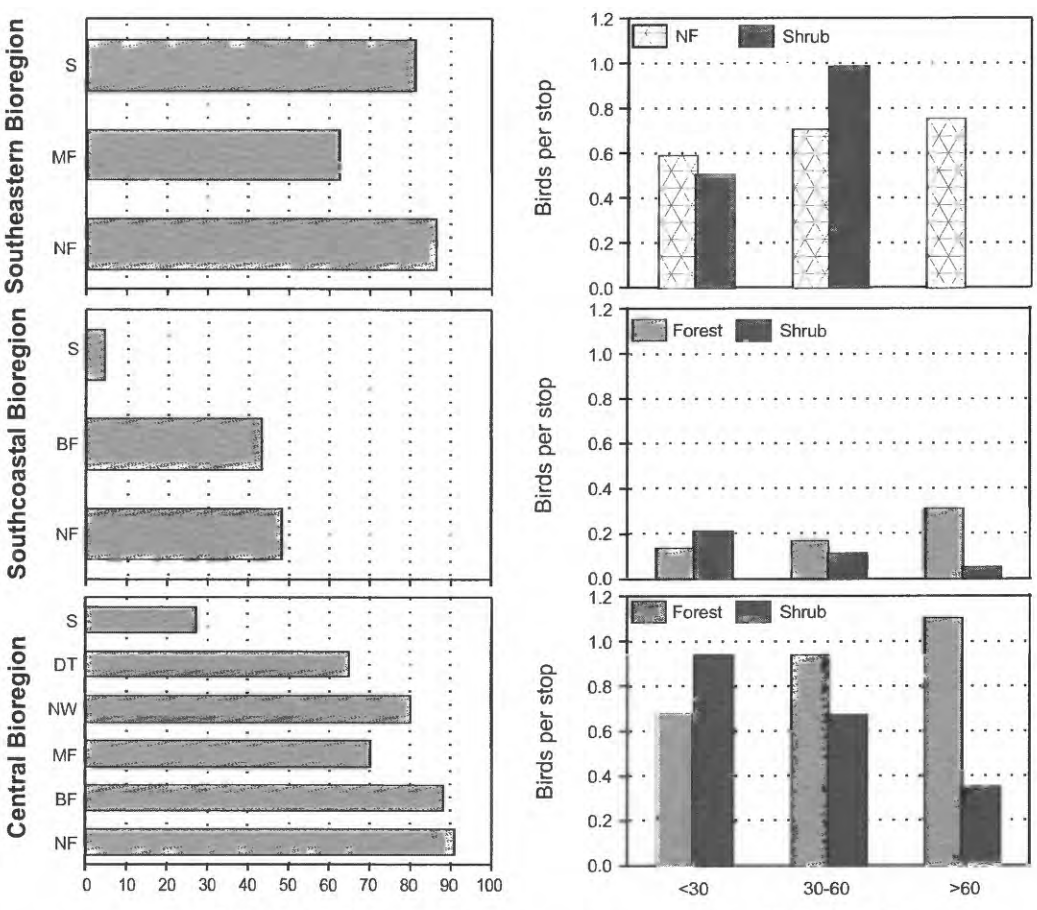
The Oregon subspecies is common throughout the Southeastern Bioregion, especially in needleleaf forests. Densities in shrub areas may be inflated because of increased detectability near clearcuts. Densities on southeastern routes are as high as 70.0 birds per year. This species is much less common on the Haines and Skagway routes, which reflects the decrease in needleleaf forest cover on these routes. Low densities are recorded on the Ketchikan route (4.7 birds per year).

Both Oregon and Slate-colored subspecies occur in southcoastal needleleaf and broadleaf forests. Highest densities are recorded on the Harlequin Lake (19.7 birds per year), Anchor River (19.7 birds per year) and Hope (17.3 birds per year) routes. Only the Oregon subspecies occurs on the Harlequin Lake and Yakutat routes (B.A. Andres, author observation). Both subspecies are found in low numbers along Copper River Delta routes; the Slate-colored subspecies occurs west of the Copper River. Both races are typically absent from open shrubby areas but are known to breed in coniferous shrubs at treeline.

High densities of the Slate-colored subspecies occur throughout the Central Bioregion, especially in mixed and needleleaf forests. Highest densities are recorded on the Eagle (98.0 birds per year) and Tower Bluffs (92.6 birds per year) routes. They are absent on tundra routes, and density is positively related to increasing forest cover.

Dark-eyed Junco

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	100	31.6	(6.3)	31.6
Southcoastal	100	8.9	(2.9)	8.9
Central	89	42.3	(4.8)	48.7



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

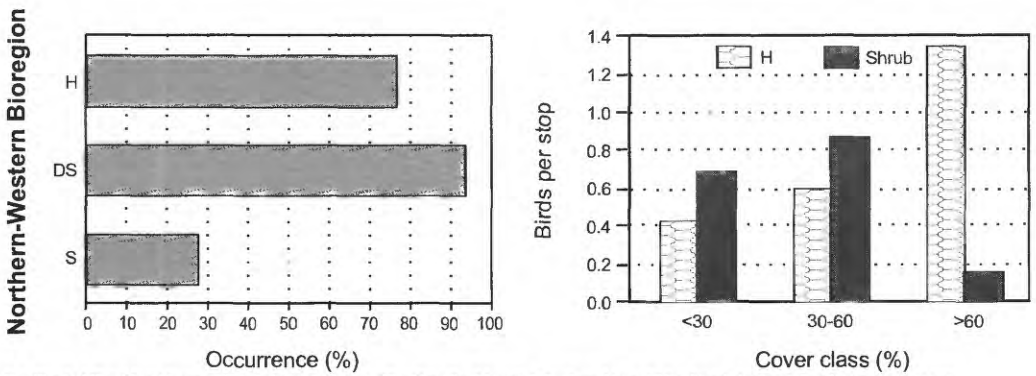
Lapland Longspur

(Calcarius lapponicus)

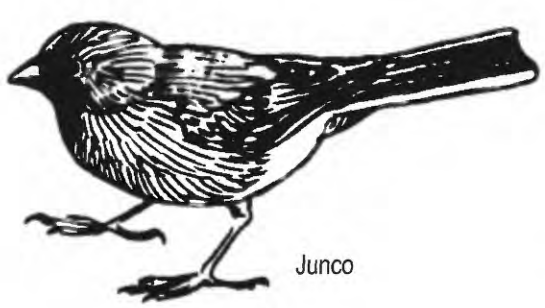
This species occurs only on northern and western BBS routes; it is absent in all other regions. In the Northern-Western Bioregion it is found mostly in upland herbaceous and dwarf shrub habitats on all six routes. Highest densities are on the Galbraith Lake (67.0 birds per year) and Teller (46.7 birds per year) routes. There is a strong positive relationship between density and increasing herbaceous cover; Lapland Longspurs are less common in low shrub habitats.

Lapland Longspur

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Northern-Western	100	27.5	(9.8)	27.5



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.



Junco

Pine Grosbeak

(Pinicola enucleator)

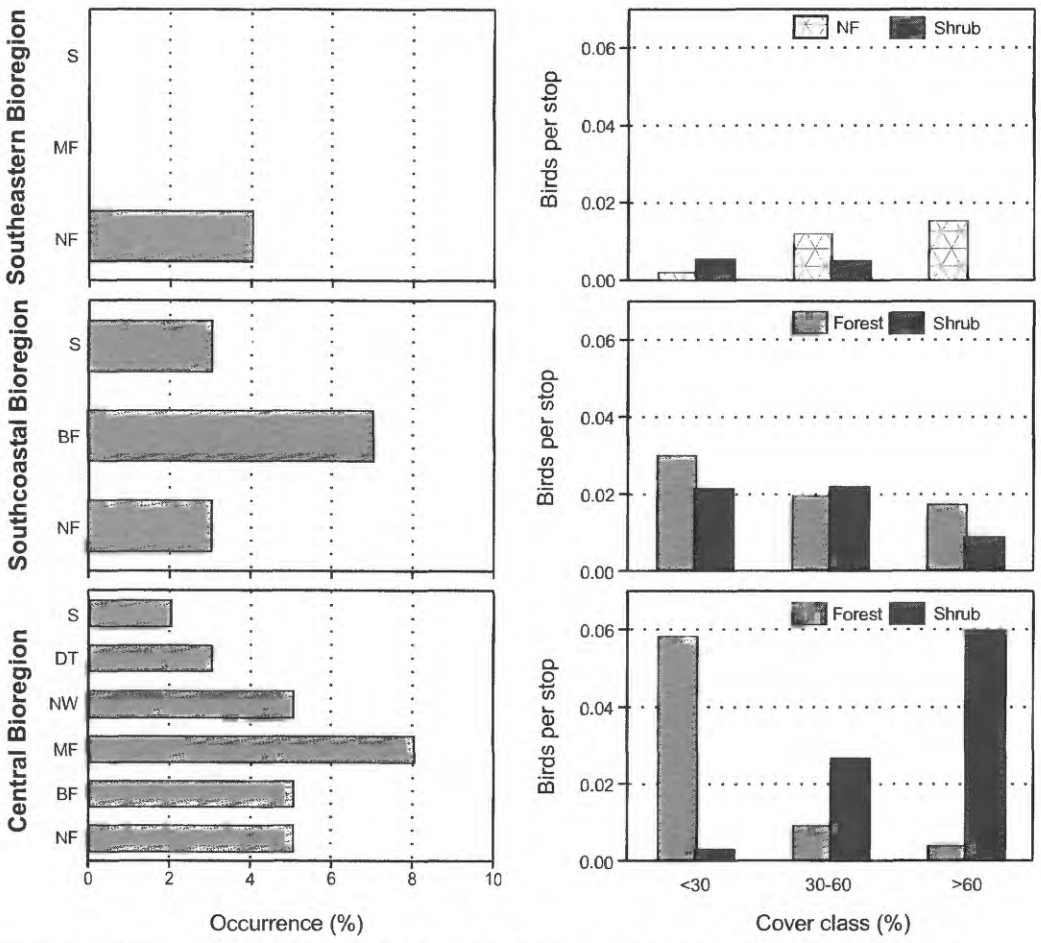
This species is rare on the Alaska BBS. In the Southeastern Bioregion, grosbeaks are found solely in needleleaf forests. Bird density is positively related to increasing forest cover.

Pine Grosbeaks occur rarely on the Southcoastal BBS; highest density is recorded on the Anchor River (3.0 birds per year) route. It occasionally occurs elsewhere.

In the Central Bioregion, the Pine Grosbeak is a forest species; it occurs on 17 routes in low numbers (less than four birds per year). Breeding Bird Survey data suggest affinity to open habitats in the Central Bioregion than elsewhere.

Pine Grosbeak

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southeastern	33	0.4 (0.2)	1.3
Southcoastal	57	0.9 (0.4)	1.7
Central	46	0.8 (0.2)	1.8



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

Common/Hoary Redpoll

(Carduelis flammea and C. hornemanni)

This species group is typically a breeder in shrub and open areas but also found in forested portions of the Central Bioregion. Many observations on Alaska BBS are of flying birds (B.A. Andres, author observation), so species identity and habitat affinities are difficult to determine. Because of the early breeding phenology of redpolls, BBS counts likely enumerate both adults and recently fledged young.

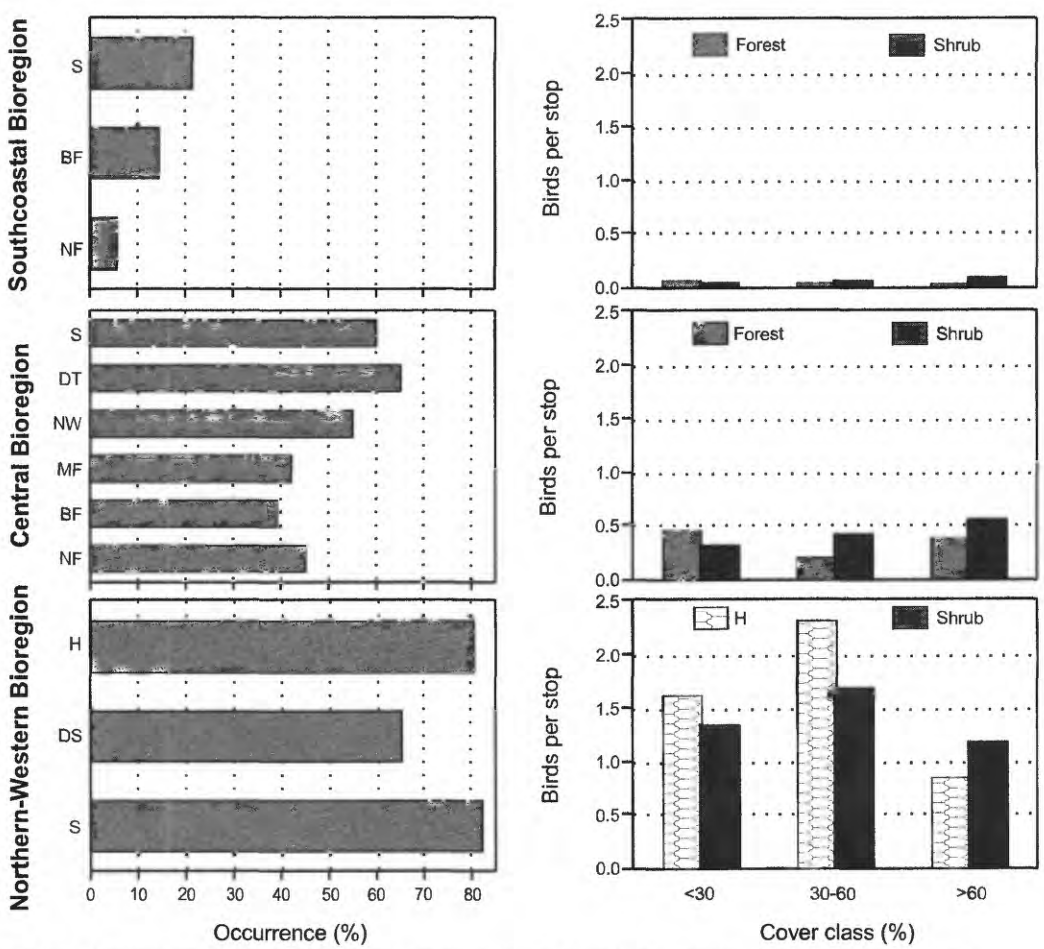
In the Southcoastal Bioregion, this species is found in low numbers on Copper River Delta routes (3.5-5.0 birds per year) and southern Kenai Peninsula routes (1.0-4.3 birds per year), where there is sufficient shrub habitat.

In the Central Bioregion, it is found in a variety of habitats. It occurs on nearly all routes in the region; highest densities are recorded in the east on the Slana (66.0 birds per year) and Nabesna (46.0 birds per year) routes.

In the Northern-Western Bioregion, it is found in high densities on the Nome (109.5 birds per year) and Council (106.7 birds per year) routes. Redpolls are recorded in much lower densities (10-30 birds per year) on northern routes.

Common/Hoary Redpoll

Bioregion	Percent routes	Birds per route (SEM)	Birds per route (where present)
Southcoastal	57	2.0 (0.8)	3.4
Central	92	20.0 (2.7)	22.3
Northern-Western	100	65.6 (16.6)	65.6



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub. .

Pine Siskin

(Carduelis pinus)

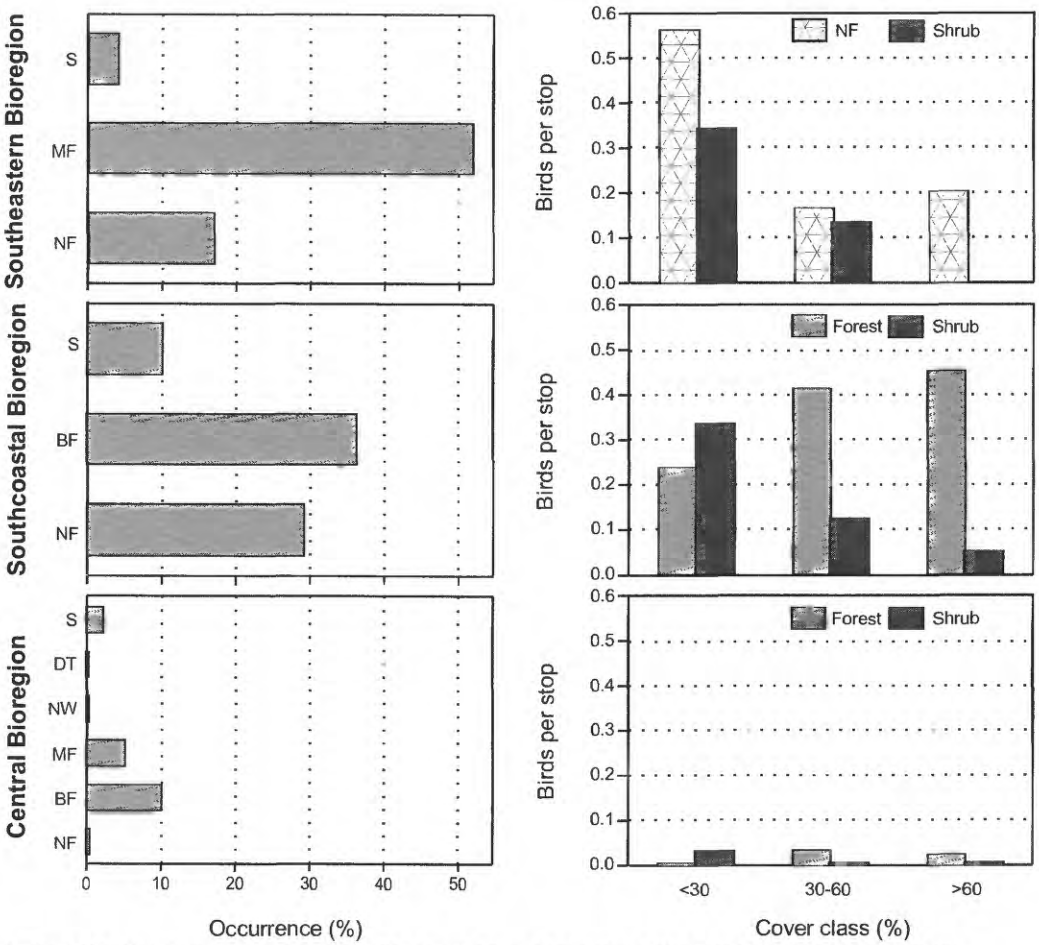
This species is generally associated with coniferous forests in the Southeastern Bioregion. Pine Siskin observations on Alaska BBS may be inflated by their propensity to visit feeders. Flyovers account for many observations on the BBS (B.A. Andres, author observation). Highest densities occur on the Sitka (47.7 birds per year) and Juneau (30.7 birds per year) routes.

In the Southcoastal Bioregion, this species occurs on all routes; it is most common on Kenai Peninsula routes. Highest densities are recorded on the Hope (48.7 birds per year), Kachemak (37.0 birds per year) and Anchor River (21.3 birds per year) routes. It is uncommon in open and shrub habitats and more closely associated with both needleleaf and broadleaf forests.

Pine Siskins are found in low numbers on 12 routes in the Central Bioregion (less than five birds per year). Highest density occurs on the Willow (21.5 birds per year) route. Birds are observed most frequently in broadleaf and mixed forest.

Pine Siskin

Bioregion	Percent routes	Birds per route (SEM)		Birds per route (where present)
Southeastern	92	14.8	(4.2)	16.2
Southcoastal	100	16.1	(7.5)	16.1
Central	32	1.1	(0.6)	3.3



S = Shrub; MF = Mixed forest; NF = Needleleaf forest; BF = Broadleaf forest; DT = Dwarf tree; NW = Needleleaf woodland; H = Herbaceous; DS = Dwarf shrub.

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13. ABSTRACT (Maximum 200 words)

The Breeding Bird Survey (BBS) is used to monitor population of landbirds on the North American continent. Each BBS route, which is surveyed once a year, consists of 50 stops placed at 0.8-km (0.5-mi) intervals along a stretch of road.The program in Alaska has greatly expanded; observers record more than 200 species on 75 BBS routes and count about 35,000 individual birds. The BBS does not record temporal changes in habitat that could account for bird population fluctuations. Therefore, this project was begun to assess vegetation covertypes along roadside routes throughout Alaska. Our purpose was to determine bird-vegetation associations and classify vegetation covertypes to monitor future changes. A well-established classification scheme was used to assess vegetation covertypes along 62 roadside BBS routes in Alaska. Bird count data from the BBS was used to determine the frequency of occurrence (percent of stops) of 48 landbird species (grouse, hummingbirds, woodpeckers, and passerines) in dominant vegetation types. Also calculated was the average bird density (birds per stop) for three major cover classes (less than 30%, 30-60%, greater than 60%) of forest, shrub, or herbaceous vegetation covertypes. Data are depicted graphically to examine relationships between vegetation covertypes and bird density or occurrence within four biogeographic regions of the state. Abundance and occurrence information for each species in each biogeographic region are also presented. This information illustrates broad-scale bird-habitat associations and will serve as a foundation to compare future changes in Alaska's landscape.

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