

PASSERINE DIVERSITY, RELATIVE ABUNDANCE, AND MIGRATION AT COLD BAY, ALASKA

BY EDGAR P. BAILEY

Diversity, relative abundance, and migration patterns of passerine birds on the Izembek National Wildlife Range, 30 miles from the tip of the Alaska Peninsula, were determined by mist-netting during the summers of 1970, 1971, 1972, and in April and May 1973. The mist-netting site was at sea level near the mouth of Russel Creek, 3 miles from Range headquarters at Cold Bay (55° 12'N, 162° 43'W).

The southern Alaska Peninsula region is tundra, composed mainly of heath (*Empetrum nigrum*) and various grasses and sedges. Patches of alders (*Alnus crispa*) and willows (*Salix* spp.) occur on lower mountain slopes and along some water courses. Only 4 miles separate the Pacific Ocean and Bering Sea at Cold Bay, and the climate is maritime with generally inclement weather. The mean summer temperature at Cold Bay is 49° F, and the average wind velocity from May through September is 16.2 mph. Subfreezing wind-chill temperatures occur regularly throughout the summer period. The cool summers are further accentuated by nearly constant cloud cover and frequent precipitation. Mean sky cover from May through September is 93 percent, and measurable rainfall occurs on 57 percent of the days. The nearly incessant wind precludes use of mist nets except in well protected areas.

Four mist nets were usually used but for short periods up to six were maintained. Nets were left up 24 hours a day. Both dark green and black 1½ inch-mesh nylon nets were used, mostly 7 ft x 18 ft. Longer nets were blown apart in storms unless supported in the center. Besides bad weather, Brown Bears (*Ursus arctos*) wreaked havoc with the operation, and I frequently was unable to check or repair nets until bears moved on. In 1970 and 1971 the nets were taken down during severe storms to prevent mortality of birds, but in 1972 they were left up regardless of weather.

RESULTS AND DISCUSSION

Summer 1970—Between 28 May and 6 November 1970, 486 birds of 14 species were captured (Table 1). Some migrants were already in the area when the nets were erected on 28 May. During the first summer, in which the nets were in operation approximately 93 days, Savannah Sparrows (*Passerculus sandwichensis*) and Yellow Warblers (*Dendroica petechia*) accounted for over one-half of the birds captured. No birds were caught after 9 October. The average number of birds captured per day between 28 May and 17 July was 5.9. Between 7 August and 2 September the average number of birds per day increased to 12.2. Many in August and September were birds-of-the-year, and highest daily total was 28 on 21 August. Fall migration of Savannah Sparrows, Yellow Warblers, and Wilson's Warblers (*Wilsonia pusilla*) peaked in the last half of August. All

TABLE 1.
Summary of mist-netting at Cold Bay, Alaska.

Species	Number captured		Percent of total		Peak number and date		First and last date captured		
	1970	1971	1970	1971	1970	1971	1970	1971	
Savannah Sparrow	177	221	299	55	15 (08/21)	19 (08/20)	14 (08/27)	05/13-10/13	05/10-09/25
Yellow Warbler	102	66	89	13	10 (08/22)	6 (08/25)	11 (08/28)	06/02-09/11	06/17-09/20
Common Redpoll	53	88	26	11	11 (09/12)	10 (05/09)	8 (09/12)	04/15-12/30	04/01-12/12
Bank Swallow	51	7	10	1	15 (07/01)	-	-	06/08-08/21	06/14-08/16
Wilson's Warbler	37	43	32	8	9 (08/27)	6 (08/30)	7 (08/28)	06/11-09/02	06/24-09/08
Golden-crowned Sparrow	35	45	42	7	6 (08/18)	3 (08/30)	3 (08/25)	05/28-09/19	06/05-09/19
Fox Sparrow	17	16	11	3	3 (05/31)	2 (08/25)	-	06/04-09/11	05/24-09/11
Water Pipit	3	6	5	1	-	-	-	05/10-09/03	06/17-08/24
Hoary Redpoll	3	4	-	-	-	-	-	06/31-09/17	05/09-09/26
Lapland Longspur	2	16	18	3	-	2 (05/12)	3 (05/11)	06/02-08/22	05/10-09/29
Hermit Thrush	2	-	1	-	-	-	-	08/31-09/17	09/10
Northern Shrike	2	-	1	-	-	-	-	10/02-03	08/07
Rock Sandpiper	1	2	2	-	-	-	-	05/30	05/05
Tree Swallow	1	-	-	-	-	-	-	06/18-06/24	-
White-crowned Sparrow	-	-	3	-	-	-	-	-	06/12-09/06
Northern Waterthrush	-	1	2	-	-	-	-	08/30	08/23-09/07
Tree Sparrow	-	2	1	-	-	-	-	09/13-10/10	09/20
Semipalmated Plover	-	2	1	-	-	-	-	-	07/22
Orange-crowned Warbler	-	4	-	-	-	-	-	08/31-09/07	-
Gray-cheeked Thrush	-	3	-	-	-	-	-	06/13-09/05	-
Black-capped Chickadee	-	1	-	-	-	-	-	08/19	-
Least Sandpiper	-	1	-	-	-	-	-	06/11	-
Totals	486	526	543						

but seven of the 53 Common Redpolls (*Acanthis flammea*) were captured between 7 August and 9 October. Bank Swallows (*Riparia riparia*) were the first summer resident to leave; only one was captured in August. A Tree Swallow (*Iridoprocne bicolor*) captured on 16 June was a new record for this area.

Summer 1971—A total of 526 birds of 17 species was captured in approximately 200 days of mist-netting (Table 1). The Savannah Sparrow again was the most common species, but the Common Redpoll ranked second this summer. The arrival dates of some spring migrants again were missed, because I was absent the last half of May. In June and July the average number of birds captured per day was 2.0; this jumped to 9.8 between 17 August and 15 September. The two fall migration peaks occurred on 20 and 30 August with the capture of 25 and 26 birds, respectively. In 1971, the average daily number of birds caught during the stable June-July period was much lower than for the nesting period the previous summer. The summer of 1971 was significantly cooler, wetter, and windier than 1970 (Table 2), probably accounting for the decrease in birds, especially insectivorous species, such as Bank Swallows and

TABLE 2.

Weather data, April - September 1970, 1971, and 1972 at Cold Bay, Alaska.

Year and month	Mean temperature (°F) and departure from normal ¹	Precipitation (in) and departure from normal ¹	Mean wind speed (mph) and departure from normal ¹
1970			
April	31.8 (-1.5)	3.83 (+2.37)	21.5 (+3.3)
May	40.8 (+2.5)	2.06 (-0.23)	17.2 (+0.4)
June	47.8 (+2.5)	2.99 (+1.04)	15.5 (-0.2)
July	51.3 (+1.6)	3.86 (+2.04)	17.9 (+2.5)
August	50.2 (-1.1)	3.82 (-0.43)	17.3 (+0.8)
September	46.9 (-0.6)	5.62 (+1.30)	16.2 (-0.1)
1971			
April	28.0 (-5.3)	0.43 (-1.03)	17.5 (-0.7)
May	34.3 (-5.2)	3.75 (+1.46)	17.7 (+0.9)
June	40.5 (-4.8)	6.67 (+4.82)	19.0 (+3.3)
July	47.8 (-1.9)	2.27 (+0.45)	15.7 (+0.3)
August	48.5 (-2.8)	2.76 (-1.49)	19.4 (+2.9)
September	44.5 (-3.0)	3.86 (-0.46)	16.7 (+0.4)
1972			
April	29.5 (-3.8)	3.09 (+1.63)	21.0 (+2.8)
May	38.6 (-0.9)	2.06 (-0.23)	16.5 (-0.3)
June	37.1 (-3.7)	2.91 (+0.96)	20.1 (+4.4)
July	48.6 (-1.1)	1.82 (0.00)	17.8 (+2.4)
August	45.7 (-1.3)	3.84 (-0.41)	14.8 (-1.7)
September	42.3 (+0.4)	1.30 (-3.02)	16.5 (-0.2)

¹Average—28 years.

Yellow Warblers. Again, as in 1970, all Wilson's Warblers were caught during fall migration, with the exception of one individual in late June. Following the previous year's pattern, only six Common Redpolls were recorded in June and July.

According to Gabrielson and Lincoln (*The Birds of Alaska*. Wildl. Mgmt. Inst., Washington, D. C., 1959), Orange-crowned Warblers (*Vermivora celata*), Northern Waterthrushes (*Seiurus noveboracensis*), Gray-cheeked Thrushes (*Catharus minima*), and Tree Sparrows (*Spizella arborea*) have not been recorded previously in this region. All were caught during fall migration. The Black-capped Chickadee (*Parus atricapillus*) is extremely rare in the Cold Bay area.

Summer 1972—During the final summer of the study, the nets were in operation almost continuously, except from 31 August to 5 September, and 543 birds of 16 species were recorded (Table 1). Relative abundances remained much the same as in the previous summers, except for the Common Redpoll which dropped to fifth in rank. The percentage of Savannah Sparrows rose to 55, and Bank Swallows again were scarce, reflecting a second unusually cool summer. Savannah Sparrows were the earliest spring migrants (10 May). The June and July average of birds recorded per day was only 1.8; this figure increased to 10.6 between 12 August and 16 September (Figure 1). The further decline in the bird population during the June-July period is probably attributable to two suc-

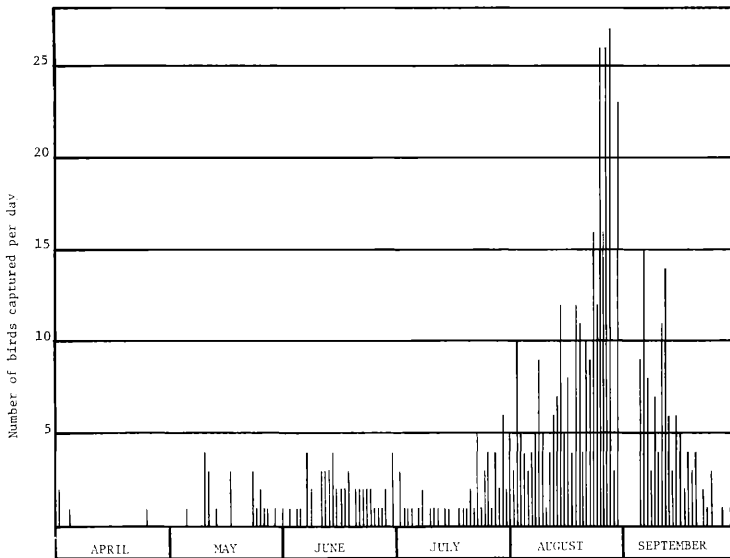


FIGURE 1. Number of birds captured per day during continuous operation of mist nets between 1 April and 30 September 1972. Nets were not in use 31 August-4 September.

cessive abnormally cold summers. However, mist net losses the previous two summers may have noticeably reduced the local nesting population. Only four birds (redpolls) were caught after September. The fall migration peak of 27 birds per day occurred on 28 August in 1972. The Savannah Sparrow and Yellow Warbler population peaks occurred on 27 and 28 August, respectively. As in both past summers, all Wilson's Warblers were captured during fall migration except for one bird in June; apparently only a few spring migrants pass through this area, and Wilson's Warblers do not nest here. Only one Common Redpoll was captured between 1 May and 9 September, indicating that few, if any, nested here. Numbers of Fox Sparrows (*Passerella iliaca*) and Golden-crowned Sparrows (*Zonotrichia atricapilla*) remained relatively stable throughout the summer, as in the previous years. Three White-crowned Sparrows (*Zonotrichia leucophrys*) were recorded.

Cumulative mist net total and effects of weather—Combined totals for birds captured all three summers and April and May 1973 are shown in Table 3. Since the nets had to be confined to shrub

TABLE 3.

Mist-netting and banding totals, summers 1970, 1971, 1972, and April-May 1973.

Species	Number captured	Percent of total	Number banded	Number recaptured	First and last date captured
Savannah Sparrow	707	44	398	5	05/08-10/15
Yellow Warbler	257	16	118	3	06/02-09/20
Common Redpoll	188	12	22	0	04/10-12/30
Golden-crowned Sparrow	123	8	61	4	05/16-09/19
Wilson's Warbler	112	7	38	0	06/11-09/08
Bank Swallow	68	4	23	1	06/06-08/21
Lapland Longspur	51	3	36	0	04/29-09/29
Fox Sparrow	45	3	27	2	05/16-09/17
Water Pipit	16	1	8	0	05/10-09/03
Hoary Redpoll	7	—	1	0	05/09-09/26
Snow Bunting	6	—	5	0	04/26-05/12
Rock Sandpiper	5	—	1	0	05/05-06/24
Orange-crowned Warbler	4	—	0	0	08/31-09/07
Northern Shrike	4	—	2	0	04/09-10/03
White-crowned Sparrow	3	—	3	0	06/12-09/06
Gray-cheeked Thrush	3	—	3	0	06/13-09/05
Tree Sparrow	3	—	3	0	09/13-10/10
Hermit Thrush	3	—	2	0	08/31-09/17
Northern Waterthrush	3	—	3	0	08/23-09/07
Semipalmated Plover	1	—	0	0	07/22
Black-capped Chickadee	1	—	1	0	08/19
Least Sandpiper	1	—	1	0	06/11
Tree Swallow	1	—	0	0	06/16
Gray-crowned Rosy Finch	1	—	0	0	04/19
Totals	1,613		756	15 (2%)	

thickets, the relative abundance of open country species, such as the Water Pipit (*Anthus spinoletta*) and the Lapland Longspur (*Calcarius lapponicus*), is not accurately represented. Lapland Long-

spurs outnumber Savannah Sparrows in this region, but longspurs rarely frequent shrubs. Two other common tundra species, Snow Bunting (*Plectrophenax nivalis*) and Gray-crowned Rosy Finch (*Leucosticte tephrocotis*), almost never venture into alders. Hermit Thrushes (*Catharus guttata*) regularly occur in alders at higher elevations, and some apparently descend to the lowlands prior to fall departure.

A total of 756 birds was banded during the three summers. Three of 138 birds banded in 1970 were recaptured in 1971, and 10 of the 365 banded the first two summers were recaptured in 1972. Returns included four Golden-crowned Sparrows, and one Bank Swallow which was recaptured two years after banding. On 17 March 1973, a Yellow Warbler banded 28 August 1972 was found dead in Costa Rica.

The number of birds captured per day during the fall migration period was apparently associated with wind direction. Migrants appeared in greatest numbers on days when westerly winds prevailed, which generally follow passage of low pressure cells or fronts. During the three summers, 14 or more birds were captured in a given day in only 23 instances. On these days, westerly winds occurred on all but one, yet the prevailing wind direction for the summer months is southeast. Migration from the Aleutian Islands and Alaska Peninsula would be facilitated by westerly winds. Few migrants were captured on days with strong southeasterly winds, which are generally associated with approaching storms.

SUMMARY

Mist nets were used for three summers in riparian shrubs at Cold Bay, Alaska, located near the tip of the Alaska Peninsula. Of the 1,613 birds captured, only 21 passerine species were represented, illustrating the limited diversity in this treeless region. Savannah Sparrows represented 44% of the birds captured. Other repeatedly-captured species included Yellow Warbler, Common Redpoll, Golden-crowned Sparrow, Wilson's Warbler, Bank Swallow, and Fox Sparrow, in descending order of relative abundance. Five new species were recorded for this region: Tree Swallow, Orange-crowned Warbler, Northern Waterthrush, Gray-cheeked Thrush, and Tree Sparrow. Species composition varied little for the three different summers, but resident populations were lower in 1971 and 1972, reflecting unusually inclement weather.

Common Redpolls were the only species present in winter in the study area. Savannah Sparrows were the first summer residents to arrive and the last to leave. Warblers and Bank Swallows arrived roughly a month later than Savannah Sparrows. Bank Swallows were the first species to leave in the fall, leaving in August. Spring migration was gradual with no large influxes on certain days, and no correlations with weather conditions were evident. Fall migration peaks occurred on days with westerly winds, following storm passages.

Of the 756 birds banded, 15 were recaptured in subsequent summers. Band return rates were highest for Golden-crowned and Fox sparrows.

ACKNOWLEDGMENTS

I especially wish to thank Calvin Reeve, Refuge Maintenance-man of the Izembek National Wildlife Range, for assistance in operation of the mist nets and maintenance of records during my absences in 1972. G. Vernon Byrd, Refuge Manager of the Aleutian Islands National Wildlife Refuge, also periodically assisted the project.

U. S. Fish and Wildlife Service, 813 D Street, Anchorage, Alaska 99501.

Received 24 June 1973, accepted 6 November 1973.