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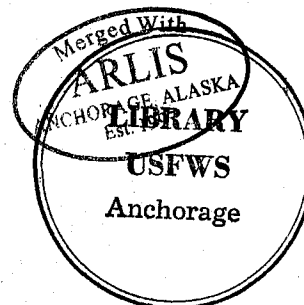
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US FISH & WILDLIFE SERVICE--ALASKA

SPECIES ACCOUNTS OF MIGRATORY BIRDS AT THREE STUDY AREAS
ON THE COASTAL PLAIN OF THE ARCTIC NATIONAL WILDLIFE REFUGE,
ALASKA, 1983.

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Key words: Anseriformes, Charadriiformes, waterfowl, shorebirds,
tundra, wetlands, species accounts, habitat use,
status and distribution, Arctic-Beaufort, north slope

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Species accounts of migratory birds at three study areas on the coastal plain of the Arctic National Wildlife Refuge, Alaska, 1983

The following species accounts describe status, breeding chronology, migration and habitat use of bird species at 3 areas on the coastal plain of the Arctic National Wildlife Refuge (ANWR) where intensive investigations of terrestrial bird populations and habitat use occurred during June-August 1983 (Spindler et al. 1984). Each study area is considered separately, despite overlap of component species and habitat types for ease of comparison by field crews in future seasons. Information is given for 45 species of birds at Okpilak River delta study area; 51 bird species at Katakturuk river study area, down river to Simpson Cove and 56 species at Jago river-Bitty study area and the Jago River drainage upriver to the foothills. In addition, status is given for species which were present in previous years (Spindler 1978, Spindler and Miller 1983) but were not observed in 1983. Further comparisons are given for other species which had important differences in population densities or habitat use between 1983 (Spindler et al. 1984) and previous years at the Katakturuk and Okpilak study areas (Spindler 1978, Spindler and Miller 1983), or suggested a change in overall status on the coastal plain of the ANWR (U.S.F.W.S. 1982)

Bird breeding chronology, behavior, status and distribution data were recorded daily during the field season. Field work in the study areas was carried out between approximately 1 June and 18 August with some breaks during the season when researchers visited 3 other areas. Therefore first and last dates of observations and first dates of hatching or young may not be all inclusive.

Status and abundance terminology for birds follows Kessel and Gibson (1978) using these categories: abundant, common, fairly common, uncommon, rare, casual, accidental, resident, migrant, breeder, and visitant. Species accounts are presented in phylogenetic order with nomenclature following American Ornithologist's Union (1983). The 2 redpoll species (common redpoll and hoary redpoll) were lumped for the purposes of this report due to confusion in field identification and because several investigators have considered them to be conspecific (Williamson 1961, and Troy 1980). Habitat types follow Walker et al. (1982) with modifications described in Spindler et al. (1984).

Status and distribution data and life history information for species in the following list and from 3 additional study areas where new plots were surveyed in 1983 as well as from Barter Island and other areas with limited observations or information was entered on computer tape using "Quick Data Base" and will be synthesized in subsequent reports. Bird species observed at Sadlerochit Delta, Jago Delta and Aichilik River study areas and on Barter Island are listed on Table 1 with breeding species indicated.

Table 1. Bird species observed at Aichilik River, Sadlerochit Delta, and Jago Delta study areas and Barter Island, Arctic National Wildlife Refuge, Alaska, May-November 1983. Presence (X), breeding (B) or probable breeding (prob B), and species found only in the foothills region of the Aichilik River drainage upstream from the study area (F) are indicated.

Species	Aichilik River	Sadlerochit Delta	Jago Delta	Barter Island
Common loon				X
Yellow-billed loon				X
Red-throated loon	X	X-B	X	X
Arctic loon			X-B	X
Short-tailed shearwater				X
Tundra swan			X	X-B
Greater white-fronted goose				X
Snow goose				X
Brant		X		X
Canada goose				X
Green-winged teal				X
Northern pintail		X-B	X-B	X
American wigeon				X
Common eider		X-B		X
King eider				X
Spectacled eider				X-B
Harlequin duck	X			
Oldsquaw		X-B	X-B	X
Black scoter				X
Surf scoter				X
White-winged scoter				X
Red-breasted merganser	X	X	X	X
Northern harrier		X		
Rough-legged hawk	X(F)	X		
Golden eagle	X			
American kestrel				X
Peregrine falcon				X
Willow ptarmigan	X			X
Rock ptarmigan	X-B	X-B		
Sandhill crane		X	X	X
Black-bellied plover		X	X	X
Lesser golden-plover	X-B	X-B	X-B	X-prob B
Semipalmated plover	X-B(F)			X
Lesser yellowlegs				X
Spotted sandpiper	X-B(F)			
Ruddy turnstone	X	X	X	X
Sanderling				X
Semipalmated sandpiper	X	X-prob B	X	X-B
Least sandpiper	X			
White-rumped sandpiper			X	X
Baird's sandpiper	X-B(F)	X	X-B	X
Pectoral sandpiper	X-B	X-prob B	X-B	X-prob B
Dunlin		X	X	X-prob B
Stilt sandpiper		X	X	
Buff-breasted sandpiper		X	X-B	X

Table 1. Continued.

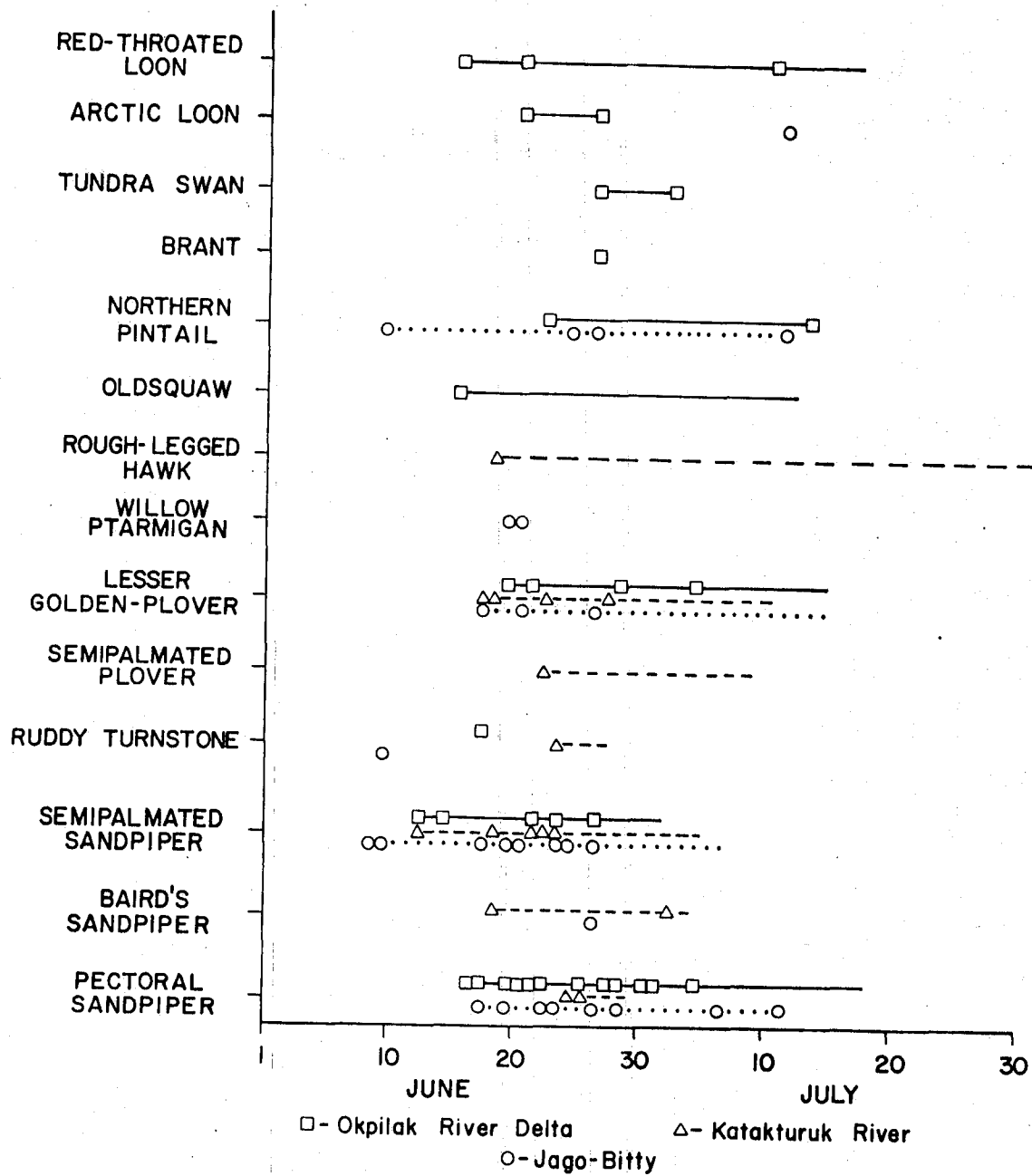
Species	Aichilik River	Sadlerochit Delta	Jago Delta	Barter Island
Long-billed dowitcher		X-prob B	X	X
Common snipe	X			
Red-necked phalarope		X		X
Red phalarope			X	X
Pomarine jaeger				X
Parasitic jaeger	X	X-B	X	X
Long-tailed jaeger	X	X	X	X
Bonaparte's gull				X
Herring gull		X		X
Thayer's gull				X
Slaty-backed gull				X
Glaucous gull	X	X-prob B	X	X
Black-legged kittiwake				X
Ross' gull				X
Sabine's gull				X
Ivory gull				X
Arctic tern	X	X-prob B	X	X
Black guillemot		X		X
Snowy owl			X	X
Short-eared owl	X(F)			X
Common nighthawk				X
Say's phoebe	X(F)			
Horned lark				X
Cliff swallow	X-B(F)			X
Northern raven	X	X	X	X-prob B
American robin	X(F)			
Varied thrush		X		
Yellow wagtail	X		X	
Water pipit	X(F)			
Northern shrike	X-B(F)			
Wilson's warbler				X
American tree sparrow	X(F)			X
Savannah sparrow	X-B	X	X	
White-crowned sparrow	X(F)			
Dark-eyed junco				X
Lapland longspur	X-B	X-B	X-B	X-B
Snow bunting	X-B(F)	X-prob B		X-B
Redpoll	X-B	X	X	X

Okpilak River Delta Birds

RED-THROATED LOON - Common breeder. Red-throated loons were present in Pond/Sedge Tundra Complex and Aquatic Tundra throughout the period of field work from 12 June to 18 August. Courtship calling was common throughout this time with diminished frequency between 30 June and 10 July. Five nests were found in Pond/Sedge Tundra: the first on 16 June (Fig. 1) contained 1 egg, not incubated; 3 nests were being incubated at Camp Pond on 21 June; 1 nest was found 12 July, status unknown. First hatching was observed on 18 July with 1 downy young and 1 egg pipped in 1 nest; three other nests were still incubated on this date. More nests were found in 1983 than in 1982, when only 2 were found (Fig. 2). From 6 to 11 August, 9 family groups with a total of 13 young were observed within a 5.6 km radius of camp, with not all suitable habitat searched within this area. Five groups had 1 young each and in 4 instances 2 young were seen. Usually only 1 adult was attending the young at a time (6 of 9 observations). Red-throated loons were more commonly seen or heard in August than during other months as they vocalized in flight between Pond/Sedge Tundra breeding areas and coastal lagoon or ocean feeding areas.

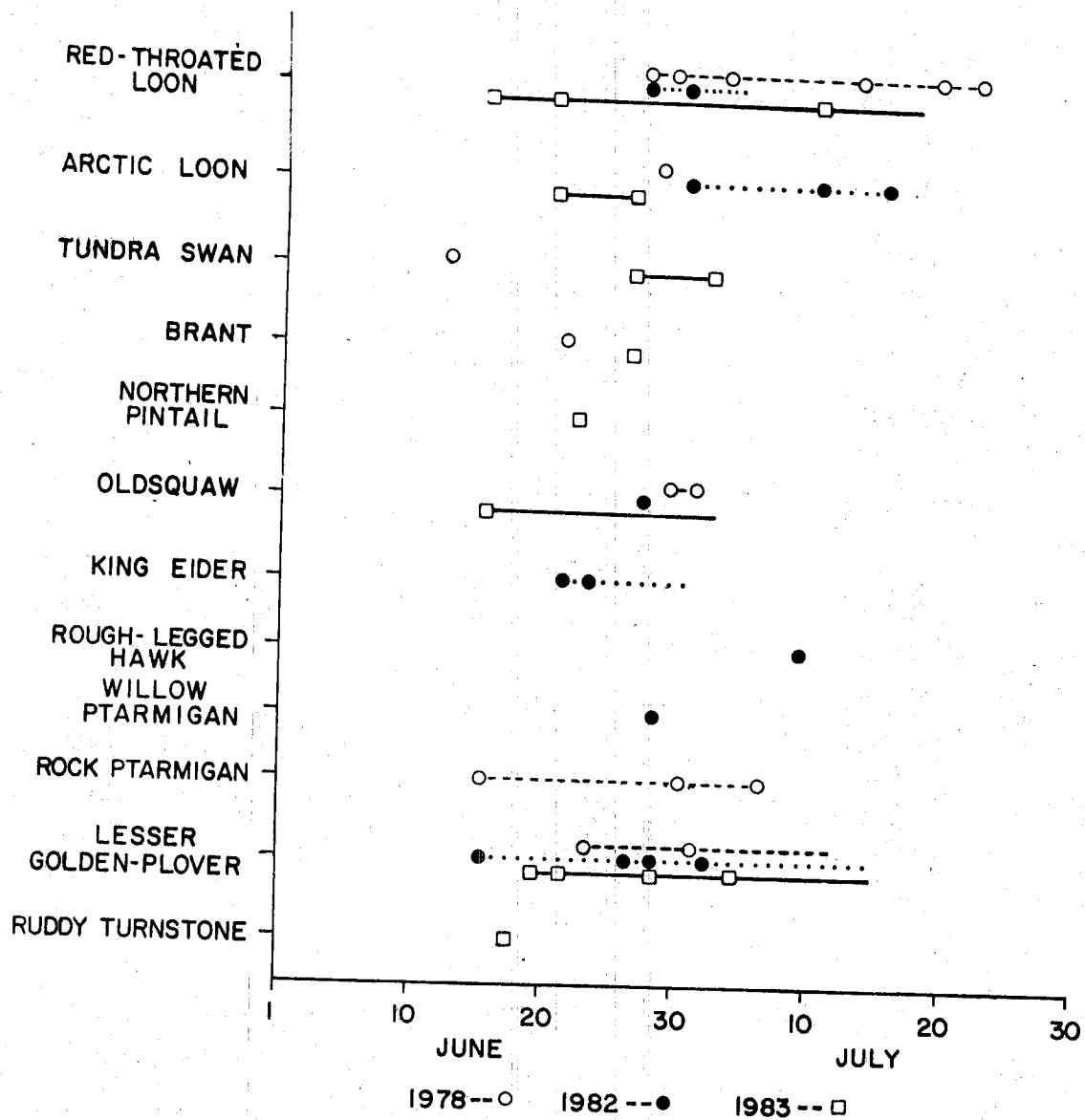
ARCTIC LOON - Common breeder. Arctic loons were present throughout the duration of field work from 12 June to 18 August. Several were observed flying and courtship-calling between 12 and 15 June; many were present in Aquatic Tundra on 17 June. First nest building was observed at the edge of Aquatic Tundra in Camp Pond 21 June (Fig. 1). A second nest was found being incubated 27 June, still earlier than incubation dates recorded in 1978 or 1982 (Fig. 2). Although only 2 nests were found, 7 family groups were observed on 6 to 18 August within 4.8 km of camp. The majority of family groups consisted of a pair of adults with 1 young, but 2 or 3 young per group were also observed. Vocalization was common throughout the breeding season, with increased levels of this and courtship "dancing" displays noted from 6 to 18 August after the conclusion of incubation and hatching of young. Flocks of arctic loons, numbering as many as 17, were observed in Camp Lake on 17 and 18 August.

TUNDRA SWAN - Uncommon breeder. Singles and pairs were seen almost daily from 12 June to 18 August, usually in Aquatic Tundra and lakes. They were less frequently observed in Riparian habitat along the Okpilak River: a pair was seen resting on gravel bar on 18 June, 3 were seen swimming in the river on 25 June; and 2 pairs foraged in a Riparian area and adjacent ridge on 16 July. One nest was found on 27 June, which consisted of a high mound of moss on a small island in Aquatic Tundra (east of plot 122). On 12 July the nest was checked and contained 3 eggs; a photographer remained in vicinity for about 1.5 h, during which time adults did not resume incubation. On subsequent days the adult was not observed incubating, though a pair remained in vicinity. The nest again was checked on 10 August, and observed to have failed with 1 cold egg still in the nest and 1 dead downy chick out of nest. The human disturbance may have occurred at a critical time and was suspected as a factor in this failure. A second nest was found 3 July at 3 Drum Marsh at a nest site which had been used in 1978 and probably was occupied in 1982. The nest was observed to have hatched by 15 July when 5 cygnets were seen swimming with a pair of adults in Aquatic Tundra and also were seen feeding on forbs on an adjacent pingo. Four young in this group had survived as of 8 August. A third nest site was observed near a pond north of 3 Drum Marsh on 23 June during an aerial swan



1983 CHRONOLOGY OF NESTING AT THREE
ARCTIC NATIONAL WILDLIFE REFUGE STUDY SITES

Fig. 1.



1978, 1982, 1983 CHRONOLOGY OF NESTING AT THE OKPILAK RIVER DELTA SITE

Fig. 2.

survey (Bartels et al. 1984), and 1 adult with 3 young were observed in adjacent Aquatic Tundra on 8 August. Two additional nests were found during the aerial swan survey for which other field observations were not collected; these were first found along ponds to the southeast of Riparian plots on 23 June, and on later survey, 3 young were observed in the company of paired adults in the area on 21 August (Bartels et al. 1984). Swans were observed more commonly in 1983 than 1982, and greater numbers of breeding pairs were found (Fig. 2). This corresponds with general findings of tundra swan populations for these years on the entire ANWR coastal plain (Bartels et al. 1984). A flightless, probably molting, swan was seen in Moist/Wet Sedge Tundra adjacent to a beaded stream 3 km northeast of camp on 8 August. The largest groups seen all summer consisted of 7 and 8 swans in ponds between the Okpilak River and Camp Lake on 16 August.

GREATER WHITE-FRONTED GOOSE - Uncommon spring migrant. Several flocks flew over the study area in June: a few on 14 June, 2 on 15, 16, 18 June, 6 on 20 June, 5 on 21 June, 8 on 22 June, 2 on 29 June.

SNOW GOOSE - Uncommon spring migrant. A flock of 26 snow geese foraged on sedges in Wet Sedge Tundra (northwest of plot 143) on 13 June. A flock of 6 was seen flying to the west 0.8 km northwest of camp on 19 June.

BRANT - Uncommon spring and fall migrant and rare breeder. It is likely that the major part of the brant spring migration was not observed in 1983 due to the late start of field work at Okpilak, 12 June. Small flocks were infrequently observed flying east (34 on 13 June, a few on 14 June, 5 on 16 June, 10 on 17 June, 6 on 19 June, 2 on 21 June, 16 on 22 June, 6 on 24 June, 1 on 25 June). Brant uncommonly used tundra wetland habitats: a flock of 10 foraged in Aquatic Tundra at 3 Drum Marsh 17 June and a flock of 7 foraged in Aquatic Tundra (east of plot 122) on 22 June. A nest being incubated on a small island in Aquatic Tundra was found 27 June, with the other member of the pair in the vicinity (Figs. 1 and 2). The nest was empty on 13 July with no evidence of its success or failure, but brant were not present in the area. The last observation of brant on the tundra was on 3 July when a flock of 4 was seen feeding in Arctophila fulva at 3 Drum Marsh. Brant were observed flying west on later dates (1 on 28 June, 10 on 8 July) and flying east (flocks of 40 and 10 on 17 August and 30 on 18 August).

CANADA GOOSE - Uncommon summer visitant. First observation was on 18 June of a flock of 3 seen swimming in the Okpilak River. A flock of 6 was seen standing on a Riparian area along the Okpilak River on 2 July. Other observations were of a pair flying to the south, west, and north over the study area on 21, 28 June, and 11 July respectively.

GREEN-WINGED TEAL - Rare summer visitant. Two sightings were made in 1983: 2 males were seen swimming in the Okpilak River on 24 June; a single male swam with a flock consisting of 1 female northern pintail and 2 female oldsquaw in a small creek about 4 km south of camp (adjacent to plot 144) on 9 July. The species was not observed in 1982 and a single male was observed in 1978.

NORTHERN PINTAIL - Fairly common breeder and fall migrant. Small groups, pairs, and singles were seen almost daily in all habitats from 13 June to 18

August. Two active nests were found, the first on 23 June (Fig. 1) with a female incubating 9 eggs in the nest located in Moist Sedge-Shrub (plot 152). This nest was still being incubated on 29 June but appeared to have been predated when checked on 9 July. An earlier nest was suspected on 19 June with "nesty" female behavior observed in Moist/Wet Sedge Tundra (plot 143). On 5 July, an empty nest was found in this area unattended. On this same date a nest with 9 eggs incubated by a female was found on an adjacent plot, likely a second nesting effort. The nest apparently hatched by 18 July. First young were seen on 8 August. Five family groups consisting of 1 to 2 females with 1 to 10 young were observed between 8 to 10 August and were probably the results of reproductive effort in addition to the nests found. In 1983 breeding appeared to be more common than in 1982, when no nests were found although a few young of the year were seen, and 1978 when no evidence of breeding was found (Fig. 2). This was suspected to correspond to drought conditions on North American prairie pothole breeding areas as described for previous years by Derkson and Eldridge (1980). The latest observation was of a flock of 20 pintails resting on a partially vegetated mudflat in Arey Lagoon 17 August.

AMERICAN WIGEON - Rare spring migrant. In 1982 a single wigeon was seen flying east over camp on 9 June. None were observed in 1978 or 1983.

EUROPEAN WIGEON - Casual spring migrant. In 1978 a pair was observed at Three-Drum Marsh on 12 June. None were seen in 1982 or 1983.

GREATER SCAUP - Rare summer visitant. A single sighting was made on 2 July in 1983 of a flock of 10 greater scaup swimming with 14 surf scoters in Camp Lake. Greater scaup were not observed in 1982 but flocks of 3 to 4 birds were seen in 1978.

COMMON EIDER - Uncommon spring migrant. Only a single sighting was made of a pair of common eiders circling over Aquatic Tundra at 3 Drum Marsh on 17 June.

KING EIDER - Uncommon spring migrant. The only sighting was of 2 birds flying over Arey Lagoon 0.8 km from camp on 27 June. In 1983, king eiders were not found breeding. In contrast to 1978, when 2 breeding pairs were observed and 1982 when 2 nests were found.

SPECTACLED EIDER - Rare spring migrant. A single sighting in 1983 was of 1 male flying south over Wet Sedge Tundra 2.4 km west of camp on 24 June. Spectacled eiders were more commonly observed in 1982 with 1 to 3 pairs sighted from 12 to 17 June, but were not observed during 1978.

OLDSQUAW - Common spring and fall migrant and breeder. Oldsquaw were seen almost daily during the entire field season from 13 June to 18 August. Pairs were observed in courtship display on 14 and 15 June in Pond/Sedge Tundra Complex and thermokarst pits in Moist/Wet Sedge. One nest found 16 June with 4 eggs, contained 9 eggs as of 7 July (Figs. 1 and 2). The female was last observed incubating the nest on 13 July; the nest was empty and apparently hatched on 17 July. During incubation the female remained on the nest during approaches by observers within 1 m; therefore it is probable that other oldsquaw nests were overlooked. The first young were observed on 6 August in Aquatic Tundra. A total of 6 family groups with 35 young (5-7 per group) were observed between 8 and 18 August in Pond/Sedge Tundra and in

lakes within 3.2 km of camp. A flock of 10 males roosted on shoreline bluffs and swam near the shore of Arey Lagoon 4 July. Larger flocks of males and/or females were seen on lakes starting in midsummer: 17 adults in a flock on 17 July; 35 juveniles with adults on 13 August; and 7 juveniles with 6 adults in Camp Lake on 18 August.

SURF SCOTER - Rare summer visitant. A flock of 14 was seen swimming with a flock of greater scaup at Camp Lake on 2 July. Surf scoters were not observed during 1978 or 1982.

WHITE-WINGED SCOTER - Rare spring and summer migrant. A pair was observed flying south on 15 June 1982 and 4 were seen flying west on 1 July 1978. None were observed in 1983.

RED-BREASTED MERGANSER - Rare summer visitant. Two females were seen swimming in the Okpilak River on 2 July 1983. Red-breasted mergansers were not observed during 1978 or 1982.

NORTHERN HARRIER - Rare summer visitant. A single sighting occurred in 1983; 1 female or immature individual was seen hunting over Riparian habitat along the Okpilak River on 2 July. This species was more frequently observed in 1982 but in 1978 no sightings were made.

ROUGH-LEGGED HAWK - Rare breeder. Rough-legged hawks were not observed in 1983 and only 1 sighting of 2 birds was made on 4 June 1978. This contrasts with 1982 when numerous sightings were made and 1 nest was found on flat Moist Sedge-Shrub Tundra (Fig. 2).

GOLDEN EAGLE - Uncommon summer visitant. The first observation was of an immature eagle which hunted over Moist Sedge Shrub Tundra, 4 km south of camp on 15 June. Single eagles were seen flying over Riparian habitat near the Okpilak River 5 km southwest of camp; flying over Wet Sedge 5.5 km southeast of camp on 26 June; an immature standing on 3 Drum pingo 3 July; an immature was present along Okpilak River on 16 July. Eagles were more commonly observed in 1983 than in 1978 or 1982.

WILLOW PTARMIGAN - Uncommon breeder. Willow ptarmigan were not observed in 1983, but in 1978 and 1982 nests were found in Moist Sedge-Shrub Tundra (Fig. 2).

ROCK PTARMIGAN - Uncommon summer resident. Single rock ptarmigan were seen in Moist Sedge-Shrub habitat on 15 June and 8 July, and in Moist/Wet Sedge 3-5 km south of camp 18 and 26 June. In 1983 rock ptarmigan were less commonly observed and breeding was not noted as compared to nests found in 1978 (Fig. 2) and subadults seen in 1982.

SANDHILL CRANE - Uncommon summer visitant. Sandhill cranes were most frequently observed in June. Single individuals were seen flying west over the study area on 13, 14, 16 and 19 June. One crane foraged in Moist/Wet Sedge Tundra on 21 and 22 June, and at Camp Pond on 23 June. A pair of cranes was seen flying east 23 June. Crane pairs were observed calling on 25 June 1.6 km northwest of camp; flying south near the Okpilak River 2 July; calling in Wet Sedge and feeding in Moist/Wet Sedge habitat on 16 and 17 August.

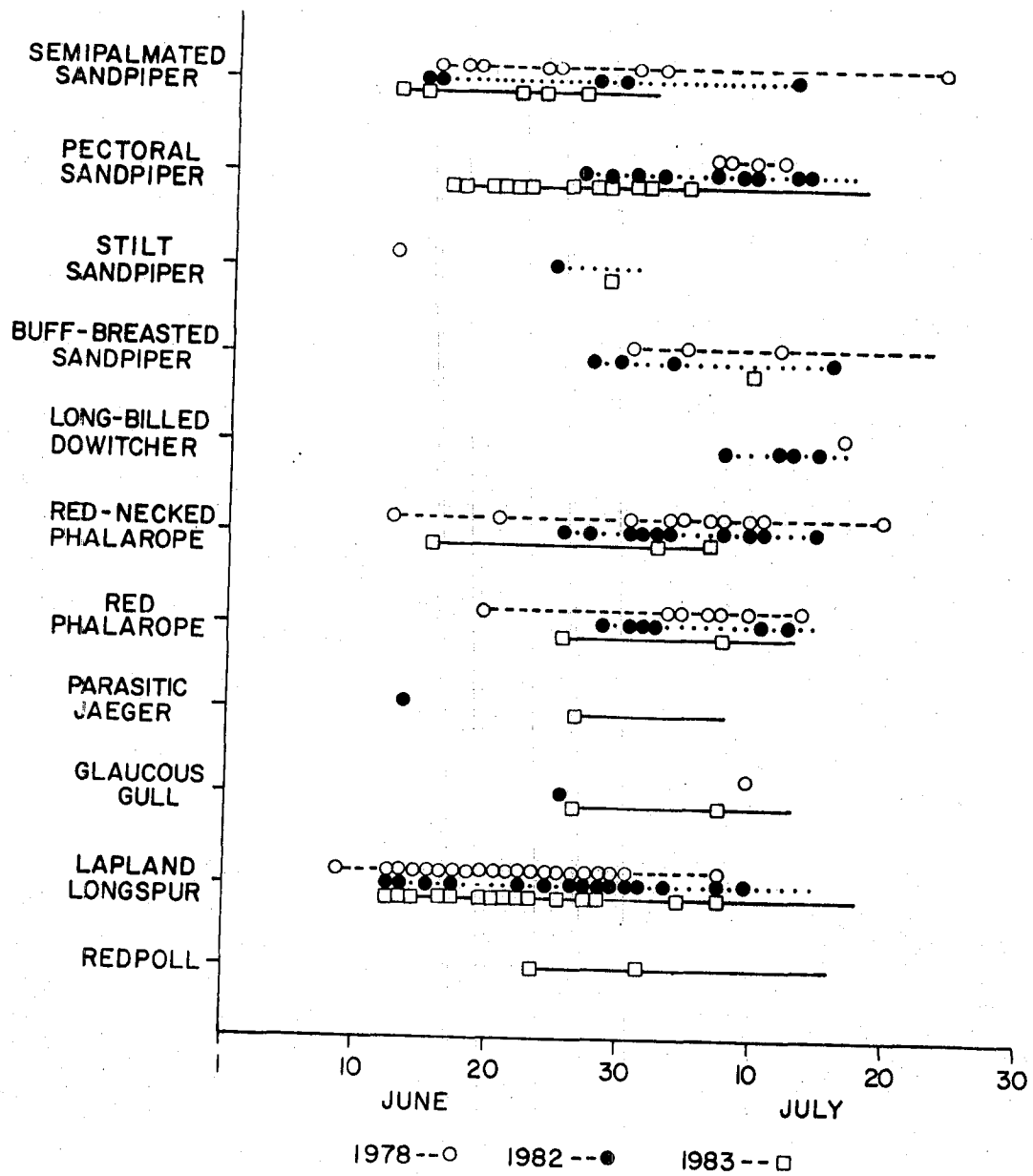
BLACK-BELLIED PLOVER - Uncommon fall migrant. Black-bellied plovers were only observed during fall migration in 1983, whereas in 1982 and 1978

sightings were also made in the spring. First observation was of 2 birds on polygon ridges of Wet Sedge Tundra on 6 August. Small flocks were observed in Wet Sedge and Pond/Sedge (4 on 7 August, 1 or 2 on 10-13 August, 3 on 17 August), and a flock of 5 seen with 4 lesser golden-plovers on an Okpilak River gravel bar on 16 August. Larger flocks of 17-25 black-bellied plovers were observed on 8 and 9 August in Wet Sedge and Pond/Sedge Tundra.

LESSER GOLDEN-PLOVER - Fairly common breeder, common fall migrant. Lesser golden-plovers were seen daily during field work between 12 June and 18 August, primarily in Moist/Wet Sedge but also less commonly in Moist Sedge-Shrub habitats. Four nests were found, 3 in Moist/Wet Sedge and 1 in Moist Sedge-Shrub on 20, 22, 29 June and 5 July. Three nests contained 4 eggs and 1 had 2 eggs. Presence of the first nest was suspected 14 June in Moist/Wet Sedge when defensive postures were noted but the nest was not found until 20 June. This nest began hatching 9 July with 2 of 4 eggs pipped, and by 10 July 3 young were hatched with the final egg pipped. Eggs were pipped at 2 other nests on 12 and 14 July. Back-dating from these known hatching dates yielded estimated nest initiation dates of 11, 14, and 16 June, based on an incubation period of 28 days (Harrison 1978). Nest initiation was remarkably synchronous among the 3 study areas, however nesting continued longer at Okpilak than at the 2 other inland sites (Fig. 1). Flight-capable juveniles were seen with adults on 6 and 8 August, and independent immatures in flocks of 3 to 8 were observed from 8 to 18 August. An adult with a late brood of downy young, not capable of flying, was observed on 11 August near camp. Nesting chronology appeared later in 1983 than 1982 but earlier than 1978 (Fig. 2).

RUDDY TURNSTONE - Uncommon breeder. First observation was on 16 June, of a flock of 7 flying west over Aquatic Tundra. A nest with 4 eggs was found incubated by an adult in Riparian habitat along Okpilak River (plot 192B) on 18 June (Fig. 1), and was empty and apparently abandoned on 24 June. The last observation was made on 24 June, of 2 birds foraging on the river gravel bar approximately 400 m from the old nest site. In 1982 turnstones were not observed, but little time was spent by observers in appropriate habitats (Fig. 2). In 1978 turnstones were suspected to have nested at the lagoon beach and mudflat and were observed on river delta and river gravel bar habitats.

SEMPALMATED SANDPIPER - Fairly common breeder. Many semipalmated sandpipers were present in Moist/Wet Sedge Tundra on 12 June, the first day of field observations. Courtship displays were common from 14 June, peaked in frequency 17 and 18 June, and occurred infrequently between 19-26 June. Eight nests were found between 13 and 28 June (Fig. 3), 5 in Moist/Wet Sedge, and 3 in Riparian. Of these nests, 7 contained 4 eggs and 1 had 3 eggs (mean clutch size = 3.99 ± 0.35 S.D.). Based on back-dating from known hatching dates, the majority of nests were initiated 6-9 June, considering a 17-19 day incubation period (Harrison 1978) and commencement of incubation with laying of third egg (Norton 1972). First hatching was observed on 27 June with peak hatching from 27 to 30 June, however, hatching was observed as late as 10 July at 1 nest (Fig. 4). First hatching of semipalmated sandpipers was observed synchronously (within a 24 hour period) at Okpilak, Jago-Bitty and Katakturuk study areas (Fig. 4). From 27 June - 10 July defensive adults called in the vicinity of their nests or chicks in Moist/Wet Sedge, Riparian or Wet Sedge habitats. Adults flocked with long-billed dowitchers, pectoral sandpipers, red phalaropes, red-necked



1978, 1982, 1983 CHRONOLOGY OF NESTING AT THE
OKPILAK RIVER DELTA SITE

Fig. 3.

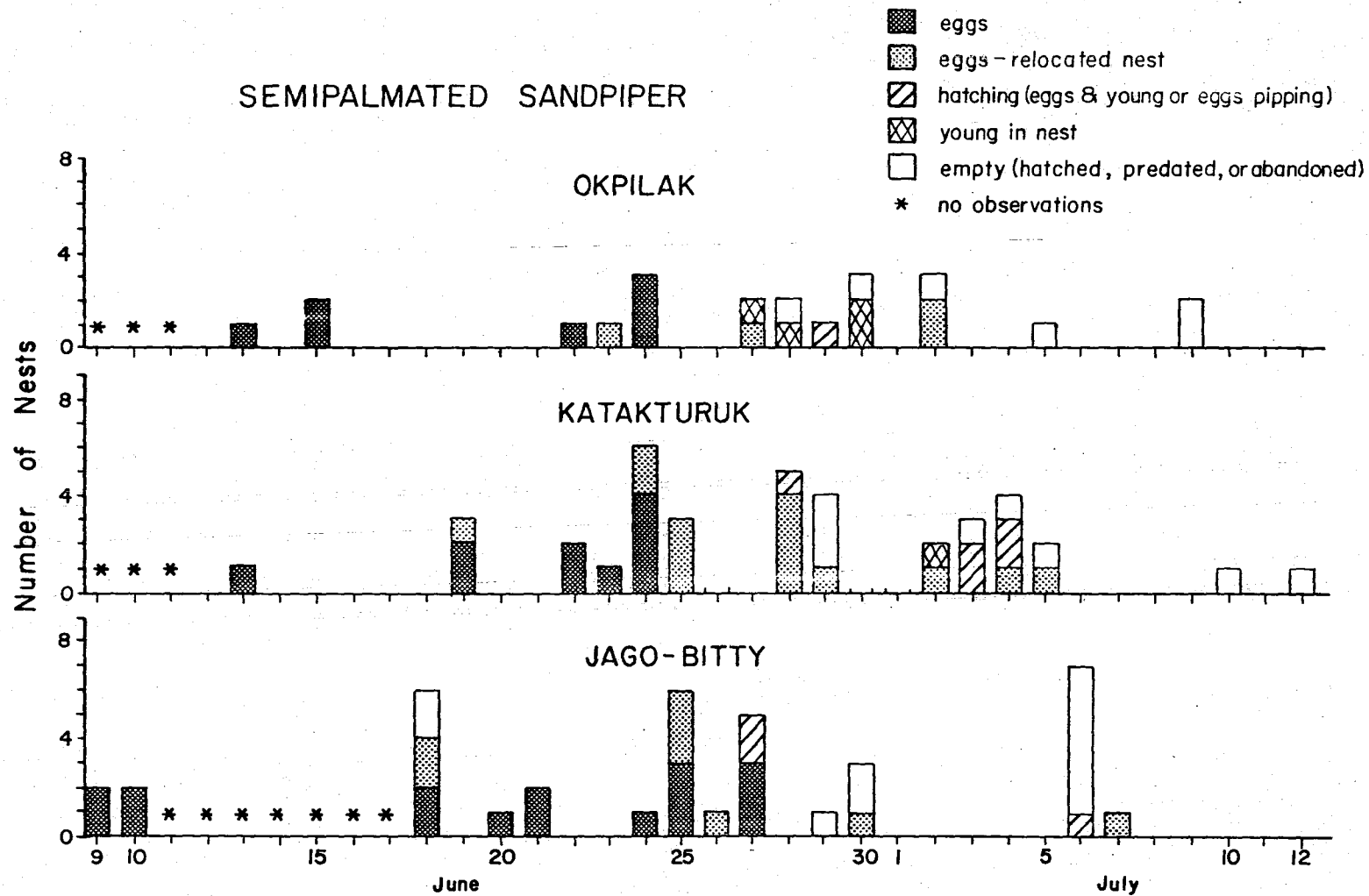


Fig. 4. Nesting chronology of the semipalmated sandpiper at the Okpilak River delta, Katakturuk River, and Jago River-Bitty study areas, Arctic National Wildlife Refuge, Alaska, 1983.

phalaropes and stilt sandpipers in defense of chicks of the various species, primarily in Pond/Sedge habitat from 3 to 12 July. On 3 July a flock of 6 adults behaved defensively in Moist-Wet Sedge habitat. After 13 July semipalmated sandpipers were infrequently observed on tundra habitats, except for Riparian where they were still common on 16 July. On 15 to 18 July, semipalmated sandpipers were usually seen in habitats adjacent to water, including 1 seen foraging along creek, 1 by Camp Pond and 1 by Camp Lake. Flocking was also observed on 17 July when about 10 semipalmated sandpipers were seen flying and foraging with about 90 pectoral sandpipers at 3 Drum Marsh. Semipalmated sandpipers were numerous in Moist/Wet Sedge Tundra adjacent to camp on 6 August, but were only subsequently observed once in tundra habitats; 2 fed in exposed mud areas (on plot 121) on 10 August. The latest observation of semipalmateds in the study area was on 16 August, of a flock of 3 on a mudflat along the Arey Lagoon shoreline.

Mean total population densities at Okpilak in 1983 were lower for 2 of 3 Flooded plots (2.5 birds/km²) and Moist-Wet Sedge plots (0-5.0 birds/km²), than in 1978 or 1982. Breeding populations in the Moist/Wet Sedge Tundra were significantly different between 1978, 1982, and 1983. Densities for Riparian plots (55.0-80.0 birds/km²) were substantially higher than in all other habitats sampled at Okpilak, and were higher than levels recorded for Riparian habitat at Jago Bitty and Katakturuk in 1983.

LEAST SANDPIPER - Rare spring migrant. One to 3 least sandpipers were observed in 1978 foraging on Wet Sedge and Moist/Wet Sedge between 19 and 23 June. The species was not observed in 1982 or 1983.

WHITE-RUMPED SANDPIPER - Rare spring migrant and probable breeder. In 1978 a single bird was observed in Wet Sedge Tundra near the coast in June and a defensive adult was seen in coastal vegetated mudflats south of Barter Island twice in July. White-rumped sandpipers were not seen in 1982 or 1983.

BAIRD'S SANDPIPER - Uncommon summer visitant and fall migrant. A pair of Baird's sandpipers, 1 acting "nesty", was observed in Moist/Wet Sedge 1.6 km southeast of camp on 17 June. All other sightings of this species were made near the Okpilak River 3-5 km southwest of camp: 1 called from Riparian habitat on 25 June; a flock of 3 chased in flight over Riparian Willows on 2 July; 1 foraged on a gravel bar on 16 July; 2 roosted on a gravel bar near the river channel and then flew east on 16 August.

PECTORAL SANDPIPER - Common breeder and abundant fall migrant. Pectoral sandpipers were common during the entire period of field observations from 13 June to 18 August, and were present in all habitats.

Male courtship displays were common from 13 to 22 June and were infrequent during 25 June to 8 July, when only 1-3 males were observed per day in most habitats. In contrast to other habitats in the study area, primarily male pectorals were seen on Flooded plots on 27 June, actively courting and chasing in flocks of 2-5. Flocks of 5 and 6 males were also seen flying over Moist/Wet Sedge on 2 July. The last male was observed 9 July.

On 13 June, the first day afield, a female was observed in "rodent run" defense posture at a probable nest. The first nest was found 17 June in Moist/Wet Sedge, an earlier date than 1982 (27 June) or 1978 (7 July, Fig. 3). Based on back-dating from known hatching dates, assuming a 21-23 day

incubation period (Harrison 1978), first clutch completion date was estimated to be between 7 and 9 June 1983. This was earlier compared to estimated dates in previous years: 17 to 19 June 1982, and 19 June 1978. Overall, this period of nesting was earlier in 1983 than in 1982 or 1978 (Fig. 3). Latest clutch completion date in 1983 was estimated to be 27 June. A total of 25 nests was found between 17 June-5 July in 4 habitats: 12 in Wet Sedge; 9 in Moist/Wet Sedge; 2 in Pond/Sedge; 2 in Moist Sedge-Shrub. Pectoral sandpipers sometimes had clumped distribution of nests. At 3 sites, 2 or 3 pectoral nests were located within 30-50 m of each other. A total of 23 nests had a clutch size of 4, and 2 had clutch size of 2, with a mean clutch size of 3.9 ± 0.4 (S.D.). First hatching probably occurred by 26-27 June when nests were found empty but first actual hatching was observed 2 July with a nest containing 2 eggs and 2 chicks (Fig. 5). By 5 July the majority of nests were empty, however eggs were found incubated as late as 18 July. Females displayed defensive behavior with their chicks from 5 to 18 July in all habitats, including Riparian where nests were not found. Overall, the Pectoral Sandpiper nesting period was very similar between Okpilak delta and Jago-Bitty (Figs. 1,5), but the period when nests had eggs was much longer at Okpilak than at the other 2 areas (Fig. 5). At Okpilak females flocked with long-billed dowitchers, semipalmated sandpipers, red-necked phalaropes, red phalaropes and stilt sandpipers in defense of their chicks as well as those of other species in Wet Sedge and Pond/Sedge habitats between 7 and 17 July. Flocks observed were: 4-6 females flying over Moist Sedge-Shrub on 9 July; 9 on Wet Sedge and 13 flying east on 12 July; and 4-6 at Camp Pond on 18 July. A flock of 90 pectorals of unknown sex flocked with 10 semipalmated sandpipers 17 July at 3 Drum Marsh. Breeding densities of pectorals in all habitats were similar to those found in 1982 but greater than those observed in 1978. Mean summer populations of pectorals were greater than found in either 1982 or 1978 in all habitats.

Pectoral sandpipers were abundant in the fall. Individuals and flocks of 2 to 10 were commonly seen in all habitats from 6 to 18 August. A single pectoral was seen on a sandy beach of Arey Lagoon 8 August; 3 were observed feeding in a spring-formed Wet Sedge area of Riparian habitat (plot 191) on 16 August. Primarily immature pectorals were abundant on Flooded plots on 10 August, in flocks usually ranging from 4-10, with larger flocks containing 14-30 birds also present on plot 123 which was wetter than other plots. On 16 to 18 August, numerous flocks of 2 to 5 pectorals were observed in eastward migration. Highest fall densities of pectorals were found in Flooded plots (300-650 birds/km²) with this species making up 65-73% of total bird populations. On Flooded, Moist/Wet Sedge and Moist Sedge-Shrub plots, fall densities increased over mean summer populations, and pectorals comprised a greater proportion of total bird population than they did during summer. In 1983 pectorals comprised a larger proportion of fall bird populations than they did in 1982. Breeding populations, however, were not significantly different among the 3 years studied for the 4 habitat types censused in all years; Flooded, Wet Sedge, Wet/Moist Sedge, and Moist Sedge-Shrub.

DUNLIN - Uncommon spring migrant and summer visitant. In 1983 a single sighting was made of 1 dunlin, in breeding plumage, on the pingo VABM Mars on 21 July (C. Babcock and J. McCarthy, pers. comm.). One observation was made in 1982 of 4 dunlin feeding in Pond/Sedge Tundra on 7 June. In 1978 4 observations were made of 1-30 dunlin in habitats along the Arey Lagoon coast.

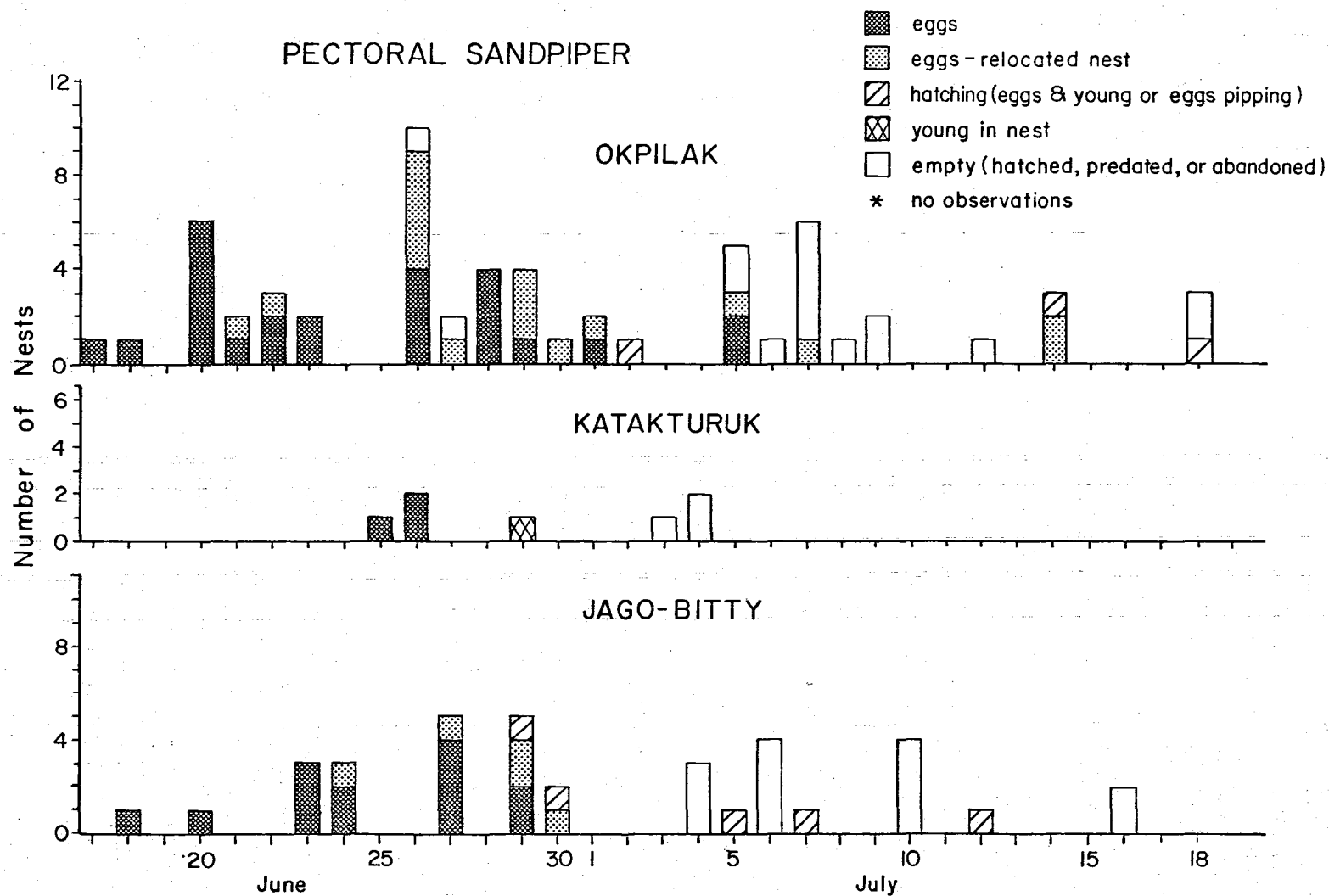
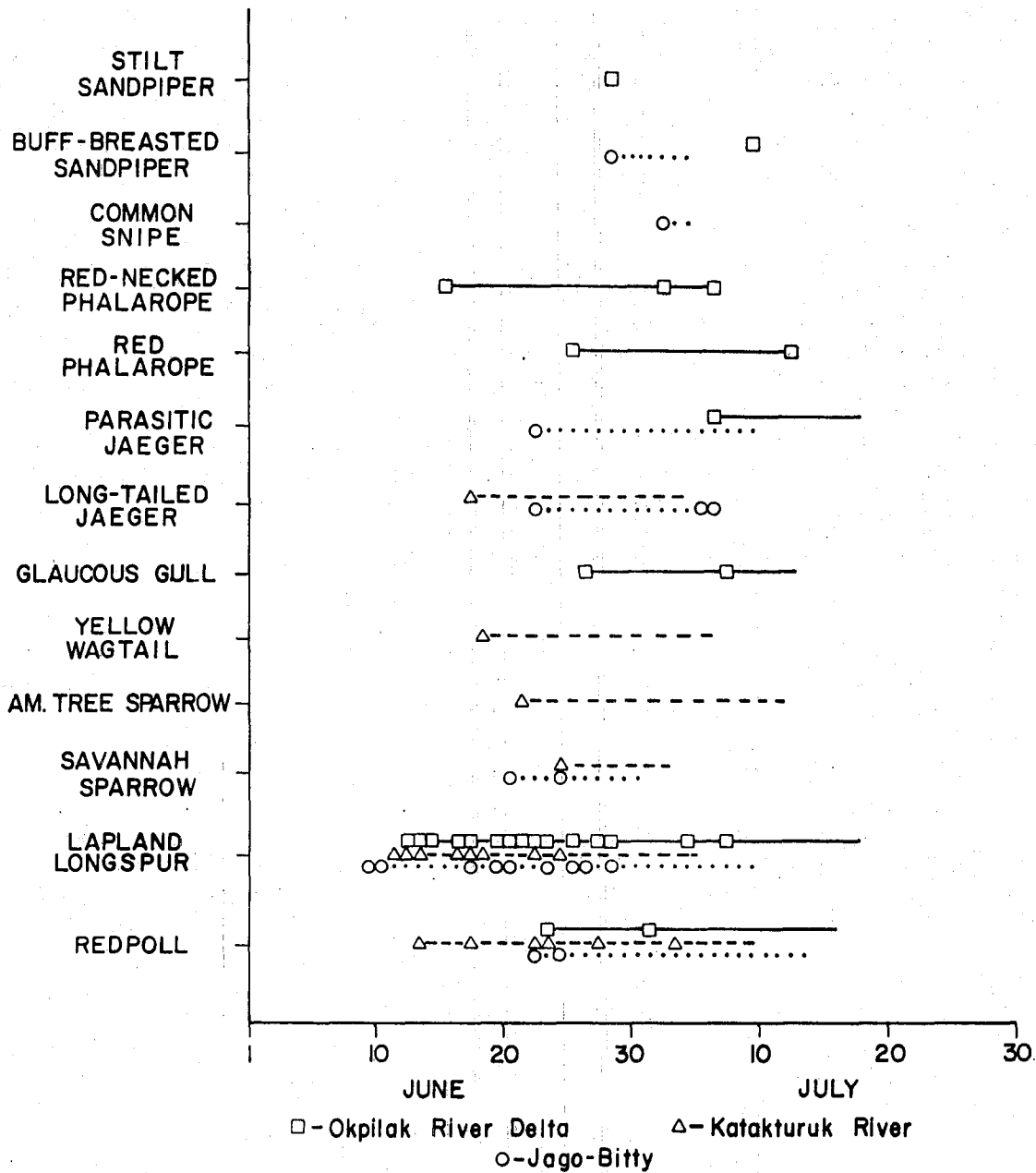


Fig. 5. Nesting chronology of the pectoral sandpiper at the Okpilak River delta, Katakturuk River, and Jago River-Bitty study areas, Arctic National Wildlife Refuge, Alaska, 1983.

STILT SANDPIPER - Uncommon breeder and rare fall migrant. First observation was made on 14 June, of a pair in aerial courtship display in Wet Sedge Tundra. Courtship displays were subsequently observed on 20, 23, 25, 29 June and 8, 9 July in Wet Sedge, Moist Sedge-Shrub and Moist/Wet Sedge Tundra. As in 1982, (Fig. 3) only 1 nest was found in 1983 on 29 June in Wet Sedge Tundra 1.6 km south of camp (Fig. 6). The nest was located on small a tussock in the middle of a low center polygon, and was in the process of hatching, with 1 egg, 1 chick in nest and 1 newly hatched chick out of the nest. The nest was empty on 30 June, with the pair of adults brooding 2 young at the edge of a small pond approximately 30 m from the nest site. Defensive adults were also observed in 2 other areas, in Moist-Wet Sedge and Wet Sedge Tundra at the edge of Camp Pond, on 3, 6, 7 June and on 15 July in Moist Sedge-Shrub Tundra approximately 3 km south of camp. Last observation was on 11 August, of a single stilt sandpiper in Moist/Wet Sedge Tundra 0.8 km northeast of camp.

BUFF-BREASTED SANDPIPER - Uncommon breeder. All sightings were in habitats adjacent to the Okpilak River approximately 4.5 km southwest of camp. A single individual standing on a river gravel bar was first observed 18 June. On 24 June a single buff-breasted flushed from Dryas-Prostrate Shrub, Forb tundra on a bluff above the river. The only nest seen in 1983 was found in the same vicinity with 4 incubated eggs on 10 July (Fig. 6). There were no other observations of this species in 1983. Not a single courtship display was seen in 1983, in contrast to previous years when the species was more common and nests were found in tundra habitats near camp (Fig. 3).

LONG-BILLED DOWITCHER - Fairly common breeder, common fall migrant. Long-billed dowitchers were regularly present in the Okpilak area by 12 June, an earlier date than previously recorded. Courtship display flights and calls occurred between 12 and 29 June in all habitats. The latest display was observed by a single bird on 8 July. Defensive behavior was first observed 4 July in Wet Sedge habitat adjacent to Camp lake. On 7 July, 5 very defensive pairs were observed in Pond/Sedge and Wet Sedge habitats south of Camp Pond and the first chicks of the season were suspected. Defensive behavior continued to be observed in Pond/Sedge and Wet Sedge habitats until 17 July when the first chicks were seen in Pond/Sedge habitat at the edge of Camp Pond. Patient watching and careful searching was necessary to locate the 3 downy, probably 3-4 day old chicks that were concealed at the bases of sedge clumps. The defensive adult, calling, flew in large circles around the observer, but repeatedly landed in vicinity of the chicks. No nests were found this year, possibly due to censuses being conducted by fewer people than in 1982, with therefore a greater chance of nests being overlooked since in 1982 all nests were found within 1-3 m of biologists. Defensive adults were still seen from 6 to 10 August in Pond/Sedge and Wet Sedge habitats. A juvenile dowitcher found on 10 August in Pond/Sedge Tundra was barely flight-capable, partially downy and had apparently hatched later than the chicks found on 17 July. A flock of immature birds foraged in the mud of a low center polygon near the coast on 8 August. Small flocks of migrating dowitchers were common on 12 July in Wet Sedge and Pond/Sedge habitats, in addition to defensive pairs of birds observed in these areas. Migrating flocks numbering 4 and 20 flew east, low over the tundra on 16 August. Mean population densities were highest on Flooded plots (15-37.5/birds/km²). Mean dowitcher population densities in 1983 exceeded those recorded in previous years, in all habitats except Moist Sedge-Shrub in 1978. Fall populations of dowitchers had considerably higher densities in 1982 than 1983.



1983 CHRONOLOGY OF NESTING AT THREE
ARCTIC NATIONAL WILDLIFE REFUGE STUDY SITES

Fig. 6.

RED-NECKED PHALAROPE - Uncommon breeder. First observed on 13 June, a flock of 3 flying over Pond/Sedge Tundra near camp. On 14 June 2 pairs displayed courtship behavior in Wet Sedge. By 13 July very few females were observed. The first nest, with 4 eggs, was found in Pond/Sedge Tundra on 16 June (Fig. 6); it still contained eggs as of 27 June but was empty on 8 July. Two other nests with eggs were found: 1 in Wet Sedge on 3 July; 1 in Pond/Sedge 7 July, but neither was relocated. First chicks were found on 5 July, apparently just hatched and brooded by the male, swimming among sedges at the edge of a thaw pit in Moist-Wet Sedge. Other chicks were found with a pair of adults in Wet Sedge adjacent to Pond/Sedge on 12 July. The nesting period of red-necked phalaropes was shorter than previous years of census, and was earlier than 1982 but later than 1978 (Fig. 3). Downy, barely flight-capable, but independent young were seen in Pond/Sedge and Aquatic Tundra as late as 10 August. From 3 to 18 July flocks of 2-10 were observed with red phalaropes, semipalmated sandpipers, pectoral sandpipers, stilt sandpipers and long-billed dowitchers defending their chicks or those of the other species in Pond/Sedge habitat at Camp Pond. In the fall, red-necked phalaropes in winter plumage were occasionally seen in flocks of 5-20 mixed with red phalaropes feeding and swimming in lakes and Aquatic Tundra.

Red-necked phalarope summer, fall and breeding population densities were greater on Flooded Tundra than in other habitats. Red-necked phalaropes were much less abundant in 1983 than in 1982 but 1983 levels were similar to those of 1978. This was most evident in comparison of mean populations on the Flooded plots: 17.5 - 37.5 birds/km² in 1983 versus 58.5 - 67.5 birds/km² in 1982 and 38.4 birds/km² in 1978. Breeding populations in the Flooded Tundra habitat differed significantly among the 3 years of study. Breeding populations in all habitats were greater in 1982 and 1978. Total numbers of nests found in the entire study area were also strikingly different between years: 3 in 1983, 14 in 1982 and 13 in 1978 (Fig. 3).

RED PHALAROPE - Uncommon breeder. First observed on 16 June, with 8 seen swimming in Pond/Sedge and Aquatic Tundra. Some pairs were seen on 17 and 18 July, with copulation observed on 27 June. The first nest, with 4 eggs incubated by a male, was found 26 June in Wet Sedge Tundra (Fig. 6). One other nest was found on 8 July, with 4 eggs incubated by the male, in Pond/Sedge Tundra. The first nest probably hatched by 7 July when it was found empty, but another nest was still incubated on 13 July. The first chicks were found swimming with a male in Pond/Sedge at Camp Pond on 3 July. Two mostly downy juveniles were seen in Aquatic Tundra as late as 10 August. Small numbers of phalaropes flocked in defense of their chicks or those of other species including semipalmated sandpiper, pectoral sandpiper, stilt sandpiper, long-billed dowitcher, and red-necked phalarope in Camp Pond and other Pond/Sedge habitats between 7 and 18 July. In August red phalaropes were observed in flocks with red-necked phalaropes, both in winter plumage, in lakes and Aquatic Tundra from 6 to 13 August.

Red phalaropes were substantially less common in 1983 than in 1982 or 1978. Mean population densities were greatest in Flooded Tundra over other habitats during each year studied, but densities were much higher in 1978 and 1982 than in 1983. Breeding densities were also lower in 1983 as shown by plot data as well as indicated by the fact that only 2 nests were found on entire study area in contrast with 8 in 1982 and 9 in 1978 (Fig. 3). Breeding populations were significantly different in the Flooded Tundra

habitat among the 3 years of study.

POMARINE JAEGER - Fairly common spring migrant. Pomarine jaegers were observed during spring migration and in early summer from 14 to 27 June 1983. Single jaegers hunted in Wet Sedge, Moist Sedge-Shrub and Pond/Sedge Tundra on 14, 23, 26, and 27 June. A flock of 4 was seen flying west on 16 June and 5 flew over Pond/Sedge and Moist/Sedge habitats on 17 to 19 June. Unlike in 1982 and 1978, pomarine jaegers were not observed during July or August in 1983.

PARASITIC JAEGER - Rare breeder, common summer visitant, common fall migrant. Parasitic jaegers were seen nearly daily from 14 June to 16 August, primarily singly but also in flocks of 2 or 3, hunting in all habitats. The largest flock seen contained 6 jaegers which called persistently as they hunted Moist/Wet Sedge habitat on 28 June. A jaeger attacked and ate a Lapland longspur fledgling on Pond/Sedge Tundra on 7 July. A pair dive-bombed and chased an arctic fox in Moist Sedge-Shrub Tundra on 9 July. The majority of jaegers were dark phase individuals. A single nest was found on 7 July which contained 2 eggs in a depression on a strangmoor ridge in Flooded Tundra (plot 121). A pair of adults performed much distraction display from the time observers were 250 m from the nest. This nest produced at least 1 downy chick which was defended by 2 adults in Pond-Sedge Tundra on 10 August. A parasitic jaeger nest was found considerably earlier in 1982, on 14 June (Fig. 3) in similar habitat, but it was unsuccessful. Nesting was noted later at Okpilak than at the Jago-Bitty study area in 1983 (Fig. 6).

LONG-TAILED JAEGER - Common spring, summer and fall visitant. Long-tailed jaegers were observed nearly daily from 13 June to 18 August. Primarily singles or flocks of 2 to 3 were seen. They hunted in all habitats, but were most frequently seen in Moist/Wet Sedge, Moist Sedge-Shrub and Riparian. A flock of 5 on 14 June included 2 pairs and copulation was observed. A flock of 6 was seen hunting over Moist Sedge-Shrub on 29 June. Long-tailed jaegers were less common in August than during June or July because only single birds were observed in August. Greatest mean population densities were achieved on Moist/Wet Sedge and Moist Sedge-Shrub plots (2.5 - 15.5 birds/km²).

HERRING GULL - Rare summer visitant. Not observed in 1978 or 1983, represented by a single sighting in 1982 of 1 herring gull with glaucous gulls in Flooded Tundra on 26 June.

THAYER'S GULL - Rare summer visitant. Not observed in 1983 or 1978, represented by a sighting of a single Thayer's gull flying over Aquatic Tundra on 14 June.

GLAUCOUS GULL - Common spring, summer and fall visitant and uncommon breeder. Glaucous gulls were observed daily from 12 June to 18 August, flying over all habitats and most commonly resting in Aquatic and Pond/Sedge Tundra. A nest was suspected in Aquatic Tundra (on plot 123) on 22 June and confirmed containing 2 eggs on 8 July and another nest was found on 27 June in Flooded Tundra (adjacent to plot 122) similar dates as active nests found in 1978 and 1982 (Fig. 3). Juveniles, approximately half-adult size, were observed on 8 August in 2 groups of 2 young swimming in the vicinity of each nest and an additional group of 3 in another Aquatic Tundra area. The largest flock of gulls consisted of 28 birds that mobbed a biologist visiting a nest on 8 July.

SABINE'S GULL - Rare spring migrant and summer visitant. Sabine's gulls were infrequently observed flying over Flooded and Moist/Wet Sedge Tundra near the coast in June and July of 1978 and 1982. None were observed in 1983.

ARCTIC TERN - Uncommon summer and fall visitant. Most frequently observed in June, with first sighting on 13 June, a flock of 5 terns flying over Camp Lake. Terns were seen flying over Camp Lake on 29 and 30 June, 10 July, and 17 August; over Aquatic Tundra on 16 June; Moist Sedge-Shrub on 23 June; Arey Lagoon shoreline on 27 June; Okpilak River Riparian areas on 18, 24, 25 June and on 2 and 16 July.

SNOWY OWL - Rare summer visitant. Only one observation was made in 1983 of a single owl standing on VABM Mars pingo on 22 June. This is in contrast to 1982 when owls were commonly observed between 6 June and 23 August.

SHORT-EARED OWL - Uncommon summer visitant. Three observations were made of single short-eared owls hunting within 1.5 km of camp: on 13 June over Wet Sedge; on 25 June over Moist/Wet Sedge; and on 8 July over Pond/Sedge Tundra. Short-eared owls were less frequently seen in 1983 than in 1982.

SAY'S PHOEBE - Accidental fall migrant. The first reported sighting of Say's phoebe on the outer coastal plain of ANWR was made 17 August. A single phoebe flew along the coastal bluff of Arey Lagoon, 0.8 km north of camp, landing and taking off frequently while observers were 5-10 m from the bird.

BARN SWALLOW - Accidental spring migrant. Only 2 sightings have been recorded, both in 1982, of a single barn swallow (9 and 17 June).

NORTHERN RAVEN - Uncommon summer visitant. One to 3 northern ravens were observed flying over Moist/Wet Sedge Tundra on 18,21,23,24,27,28 June, 1,2,3,5,16 July and 8,18 August. Ravens were observed throughout a longer time span than in 1982 and were more common than in 1978.

SAVANNAH SPARROW - Fairly common breeder. Savannah Sparrows were observed from 18 June to 16 August, primarily only in Riparian habitat during 1983. The species could have been present earlier in the season before researchers visited Riparian habitats. The majority of sightings were within the more specific types Moist Low Willow (willows greater than 20 cm) and Dryas river terrace, usually on higher ground above the river channel elevation. Savannah Sparrows were also heard in Moist Sedge-Shrub Tundra near the edge of river bluffs. Singing birds were observed throughout this period. Based on consistency of presence and territorial behavior, breeding was assumed to have occurred in the Riparian habitat, though at low densities (average of 2.5 territories/km²). Savannah Sparrows were not observed in 1982 but in 1978 one sighting was made of a single bird by camp, and 1 was observed 5 km inland along the Okpilak River (corresponding to the Riparian habitats studied more intensely in 1983), and several were observed a greater distance inland (20-26 km).

FOX SPARROW - Casual summer visitant. Only one observation of this species has been recorded. One fox sparrow was seen in Moist Sedge-Shrub on 28 June 1982.

LAPLAND LONGSPUR - Abundant breeder. Lapland longspurs were present in all habitats during the entire period of observation from 12 June to 18 August. Male courtship displays were common from 12 to 16 June, were infrequent between 17 and 29 June, and only 1 display per day was heard from 30 June to 4 July. Forty-two nests were found from 13 June to 8 July in all habitats studied: 17 in Moist/Wet Sedge, 8 in Moist Sedge-Shrub, 8 in Wet Sedge, 4 in Pond/Sedge, 4 in Riparian. The earliest clutch completion date was 8 June based on back-dating from known hatching dates and incubation period of 10-14 days (Harrison 1978). Twenty-five of the nests were first found with eggs, 17 with young, and 1 empty (Fig. 7). Clutch sizes ranged from 3-6, with modal size of 5 and mean of 4.73 ± 0.74 (S.D.). First hatching was observed 21 June. A majority of nests observed after 22 June had hatched. One nest with incubated eggs was found as late as 5 July and was perhaps a second nesting effort. Nesting success was 87.9% of 33 nests and hatching success was 93.4% for 29 nests with sufficient data. Despite the large annual differences in length and initiation of nesting period for other species, these characteristics were similar among the 3 census years at Okpilak delta (Fig. 3). In 1983 longspur nesting activity extended later into the season, past mid-July, at Okpilak as compared to the 2 inland study areas (Fig. 6). First fledglings, some flight-capable, were seen 2 July. At most nests observed after this date young had fledged (Fig. 7). In July juveniles were commonly seen with adults, which were usually observed foraging, often in groups of 2 to 3 males with females. In August, primarily immatures were observed. In Riparian habitat longspurs foraged primarily on serral-herb and gravel bars in fall, in contrast to earlier in the summer when they were more abundant in willows.

While longspurs utilized all habitats in all seasons and were found breeding there, densities were greatest in the drier habitats: Moist/Wet Sedge, Moist Sedge-Shrub and Riparian. Highest mean populations were found in Riparian, possibly due to extensive use of the area for foraging by birds which bred in adjacent habitats on the river bluff and inland beyond. Highest breeding populations were found on Moist Sedge-Shrub, closely followed by Moist/Wet Sedge and Riparian. Fall densities were lower than mean summer densities in all habitats except Moist Sedge-Shrub. Greatest fall densities were found in Moist Sedge-Shrub but were closely followed by densities in Riparian. Breeding densities did not differ significantly among the years 1978, 1982, and 1983 in Flooded, Wet Sedge, Moist/Wet Sedge, and Moist Sedge-Shrub habitats, although maximum variation was less than 10% in the latter 3 habitats, but exceeded 50% for the Flooded tundra.

SNOW BUNTING - Uncommon spring and fall visitant. A single snow bunting was seen flying over VABM Mars pingo on 13 June and in vicinity of camp on 27 June. Three immatures were observed on a coastal bluff 5 km northeast of camp on 8 August. These were possibly from nests in driftwood logs along the mainland shoreline, or flew from nearly Barter Island where snow buntings are known to nest.

REDPOLL sp. - Fairly common breeder. Redpolls were commonly observed 18 June to 16 August in Riparian habitats including willows on gravel bars and Dryas-Forb, and on river bluffs along Okpilak River. A single sighting was made in habitats distant from the river, of a redpoll flying over Moist/Wet Sedge Tundra 0.8 km north of camp. Three nests were found 24 June to 2 July in Riparian willow thickets. The first 2 nests were found 24 June, both recently initiated and both over 10 days later than the first date they were

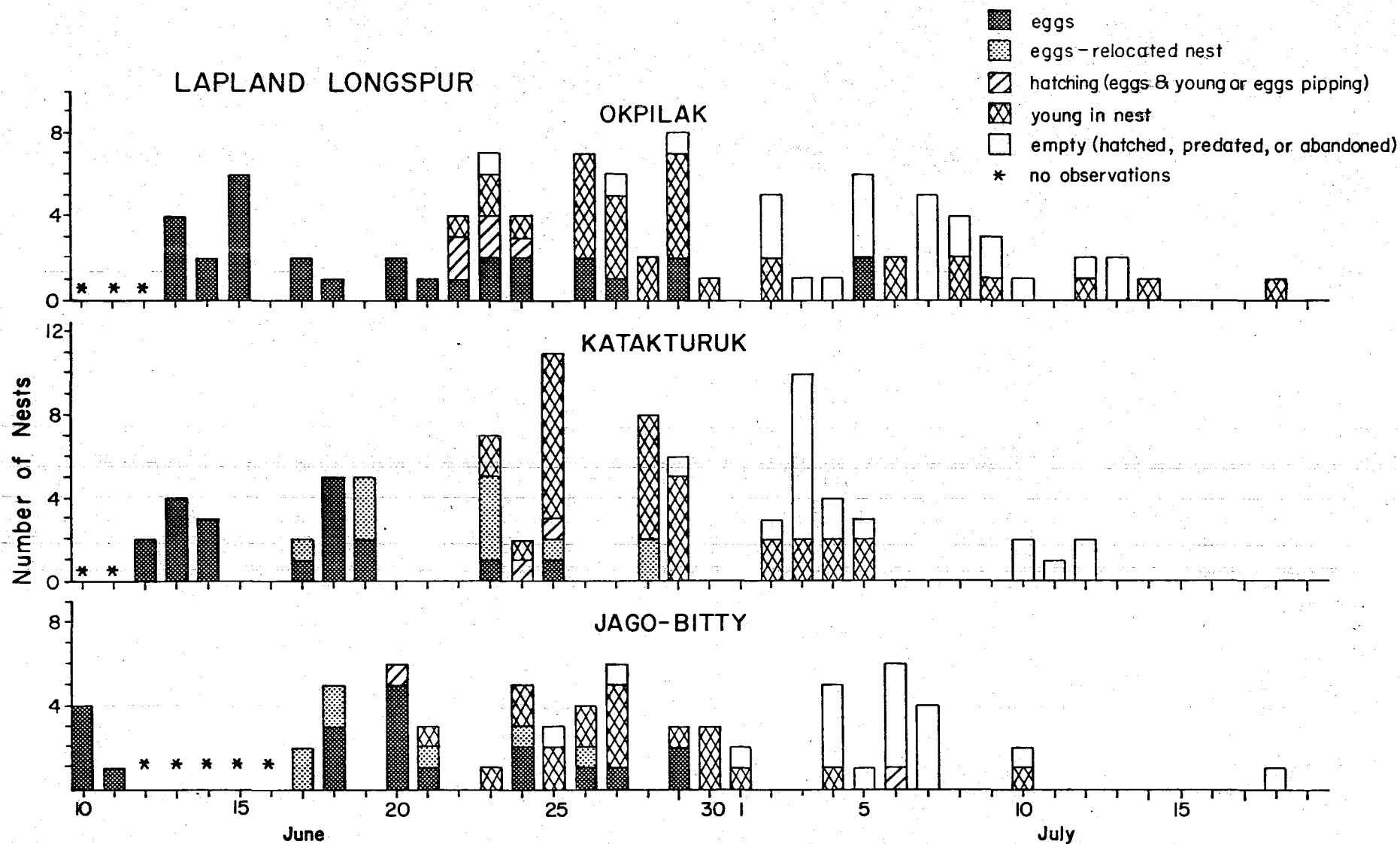


Fig. 7. Nesting chronology of the Lapland longspur at the Okpilak River delta, Katakturuk River, and Jago River-Bitty study areas, Arctic National Wildlife Refuge, Alaska, 1983.

noted for the inland Katakturuk study area (Fig. 6). One nest was on a willow clump on an island in the Okpilak River channel and contained 1 egg, with the full clutch of 4 eggs completed by 2 July. The second nest was located in willows on a bluff and was empty with the female sitting on it 24 June; it contained a full clutch of 5 eggs by 2 July. A third nest also found on 2 July in the center of a willow clump on a gravel bar contained 2 eggs. First hatching occurred by 10 July when 3 young of a 4 egg clutch were found; by 16 July young still in the nest were nearly ready to fledge. The other 2 nests were empty and probably successfully hatched by 10 and 16 July, respectively. Many redpolls were seen in flocks of 2-8 in Riparian habitats 24 June and 16 August. Redpolls were noted in greater numbers and found to be breeding in contrast to previous years probably because of increased field effort in Riparian habitats along the Okpilak River in 1983 (Fig. 3). Redpolls had similar breeding densities in Okpilak Riparian habitat (15 nests/km²) compared to average densities at Katakturuk (20 nests/km²) and were higher than breeding densities recorded at Jago-Bitty (average of 3.3 nests/km²).



Katakturuk River Birds

RED-THROATED LOON - Fairly common probable breeder on coast, rare fall migrant inland. Two pairs were observed in 2 small ponds near the mouth of the Katakturuk River on 30 June; adults were also observed feeding in Simpson Cove. Single adults were seen and heard flying over camp in mid-August.

TUNDRA SWAN - Uncommon breeder on coast, rare summer visitant inland. Three adults flew north-northwest on 20 June. A pair with nest containing 3 eggs was observed in a saline meadow-pond area at the mouth of the Katakturuk River 30 June.

GREATER WHITE-FRONTED GOOSE - Rare spring migrant. Two adults flew over camp 12 June.

GREEN-WINGED TEAL - Uncommon breeder in foothills. One adult was observed in an overflow channel of the Katakturuk River 6 km south of camp 24 June. At least 10 adults, including at least 3 pairs with broods of up to 8 young were observed in a wet and mossy Riparian area 24 km upriver from camp, at the base of the Sadlerochit Mountains, 20 July.

NORTHERN PINTAIL - Uncommon breeder and spring migrant. Single pairs were observed in Tussock Dwarf Shrub habitat 13 June and in Riparian habitat 14 June. On 16 June a flock of 9 flew upriver and 4 adults were observed on a small lake 8 km northeast of camp. Single adults flew over Riparian habitat on 18 and 23 June. One nest was found in Riparian and 1 brood in Tussock Dwarf Shrub habitat in 1982; no nests or broods were observed in 1983. At least 15 adults were observed in saline meadows, ponds, and inlets near the mouth of the Katakturuk River 30 June.

AMERICAN WIGEON - Status unknown. Three adults were observed on a small lake 8 km northeast of camp 16 June.

GREATER SCAUP - Status unknown. Three males and a female were observed on a small lake 8 km northeast of camp 16 June.

COMMON EIDER - Status unknown. One female was observed in a saline meadow-pond area at the mouth of the Katakturuk River 30 June.

HARLEQUIN DUCK - Uncommon summer visitant. A pair was observed on the river near camp 12 June. A single female flew downriver 13 June. A pair was observed on the river 8 km north of camp 29 June. A female, 2 pairs, and 2 females were seen at 18, 24, and 30 km south of camp on the Katakturuk River on 20 and 21 July.

OLDSQUAW - Status unknown. Three pairs were observed on a small lake 8 km northeast of camp 16 June. Many adults were observed on ponds at the mouth of the Katakturuk River and in Simpson Cove, including 1 male and 2 females courting, on 30 June.

SURF SCOTER - Status unknown. About 200 adults, mostly males, were observed feeding and resting in Simpson Cove 30 June.

WHITE-WINGED SCOTER - Status unknown. Fourteen adults, mostly males, were observed in Simpson Cove 30 June.

RED-BREASTED MERGANSER - Status unknown. Three pairs and 8 other adults were observed at Simpson Cove 30 June. None were seen inland in 1983, but a pair was seen flying upriver in 1982.

NORTHERN HARRIER - Rare summer and fall visitant. One adult hunted over Riparian Willow and Dryas river terrace 8 km north of camp 1 July. There were 3 observations in 1982 in June and late August.

ROUGH-LEGGED HAWK - Uncommon breeder. One pair nested near the top of the river bluff 2 km north of camp. Two adults were frequently seen flying and hunting in the area throughout June and July. The nest contained 3 eggs on 19 June (Fig. 1). On 8 July, 3 recently hatched downy young were observed in the nest. On 19 July, 3 adults were observed attending the nest. On 9 August only 2 young were observed in the nest. A second nest was found on a river bluff 18 km south of camp on 20 July containing 1 young bird, with 2 adults in the vicinity.

GOLDEN EAGLE - Uncommon summer and fall visitant. One was observed 19 June in 1983; there were 4 observations in 1982 in June and late August.

PEREGRINE FALCON - Rare summer visitant. Not observed in 1983; there were 2 sightings but no positive identification in 1982.

WILLOW PTARMIGAN - Uncommon spring and fall visitant. Two males were observed 13 June and 1 female was observed 19 June, 1 km northwest of camp in Tussock Dwarf Shrub habitat. One pair was observed 12 July, 1 km south of camp in Riparian habitat. In 1982 there were 2 observations in late August in Tussock Dwarf Shrub and bluff habitats.

ROCK PTARMIGAN - Common breeder. In 1982, 2 nests were found, 1 on Moist Sedge and 1 on Tussock Dwarf Shrub, and a nest was suspected on Moist Sedge-Shrub habitat. In 1983 no nests were found. A pair copulated in Riparian habitat near camp 12 June. Males displayed through 28 June in Riparian habitat. There were 11 observations of single males in Moist Sedge-Shrub, Tussock Dwarf Shrub, and Riparian habitats 19 June to 15 July. One male was observed along Simpson Cove shoreline 30 June. Two pairs were observed, with 10 and 7 flight capable young, 14 km south of camp in Riparian habitat 25 July. Two pairs were observed with 9 and 6 flight capable young in Moist Sedge and Riparian habitats near camp 9 August; also single males and 1 female were observed in Riparian and Tussock Dwarf Shrub habitat 9-11 August.

SANDHILL CRANE - Rare summer visitant. One flew north downriver 26 June.

LESSER GOLDEN-PLOVER - Common breeder and fall migrant. Adults were observed every day from 12 June to 16 August. They were more numerous in Tussock Dwarf Shrub and Riparian habitats (12-16 birds/km²) than in Moist Sedge or Moist Sedge-Shrub habitats (7 birds/km²) during June and July. During fall census (9-11 August) they were seen only in Moist Sedge and Riparian habitats.

Six nests were found between 18 and 28 June, (Fig. 1) all with 4 eggs. Four nests were in Riparian or Dryas terrace, 1 in Tussock Dwarf Shrub, and 1 in Moist Sedge habitat. Hatching dates for the Riparian nests (4-8 July first egg hatched) were earlier than for the 2 nests in other habitats (estimated

12 July in Tussock Dwarf Shrub and 20 July in Moist Sedge), suggesting that the Riparian habitat was preferred for nesting. Hatching success was 14 out of 16 for 4 nests in which it was observed. Flight capable young were first observed 9 August.

Small flocks of about 5 birds were first seen about 25 July; many flocks of 10-15 were seen flying east and northeast around 12 August. In 1982 1 flock of 12 was observed 26 August. Lesser golden-plovers were observed all along the Katakturuk River, from its mouth to 34 km south of camp, in all habitats, except not in Katakturuk gorge.

SEMIPALMATED PLOVER - Fairly common breeder inland. One nest was found 22 June (Fig. 1) on a gravel bar across the river from camp; 4 eggs hatched 8 July. There were 2 more nests along the bluff northwest of camp. Birds were seen in Riparian habitat near camp from 12 June through 14 July. Many pairs were observed, including 2 with large but flightless chicks, from camp upriver to the valley 34 km south, 19 to 25 July. None were observed from 2 km north of camp to the coast. The last sighting was 1 bird observed near camp 13 August.

WANDERING TATTLER - Fairly common suspected breeder inland (foothills and mountains) and spring migrant. Single birds were observed along the river in Riparian or Dryas terrace habitats 14 and 15 June, near camp. At least 15 single birds were observed along the Katakturuk River from 24 to 34 km upriver from camp on 21-24 July (in the foothills, gorge, and valley beyond); some birds were extremely defensive.

SPOTTED SANDPIPER - Fairly common breeder inland (foothills and mountains) and spring migrant. A single bird was observed 18 June, and a pair was observed 21 and 23 June, along a river channel in Riparian habitat 1 km south of camp. At least 15 single birds were observed along the Katakturuk River from 16 to 34 km upriver from camp on 20-24 July (in the foothills, gorge, and valley beyond). An adult with 1 large flightless chick was observed 24 July near the end of the Katakturuk gorge, 34 km upriver from camp.

WHIMBREL - Rare probable breeder inland. Four adults were observed on 1 July 5 km south of camp, feeding in Moist Willow/Sedge habitat; they flew north. One adult was observed 24 July 18 km south of camp in Low Willow habitat near the river, vocalizing and very defensive, with a nest or chicks suspected.

RUDDY TURNSTONE - Fairly common breeder (more common towards coast, less common further inland). Singles and pairs were observed in Riparian habitats (Low Willow, Dryas terrace, gravel bars) from 12 June through the end of July near camp. The last observation was 9 August in 1983, but 1 bird was seen feeding on a gravel bar 26 August 1982. One nest was found 24 June (Fig. 1) with 2 eggs on a gravel bar near camp; the first egg hatched 28 June. One nest was found 29 June with 4 eggs on gravel bar 8 km downriver from camp. Many pairs were observed along the Katakturuk River from camp to the river mouth 29 June to 1 July. A few pairs were observed along the Katakturuk River from camp to 24 km upriver 19-25 July.

SANDERLING - Rare breeder. There were 2 observations in 1982, including a defensive adult with 2 chicks in Riparian habitat 14 July. None were observed in 1983.

SEMIPALMATED SANDPIPER - Abundant breeder. Birds were observed daily from 11 June to mid-July in Tussock Dwarf Shrub and Riparian habitats; a few were observed 17-23 June in Moist Sedge and Moist Sedge-Shrub habitats. Display flights were observed 18-24 June in Riparian, Tussock Dwarf Shrub, and Moist Sedge habitats. Densities were 20-30 birds/km² on Tussock Dwarf Shrub plots and 55 birds/km² on Riparian plots in June and early July; 3 birds/km² on Tussock Dwarf Shrub and 20 birds/km² on Riparian in mid-July. The only August sighting was 2 birds in Riparian habitat on 13 August.

Three nests were found in Tussock Dwarf Shrub habitat 13-19 June with 4 eggs each; 7 nests were found in Riparian 22-24 June with clutch size 2-4 (mean 3.1) eggs (Fig. 1). In Tussock Dwarf Shrub habitat 2 nests hatched between 25 and 29 June, and 1 between 29 June and 3 July (Fig. 4). In Riparian habitat known hatching dates were 28 June, 2 July, 3 July, and 4 July (2 nests), and 1 nest hatched between 5 and 12 July. Although fewer nests were found in Tussock Dwarf Shrub habitat, they averaged larger clutch sizes and earlier hatching dates than in Riparian habitat. Nests were on the ground, generally concealed by sedge or willow. Flightless chicks were observed on Riparian plots on 5 and 12 July and on Tussock Dwarf Shrub plots on 6 and 13 July, accompanied by adults.

Many semipalmated sandpipers were observed along the Katakturuk River from camp to the river mouth 29 June - 1 July, including defensive pairs and small flocks of 5-6 birds. Many were also observed from camp to 24 km upriver on 19, 20, and 24 July, but were less numerous farther inland, and none were observed beyond 24 km south of camp (3 km from the Sadlerochit Mountains).

BAIRD'S SANDPIPER - Fairly common breeder. The first observation was 13 June. A nest was found on the bluff near camp 19 June, with 4 eggs, of which 3 hatched by 29 June (Fig. 1). A nest was found on 3 July, with 4 eggs that hatched on 4 July, on a gravel bar by the river. An adult with chicks was seen 5 July and 12 July on a Riparian plot. Many were seen on Simpson Cove shoreline 30 June; several were seen in Riparian and bluff habitat along the Katakturuk River up to 27 km south of camp (gorge entrance) 19 to 24 July. The last observation was 9 August: 2 adults on the river terrace near camp.

PECTORAL SANDPIPER - Fairly common breeder and fall migrant. The first observation was 11 June. Males made display flights over Wet Sedge 12-14 June. A nest was found in Tussock Dwarf Shrub with 4 eggs which hatched 29 June (Fig. 5). Two nests were found (each with 4 eggs) and a third suspected in Moist Sedge-Shrub habitat 26 June. They were empty by 4 July, but defensive adults were seen in the area on 7 July. A nest was suspected on the Wet Sedge plot, and an adult with 1 chick was observed there 14 July. Duration of nesting activity was shorter and numbers of nests found were less at Katakturuk than at the Okpilak and Jago-Bitty study areas (Fig. 1).

Pectorals were observed on the Wet Sedge plots and Moist Sedge-Shrub plots on all censuses. They were observed on Tussock Dwarf Shrub at the top of the bluff only until 3 July, but were on the Tussock Dwarf Shrub plot adjacent to Moist Sedge-Shrub habitat throughout all censuses. One was observed in Riparian habitat 11 August. Several were observed in Wet Sedge habitat near the mouth of the Katakturuk River 30 June, but none were observed upriver from camp 19-25 July. Pectorals were observed at Katakturuk camp through 16 August 1983, but no large flocks were seen. In 1982 flocks of 5-25 were observed 26 August traveling west and feeding in wet areas.

DUNLIN - Rare possible breeder. One bird was observed feeding near the abandoned Distant Early Warning Line site on Simpson Cove shoreline 30 June. A pair in breeding plumage with nest suspected was observed 2 km inland from the mouth of the Katakturuk River 30 June.

BUFF-BREASTED SANDPIPER - Rare summer visitant. There were 3 observations on Riparian and Tussock Dwarf Shrub habitat 19 and 21 June, and 5 July, 1982. None were observed in 1983.

RED-NECKED PHALAROPE - Rare breeder inland. Two adults were observed in a small lake 8 km northeast of camp 16 June. Ten adults were observed in a small pond near the Katakturuk River mouth (2 km inland) 30 June. None were observed near camp in 1983, but in 1982 a male defended 3 chicks on a Moist Sedge-Shrub plot 15 July.

POMARINE JAEGER - Rare spring migrant. One bird was observed hunting over Riparian habitat Willow 12 June. One bird was observed flying 15 and 18 June.

PARASITIC JAEGER - Uncommon possible breeder. They were present throughout the summer 11 June to 10 August with 1-4 birds observed regularly, over all habitats. A pair was observed at Simpson Cove shoreline 30 June. Five were observed 10-16 km upriver from camp, 19-20 July. In 1982 a nest was suspected in Moist Sedge-Shrub habitat.

LONG-TAILED JAEGER - Fairly common breeder. One to 4 birds were observed daily in the study area 11 June to 16 August, flying and hunting over all habitats. One nest was found on a Dryas terrace 1 km south of camp with 2 eggs that hatched 3-4 July (Fig. 6). One adult with 2 flight-capable young was observed 11 August hunting over Tussock Dwarf Shrub habitat. A few pairs were observed near the mouth of the Katakturuk River 30 June, in Tussock Dwarf Shrub and Moist Sedge habitats. A few pairs were observed from camp to 34 km upriver along the Katakturuk 19-25 July. In 1982, 5 nests were found within a 9.5 km radius of camp.

HERRING GULL - Rare spring migrant. One was observed flying over the river 21 June 1982. None were observed in 1983.

GLAUCOUS GULL - Rare spring and fall migrant inland, probable coastal breeder. One was observed 24 June flying south along the river, and 1 was observed 14 August flying over the river. Many were observed at the mouth of the Katakturuk River and at Simpson Cove 30 June, including one pair with probable nest in a saline meadow-pond area at the mouth of the Katakturuk.

ARCTIC TERN - Status unknown. Three adults were observed flying over a saline meadow-pond area at the mouth of the Katakturuk River 30 June.

SNOWY OWL - Rare summer visitant. One was observed flying and resting at the base of Katakturuk River bluffs 6 July 1982. None were observed in 1983.

SHORT-EARED OWL - Uncommon summer visitant. One was observed hunting over Tussock Dwarf Shrub habitat 19 June, 6 July, and 15 August. One was chasing and being chased by a rough-legged hawk and long-tailed jaeger over Moist Sedge habitat 16 August.

HORNED LARK - Rare summer visitant; possible breeder in foothills. Four adults and 1 juvenile were observed feeding and vocalizing on hillsides above the Katakturuk River 34 km upriver from camp (in the valley between the Sadlerochit and Shublik Mountains) 22 July. In 1982, 2-4 adults were seen feeding and displaying 21-23 June in Riparian and ridgetop habitat near camp.

NORTHERN RAVEN - Rare summer visitant. A single bird was observed flying north 11, 12, 25, and 28 June, and flying south 16 and 17 June. A pair was observed 5 km south of camp in Riparian habitat 30 June, and 1 bird was observed 5 km inland from the Katakturuk River mouth 30 June. A single bird was observed flying over camp 3, 4, 6, and 14 July, and being chased by long-tailed jaegers 26 July. A pair dive-bombed a dome tent 10 August, and single birds were observed 15 and 16 August.

AMERICAN ROBIN - Rare summer visitant. One was observed 24 June in Low Willow habitat near camp. One was observed 22 July in Riparian Willow habitat along a tributary of the Katakturuk River 35 km upriver from camp (in the valley between the Sadlerochit and Shublik Mountains). One was observed 24 July in Riparian habitat in the Katakturuk River gorge 32 km upriver from camp.

YELLOW LOW WAGTAIL - Fairly common breeder. The first observation was 12 June in Willow. A nest was found 19 June in Tussock Dwarf Shrub habitat at the edge of Katakturuk River bluff, with 5 eggs; 4 eggs hatched 29-30 June; the young fledged by 13 July. Wagtails were most commonly seen in low to medium willow thickets within Riparian habitat and willow-filled gullies of the bluff. At least one nest was suspected on or near each Riparian plot. Six to 8 adults were observed on censuses of Riparian plots in June-July, and 13 on 9-11 August. The last observation was 15 August. Adults were observed feeding fledged juveniles on all Riparian plots 10-12 July.

WATER PIPIT - Rare probable breeder, more common in foothills; fairly common fall migrant. Single birds were observed 13, 16, and 19 June on the river bluff near camp and on a bluff 6 km northeast of camp. Many were observed from 14 to 40 km upriver from camp, along the river and on hillsides and in Tussock Dwarf Shrub habitat. Two were observed 15 August feeding on a gravel bar near camp. In 1982 a nest was suspected on the river bluff west of camp. Up to 12 birds were observed in Riparian and Tussock-Dwarf Shrub plots on 25 and 26 August 1982.

NORTHERN SHRIKE - Rare summer visitant and breeder in foothills. One adult was observed hunting 29 June in Riparian habitat 1 km south of camp. One juvenile was observed in Riparian habitat on 21 July 27 km south of camp at the entrance to Katakturuk gorge. An adult pair with 4 flight-capable young was observed near a nest in Riparian Willow habitat 30 km upriver from camp in Katakturuk gorge on 21 and 24 July. Two juveniles were observed hunting in Riparian Willow habitat 18 km upriver from camp 24 July.

YELLOW WARBLER - Casual spring migrant. One adult was observed feeding in low willow 16 June.

AMERICAN TREE SPARROW - Fairly common breeder inland. Males sang 12-24 June. Tree sparrows were observed on all 3 Riparian plots, approximately 40 birds/km² in June, 17 birds/km² in July, and 180 birds/km² in August. One nest was found in Low willow on 22 June with 5 eggs (Fig. 6). The first eggs hatched 5 July, but only 4 chicks remained 12 July. A few adults were observed downriver from camp on 29 July but not beyond 5 km north. Many were observed from camp to 35 km upriver 19-25 July. In 1982 adults and juveniles were still present in Low willow near camp 25 August.

CHIPPING SPARROW - Casual summer visitant. A single singing bird was observed in Low willow 23 June 1982. None were observed in 1983.

SAVANNAH SPARROW - Uncommon Breeder. The first observation was 13 June in Tussock Dwarf Shrub habitat. Up to 9 birds were observed on Tussock Dwarf Shrub and Moist Sedge-Shrub plots in June and July. One nest was found in Moist Sedge-Shrub habitat on 25 June with 6 small nestlings (Fig. 6); on 3 July 1 large nestling was in the nest and 1 dead one was nearby. Two nests were suspected on Tussock Dwarf Shrub plots. A fledged juvenile was observed feeding with adults on 13 July. Single birds were seen in Low willow habitat on 12 July and 9,10,15 August. Six were seen on 11 August on Tussock Dwarf Shrub plots. In 1982 a single bird was singing in low riparian willow 25 August. A few were observed along the Katakturuk River from camp to the river mouth 29 June, and several at Simpson Cove 30 June. A few were also observed along the Katakturuk upriver to 14 km south of camp, 19 and 20 July.

WHITE-CROWNED SPARROW - Fairly common probable breeder inland and in foothills. A single male displayed and sang in low willow 1 km north of camp on 12,18,24 June and 1 July. Four birds fed and vocalized 6 km south of camp in low willow 2 July. Many were observed in Riparian Willow from 11 to 35 km upriver from camp, along the Katakturuk River, 20-24 July.

LAPLAND LONGSPUR - Abundant breeder. Lapland longspurs were observed every day at Katakturuk Camp from 11 June to 16 August. They were observed in all habitats, but were most dense within low willow sections of Riparian habitat, especially in July and August (250-300 birds/km²).

Male display flights were observed 11-26 June in all habitats. Four nests were found in Moist Sedge habitat 14-23 June; 7 nests were found in Tussock Dwarf Shrub habitat 13-25 June; and 10 nests were found in Riparian habitat 12-25 June (Fig. 6). Clutch sizes were 3-6 (mean = 4.8) compared to 4-8 (mean = 5.3) in 1982. Estimated¹ nest initiation dates were 1-22 June and estimated¹ hatching dates were 18 June - 5 July. One nest was destroyed by predators before hatching and 1 after hatching in Riparian habitat. Dead chicks were found in 3 nests in Tussock Dwarf Shrub habitat and in 1 nest in Moist Sedge habitat, for a total of 10 dead chicks. Hatching success for nests not predated was 76 out of 83 eggs, or 92%. All young had left nests by 3 July on Tussock Dwarf Shrub habitat, by 11 July on Moist Sedge habitat, and by 12 July on Riparian plots (Fig. 7). Nests were located primarily on the south side of tussocks; some were at the base of willows or on stream banks. Fledged juveniles were observed 5-13 July in all habitats.

¹Using 10-14 days incubation from last egg (Harrison 1978).

Many Lapland longspurs were observed from Katakturuk Camp to the mouth of the Katakturuk River on 30 June, and upriver to the Sadlerochit Mountains on 19-25 July. None were observed in the Katakturuk gorge 27-34 km south of camp and only a few in the valley between the Sadlerochit and Shublik Mountains.

SMITH'S LONGSPUR - Casual summer visitant, more common in foothills. A single male was observed in Tussock Dwarf Shrub habitat 25 June near camp; in Riparian habitat on 23 July 40 km upstream along the Katakturuk River from camp; and in Riparian habitat near camp 11 August.

SNOW BUNTING - Status unknown. A single bird was observed flying over the river terrace near camp, after strong winds, 22 June. Many were observed when investigators visited the Simpson Cove shoreline 30 June. One bird was observed in Riparian habitat, in Katakturuk River gorge, 30 km upriver from camp, 21 July. Seven were observed in the Sadlerochit Mountains above 600 m elevation 22-23 July, 35 km up the Katakturuk River from camp.

REDPOLL - Common breeder. Nine nests were found, all in portions of low willow Riparian habitat, from 14 June to 4 July (Fig. 6). Known and (estimated)¹ nest initiation dates were (9 June), (11 June), 13 June, 22 June, (25 June), and 4 July. Known and (estimated)¹ hatching dates were (20 June), 22 June, 26 June, and (7 July). Three nests were destroyed by predators either before or soon after hatching. Clutch sizes ranged from 2 to 5 (mean = 4.1). Hatching success was 17 out of 19 for 4 nests which were not destroyed by predators. Most young fledged the first week of July. Fledged juveniles were first observed 5 July. Nests were located in willow bushes, up to 75 cm from the ground.

Redpolls were observed primarily in Riparian Willow habitat, at densities of around 65 birds/km² in June, 20 birds/km² in July, and 67 birds/km² in August. Two were observed in Moist Sedge-Shrub habitat at the top of the bluff west of camp on 13 July. One was observed along the shoreline at Simpson Cove 30 June. Many were observed in low willow portions of Riparian habitat along the Katakturuk River from camp to 34 km upriver 19-25 July, and 4 were observed on a mountainside in the Sadlerochit Mountains 35 km upriver from camp on 23 July. Large groups including fledged juveniles were seen in Riparian habitat 9 August, and some were still present 16 August. In 1982 small flocks were seen 25-26 August.

¹Incubation and nestling period seemed to be shorter than those given in Harrison (1978); they were estimated at 10 days and 7 days, respectively. Hatching dates were estimated with 10-day incubation from the third egg. The wide spread in nest initiation dates suggest that double clutches might have been possible.

Jago River - Bitty Birds

RED-THROATED LOON - Uncommon summer visitant. Represented by a single observation of a pair flying and calling over a large lake 11 km northeast of camp on 12 July.

ARCTIC LOON - Uncommon breeder. A single nest was found with 2 eggs incubated by 1 adult at edge of the third large lake 11 km northeast of camp on 12 July (Fig. 1). Two other adults were seen in this vicinity on 12 July. One arctic loon was seen swimming in a lake 3 km northeast of Marie Mountain (south of camp approximately 34 km) on 23 July.

TUNDRA SWAN - Uncommon spring migrant and breeder. First observed 5 June when a single swan was seen flying southeast about 8 km north of camp. A pair flew from the southeast and landed in Riparian habitat 1.5 km west of camp on 10 June. A flock of 4 with 1 unidentified goose was seen flying 6.5 km northeast of camp on 11 June. A single swan was seen swimming and calling on a large lake 11 km northeast of camp 12 July. The only breeding effort was recorded on an aerial swan survey on 21 August, with 1 pair and 2 young sighted in a lake 5.5 km north of camp (Bartels et al. 1984).

GREATER WHITE-FRONTED GOOSE - Fairly common spring migrant. This species was only observed during spring migration. Flocks of 3 or 4 were seen flying over Jago-Bitty camp on 2, 3, and 5 June. Single pairs were seen flying east over an area 5 km northeast of camp on 7 June, with a single goose over camp on 9 June, and flying to the north over Moist Sedge-Shrub 3 km north of camp on 20 June.

SNOW GOOSE - Uncommon spring migrant. Two sightings were made of snow geese flying over camp; a flock of 4 on 3 June and a single bird on 4 June.

BRANT - Uncommon spring migrant. Two observations were made of brant flying over camp; a flock of 3 on 2 June and a single bird on 4 June.

GREEN-WINGED TEAL - Rare summer visitant. Only a single observation was made of 1 teal swimming in the lake 1.6 km north of Marie Mountain in the foothills region (approximately 34 km south of camp).

MALLARD - Rare summer visitant and breeder. There were 2 observations at a large lake located 11.5 km southeast of camp: 4 pairs seen on 2 July; 8 adults with 10 ducklings on 25 July. This is the first documented breeding record for this species on the coastal plain of ANWR.

NORTHERN PINTAIL - Common summer resident and fairly common breeder. Pintails were seen flying singly and in small groups daily from 1 to 11 June, and less frequently after this period. Pintails were the most common species of waterfowl breeding in the study area. Five nests were found between 9 June and 12 July: 3 on plots (2 in Riparian, 1 in Moist Sedge-Shrub) and 2 adjacent to lakes 11.5 km north of camp. Clutch sizes were 6, 6, and 8 for 3 nests where eggs were counted. Of 3 nests rechecked, 1 was destroyed by predators probably by jaeger or gull, and 2 had hatched by 30 June and 6 July. A brood of 2 ducklings with 3 adults seen 11 August was the latest observation of the species.

GREATER SCAUP - Rare summer visitant. A single sighting was made of a scaup which flushed from tall willows in Riparian habitat 1.6 km north of camp on 10 June.

LESSER SCAUP - Rare summer visitant and breeder. Two sightings were made: 2 scaup swam in the pond 11.5 km south of camp on 2 July; 1 adult with a brood of 6 swam in a pond 1.6 km east of Marie Mountain (34 km south of camp). These observations represent the first record as well as documented breeding of this species on the coastal plain of ANWR.

HARLEQUIN DUCK - Uncommon summer visitant. A pair of harlequin ducks was seen flying over Okpirourak Creek at its confluence with Jago River 1.5 km north of camp on 10 and 24 June.

OLDSQUAW - Fairly common summer visitant and breeder. Oldsquaw were observed from 2 June to 11 August, as singles, pairs, small flocks (2-6 birds) and rarely larger flocks in river, lakes, Wet Sedge, Moist Sedge and Wet/Moist Sedge habitats. Courtship displays and chasing between males and females were observed on 5 June involving 2 pairs 1.5 km northeast of camp; 6 June among 3 birds in the Jago River and a pair in Moist Sedge 1.5 km north of camp; and 11 June with 3 oldsquaw in Wet Sedge 8 km north of camp. Nests were not found, but 3 broods of 4 ducklings were seen with 9 adults on the pond 11.5 km south of camp on 25 July. The last pair observed was on 12 July on a large lake 11.5 km northeast of camp. Larger flocks were observed in lakes: 15 birds 11.5 km south of camp on 2 July; 13 birds 11.5 km northeast of camp on 12 July; 2 flocks (17, 11 birds) 1.5 km east of Marie Mountain (34 km south of camp) on 23 July; 9 birds 11.5 km south of camp on 25 July. The last observation was on 11 August of a flock of 6 females swimming in Okpirourak Creek 1.6 km north of camp.

RED-BREASTED MERGANSER - Uncommon summer visitant. The species was first observed 6 June, a pair flying west over the Jago River about 1.5 km northeast of camp. One other sighting, on 11 June, was made of a single female flying east over the Jago River about 5 km northeast of camp.

NORTHERN HARRIER - Rare summer visitant. Single sighting of a harrier chased by a long-tailed jaeger was made 14.5 km south of camp on 24 July.

ROUGH-LEGGED HAWK - Uncommon summer visitant. One hawk was seen hunting near camp on 24 June. Two observations were made to the south of camp: 1 flying over an area 14.5 km up-river on 2 July; 1 standing in Moist/Wet Sedge Tundra 3.2 km northwest of Marie Mt. (34 km from camp) on 22 July. In 1982 an active rough-legged hawk nest was found on the river bluffs of Bitty (10.5 km south of camp) with 2 downy young and 2 eggs in a stick nest attended by a pair of hawks on 23 July. No nest was present in 1983.

GOLDEN EAGLE - Fairly common summer visitant. Single golden eagles, including 1 immature, were observed soaring and hunting over areas 1.5 to 5 km from camp on 9, 10, 21, 25 June, and over Marie Mt. on 21 July. Pairs were seen soaring 3 km southeast of camp on 24 June, over Bitty (7 km south of camp) 1-3 July, and 2 immatures flew over Okpirourak Creek near Marie Mt. (33 km from camp) on 22 July.

WILLOW PTARMIGAN - Common resident, fairly common breeder. Willow ptarmigan

were most commonly observed in Moist Sedge-Shrub (1.1 birds/km²) and Tussock Dwarf Shrub Tundra (0.2 birds km²), but also less frequently in Moist/Sedge and Wet Sedge from 2 June - 12 August. Courtship behavior by 3 males in winter and breeding plumage was observed 9 June in Tussock Dwarf Shrub Tundra. Two nests were found: on 20 June in Moist Sedge-Shrub with 10 eggs incubated by female (found abandoned with cold eggs 27 June); on 21 June in Tussock Dwarf Shrub Tundra with 12 eggs incubated by female (11 eggs hatched by 7 July) (Fig. 1). At the latter nest the female did not flush on 26 June until researchers approached within 2 m and in a later test of rope dragging technique she did not flush at all (thus demonstrating the ineffectiveness of rope dragging). The majority of broods were seen in the Moist Sedge-Shrub type. First young of the season, a brood of 4 with female, were observed on 6 July. Other broods seen included: 9 young with defensive male 12 July; male defending brood on 25 July; pair with brood of 10 on 26 July. Groups of older chicks were found in additional habitats: a brood of 8 chicks, 2/3 grown, with a pair of adults in Moist/Wet Sedge on 8 August; brood of 9 full-grown young with 1 adult in Wet Sedge on 11 and 12 August.

ROCK PTARMIGAN - Common resident, uncommon breeder. While rock ptarmigan were observed as frequently as willow ptarmigan, breeding was less common and was seen in an additional habitat - Riparian. Rock ptarmigan were not as abundant, however, as willow ptarmigan, with 0.3 birds/km² in Tussock Dwarf Shrub and 0.2 birds/km² in Riparian. Rock ptarmigan were observed between 1 June and 13 August. Male courtship behavior was observed 1 June and 3 June near camp and on 9 June in Tussock Dwarf Shrub Tundra. A male was observed displaying to a #10 tin can lid on 5 June near camp! Females were seen molting to summer plumage on 9 June. First flocking by males was observed 12 July with a group of 5 in Moist Sedge-Shrub 11 km north of camp. No nests were found, although breeding occurred in the study area. The first young found were on 26 July: chicks were flight-capable in the presence of a pair of adults in Moist/Wet Sedge. Another brood consisting of 10, 2/3-grown chicks was found 13 August, in Riparian habitat (plot 391).

SANDHILL CRANE - Rare spring migrant. Single observation of a pair flying over the Jago River 1.5 km east of camp was made on 5 June.

BLACK-BELLIED PLOVER - Rare summer visitant and migrant. A single sighting of a flock of 4 birds flying west over low willow 3 km northeast of camp was made 7 July.

LESSER GOLDEN-PLOVER - Common summer visitant, fairly common breeder. Lesser golden-plovers were seen daily in all habitats during the period biologists were in the study area, 1 June to 13 August. This species was observed as far inland as 1.5 km south of Marie Mtn., with 2 seen there on 20 July. Pairs were noted in courtship display, chasing and calling on 1 and 6 June. Three nests containing 4 eggs were found on 18, 21 and 27 June in Moist Sedge, Tussock and Moist Sedge-Shrub Tundra, respectively (Fig. 1). The earliest nest presumably hatched by 4 July. Hatching in process was observed at one nest on 7 July with 3 eggs pipped and on 15 July at another in which 2 chicks and 2 pipped eggs were found. Backdating of these nests indicates nest initiation dates of 9 and 13 June, respectively. First chick out of nests was found 12 July in Wet Sedge Tundra. First flight capable young, in a flock of 3, were seen in Riparian Willow on 20 July. Other groups of young chicks were subsequently seen in Riparian 1.5 km

east of camp on 23 and 26 June. First flocking was seen on 28 July, with a group of 15 in Moist Sedge Tundra near camp. The first eastward migration was seen as a flock of 27 flew over Tussock Dwarf Shrub Tundra on 9 August.

SEMIPALMATED PLOVER - Uncommon summer visitant. All sightings were of pairs in July, mostly in habitats adjacent to the Jago River. Two observations were of birds in mud 11 km south of camp (1 and 26 July), and one sighting was made on a gravel bar 3.2 km south of camp on 3 July. The only observation of this species on tundra habitat was on 12 July in Tussock Shrub Tundra 3.2 km north of camp.

SPOTTED SANDPIPER - Rare summer visitant. One sighting of a single bird was made in the foothills region 1.6 km north of Marie Mountain in Moist Sedge-Shrub Tundra on 20 July. The species may remain inland into September, based on observations at 8 km inland along the Aichlik River on 11 September.

WHIMBREL - Rare summer visitant. One observation was made: 2 whimbrels calling and chasing each other over Riparian near camp on 26 June.

RUDDY TURNSTONE - Fairly common breeder. Most sightings were of a pair which nested near camp on a gravel bar of the Jago River. First observation was of a pair feeding on 2 June. Copulation was observed on 5 June and fighting between 2 males was also noted. A nest with 4 incubated eggs was found 6 June and its 2 eggs hatched 29 June (Fig. 1). Backdating gave an estimated clutch completion date of 3 June. A pair was observed defending chicks on 26 July. The last observation was made on 8 August of a pair in winter plumage. Only 1 observation was made of a turnstone in a habitat other than Riparian habitat: a single bird was seen in Moist/Wet Sedge 1.6 km north of Marie Mountain (33 km from camp) on 20 July.

SEMIPALMATED SANDPIPER - Common breeder. Semipalmated sandpipers were present in the study area upon the researchers' arrival 1 June. Semipalmated sandpipers were most commonly seen in Moist Sedge, particularly areas with low willow vegetation, Riparian, and Moist Sedge-Shrub. They were seen less frequently in Tussock Dwarf Shrub and Wet Sedge Tundra. Courtship displays were noted from 1 to 9 June. A total of 17 nests was found between 9 and 27 June, (Fig. 1) all with a clutch size of 4 eggs. The majority of nests were found in Riparian habitat (9 nests), with remainder in Moist Sedge-Shrub (5 nests) and one each in Moist Sedge, Wet Sedge and Tussock Dwarf Shrub Tundra. Nest success rate was 92.3% (13 nests) and hatching success rate was 92.3% (12 nests) based on nests with sufficient data. At one of the first nests found the adult removed a cracked egg by carrying it in its feet. Subsequently, the nest was found abandoned. The first nest with pipped eggs was seen on 25 June and first hatching was observed on 27 June. After this date, the majority of nests had hatched, but hatching was witnessed as late as 6 July and one nest still contained incubated eggs on 7 July (Fig. 4). Back-dating of known hatches yielded nest initiation dates of 6, 8, and 17 June. An adult was observed defending chicks in Moist Sedge on 27 July. The last observation was of a single bird in Riparian habitat 8 August.

BAIRD'S SANDPIPER - Uncommon breeder. First observed on 3 June, a single bird in Wet Sedge habitat 800 m south of camp. The majority of other sightings were of single birds in Riparian habitats. One Baird's was seen

on a gravel bar 4.8 km northeast of camp on 7 June. The only nest found contained 4 incubated eggs on 27 June in Riparian habitat. Other sightings were made in this general vicinity on 29 June and 12 July. One Baird's sandpiper was found calling in Alpine Tundra 11 km west of Marie Mountain on 21 July.

PECTORAL SANDPIPER - Common breeder and fall migrant. First seen on our arrival to the study area on 1 June when 3 birds were seen courting in Moist Sedge Tundra near camp. Observed in all habitat types on study area but nested commonly only in Wet Sedge and Moist Sedge-Shrub and sparsely in Moist Sedge types. Male courtship display was observed only during the first week of June. Perhaps courting activities were limited in early June 1983 because of extremely high winds (averaging 16 km/h) during the courting period. The first nesting probably began 11 June because on that date a fresh eggshell and defensive female were seen on a Wet Sedge plot. The first nest was found 17 June (when researchers returned after a 6-day lapse) on a Moist Sedge tundra plot near camp. Based on back-dating from known hatching dates using a 21-23 day incubation period (Harrison 1978) the earliest clutch completion date was 8 June while the latest clutch completion date was 21 June. A total of 15 nests were found in the following habitats: Moist Sedge-Shrub(6), Wet Sedge (5), and Moist Sedge (4). First hatching was observed 29 June, with other nests in the process of hatching 30 June, 5,7, and 12 July (Fig. 5). By the first week of July the majority of nests were empty. Mean clutch size was 3.8 ± 0.4 (S.D.), nest success for 13 followed nests was 100%, while hatching success was 96%. Females exhibited defensive behavior near nests and young on the Moist Sedge-Shrub and Wet Sedge plots throughout the month of July. The peak of flocking by defensive females with flocks of up to 10 other individuals flocking around the defensive birds occurred 10 July. Flocking occurred later into July and August but was not nearly as prevalent as along the coast. The first flocking away from defensive birds was noted on 27 July as 9 birds were seen flying over a Riparian area. Pectoral sandpipers became less common in August as flocks of 7,5,14,3 and 3 were seen on 9,10,11,12, and 13 August, respectively.

DUNLIN - Uncommon spring and fall migrant. Only 2 observations, 1 spring and 1 fall, have been made of Dunlins near Jago-Bitty: on 10 June 1 bird flying over Riparian 1 km northeast of camps and on 11 August 1 bird sitting in willows 4 km northeast of camp.

STILT SANDPIPER - Uncommon breeder. First observed on 4 June when 2 birds were seen: 1 feeding and flying in a Wet Sedge area near camp; and 1 sitting in low willows 2 km south of camp. A pair in courtship flight was observed 7 and 11 June over Wet Sedge Tundra 3 km northeast of camp. A pair defending 3 chicks was found in Moist/Wet Sedge (Mosaic) just north of plot 333 on 29 June. Three flight-capable young were observed 12 July in the company of 2 adults 11 km NE of camp in Wet Sedge Tundra.

BUFF-BREASTED SANDPIPER - Uncommon breeder. The first observation was on 11 June when 1 bird was seen sitting on a gravel bar 2 km south of camp. A subsequent observation of the species, not apparently related to nesting, was made of 1 bird in Tussock Dwarf Shrub Tundra 3 km south of camp. The first and only nest was found on 29 June in Moist Sedge Tundra 0.2 km south of camp (Fig. 6). The 4 eggs in this nest pipped on 5 July and were hatched by 6 July. Using an incubation period of 23 days (Martin and Moitoret 1981) back-dating yielded a nest initiation date of 12 June.

LONG-BILLED DOWITCHER - Fairly common summer resident, probable rare breeder. The first observation was 2 June when 2 birds were seen standing in low willow 1 km south of camp. Frequent observations of pairs in courtship flights or singles were made throughout June in Wet Sedge or Moist Sedge Tundra. The first flocks occurred in Wet Sedge Tundra on 12 July when 30 birds were counted. Three adults in winter plumage were seen in Tussock Dwarf Shrub Tundra on 9 August 2 km south of camp. The only evidence of breeding was the observation of a juvenile bird on a Wet Sedge census plot 5 km northeast of camp on 11 August. The species may remain inland into September, based on observations of several small (5-10) flocks 8 km inland on the Aichilik River 10-12 September.

COMMON SNIPE - Fairly common breeder. Snipe were limited to a specific combination of habitat types defined by Wet Sedge or Wet/Moist Sedge (Mosaic) tundra in proximity to willows of low or medium height. A nesting/display area was found 1 km west of camp along a small tributary to Okpirourak Creek. In that area displaying males were observed almost daily from 1 June until 2 July, the last recorded display flight. Snipe were also found displaying in a similar combination of habitats 11 km south of camp along the southern base of Bitty ridge. The first and only nest found was on 29 June in 1.5 m tall willows along Okpirourak Creek, 1.5 km north of camp (Fig. 6). On 16 July the same nest was abandoned precluding determination of nest-initiation date.

RED-NECKED PHALAROPE - Uncommon breeder, fairly common summer resident. The first observation was 4 June when a pair was seen flying near camp. Pairs and singles were seen in small ponds, sections of river and creek, Moist Sedge, Wet Sedge, and Riparian habitats throughout June and early July. The only evidence of breeding was 1 chick with 2 defensive adults in Wet Sedge Tundra 11 km north of camp on 12 July. The latest observation was of 2 birds near camp on 23 July. The paucity of red-necked phalaropes in this inland study area was not expected, and may be related to annual variability as well as inland/coastal differences.

RED PHALAROPE - Rare spring migrant. Only 1 individual was observed on 5 June at a small pond 1 km southwest of camp.

POMARINE JAEGER - Common spring migrant. The species was seen as single birds or in groups of up to 8 birds hunting locally and/or traveling eastward every day observers were in the field from 1 to 18 June. Numbers of pomarines seen declined towards the last few days they were present. The decline in pomarine jaegers corresponded to a decline in numbers of caribou cows and calves in the immediate area, suggesting an association. On 11 June a total of 5 pomarine jaegers were seen scavenging on a caribou calf carcass that was killed by a bear the day before, 1.6 km south of camp on Tussock Dwarf Shrub Tundra. The latest date a large group of caribou cows with calves was seen on the study area was 21 June, 3 days later than the last pomarine jaeger observation.

PARASITIC JAEGER - Rare breeder, common summer resident. Parasitic jaegers were seen most days observers were in the field in June and July. Mostly groups in migration were observed 2-11 June with pairs and singles predominating thereafter. A majority of observations were over Moist Sedge, Moist Sedge-Shrub, Wet Sedge, and Riparian habitats. The only nest was of a

dark phased pair found 23 June in Wet Sedge tundra 4 km northeast of camp; it contained 2 eggs (Fig. 6). Hatching occurred about 30 June, based on 1 pipped egg. Nest initiation was probably 2-6 June, based on an incubation period of 24-28 days (Harrison 1978). Two chicks were in the nest when it was checked 10 July, and by 18 July the chicks had left, but were still in the areas as indicated by 2 defensive adults nearby. The 2 nearly grown and fledged young were seen in the vicinity of the nest accompanied by 2 defensive adults on 11 August, which represented the latest observation of the species on the study area.

LONG-TAILED JAEGER - Fairly common breeder, common summer resident. First observation was on 2 June when a flock of 3 was seen hunting over Riparian habitat near camp. Groups of 3 to 5 were seen regularly throughout June and early July, but no real migratory movement was detected as with pomarine and parasitic jaegers. Observations were made mostly on or over Riparian and Dryas terrace habitats, with lesser numbers in Moist Sedge, Wet Sedge, and Tussock-Dwarf Shrub habitats. The first nest was found on 18 June, containing 1 egg on open Dryas terrace 0.5 km northeast of camp (Fig. 6). A second nest was found 23 June which consisted of 2 eggs in Wet Sedge Tundra 3 km northeast of camp. The third nest was not found until 7 July and it contained 1 pipped egg and 1 chick. Back-dating the latter nest of known hatching date yielded an estimated nest initiation date of 14 June. The first nest to be found contained an incubated egg on 6 July but was empty by 14 July. The latest observation was of 3 birds hunting over Tussock Dwarf Shrub Tundra 8 August.

MEW GULL - Rare visitor to middle coastal plain, probable rare breeder in foothill region. One defensive adult was seen at Jago Lake near Marie Mt. in the foothills.

GLAUCOUS GULL - Uncommon summer resident. The species was present on the study area when the field crew arrived 1 June. Single birds were observed flying and hunting on 1 and 23 June, and 20 July; a groups of 5 was observed standing on a gravel bar on 12 July.

BLACK-LEGGED KITTIWAKE - Casual late summer visitant. One immature was seen flying near camp on 10 August.

ARCTIC TERN - Rare breeder and summer resident. The first observation was of a single bird flying over the Jago River on 29 June. A brood of 2 chicks defended by 3 adults was found on the shore of a large lake 11 km northeast of camp on 12 July.

SHORT-EARED OWL - Uncommon summer visitant. All observations were of single birds hunting over Wet Sedge or low willows within a 5 km radius of camp on 1, 10, 24 and 29 June and 4 July. Although not observed at the Jago-Bitty camp because of its lateness in the season, a pronounced migration of short-eared owls was observed on the coastal plain in early September: 3-5 birds per day at 6 km inland along the Aichilik River on 10 to 12 September and about the same or more birds per day at Barter Island the first 2 weeks of September.

HORNED LARK - Uncommon summer visitant and probable breeder. Both observations are from the medium to tall willow stands near the south-facing

slope of VABM Bitty, the first a pair seen on 2 July; the other a single individual seen on 26 July. Larks were more numerous in the foothills around Mt. Marie and Old Man Creek.

NORTHERN RAVEN - Uncommon resident. Singles or a pair were seen flying overhead from camp or nearby plots on 2,4,5,6,7,20,23,29,30 June. One bird was seen south of VABM Bitty 2 July; 1 was seen farther inland near Marie Mt. 20 July. The latest observation was on 9 August 2 km south of camp.

YELLOW WAGTAIL - Uncommon summer resident and probable breeder. Wagtails were present on the study area when researchers arrived 1 June. A majority of observations were in association with low to medium height willows; they were also observed in Tussock Dwarf Shrub and Moist Sedge Tundra. Singles were observed 1,6, and 9 June near camp. Pairs (2, 3, and 2 respectively) were observed on 10,21, and 23 June in Riparian habitat 2 km north of camp. Several birds from adjacent territories flocked together in common defense of suspected nests 2 July on the south side of VABM Bitty, 10 km south of camp. The latest observation was 20 July near Marie Mt., 35 km south of camp.

WATER PIPIT - Uncommon summer resident and probable breeder. Pipits were most often seen in association with the Jago River bluff which extended from 2 km south of camp to VABM Bitty, 11 km south of camp. This bluff included Tussock Dwarf Shrub, Low Willow, Wet and Moist Sedge, and rock outcrops, all of which were used by pipits vocalizing and defending suspected nests. Singles were seen on 2 and 21 June; many were seen on a walk from camp along the river bluff 2, 3 and 25 July; and 2 pairs were seen near Mt. Marie, 35 km south of camp.

CEDAR WAXWING - Accidental. Two birds were observed in the medium high shrub thickets on the south side of VABM Bitty 11 km south of camp on 2 July.

NORTHERN SHRIKE - Rare summer visitant, possible breeder. A group of 4 birds, probably juveniles, was seen in medium height willow 14 km south of camp and 3 km south of VABM Bitty on 24 July.

TREE SPARROW - Uncommon summer resident and probable breeder. Males perched and singing on 1-1.5 m tall willows were seen on 10, 21, and 29 June at the confluence of Okpirourak Creek and Jago River. Many individuals were seen in medium-height willows on the south facing slopes of VABM Bitty on 1 and 25 July, as well as in Riparian habitats 2 km south of Marie Mt. along the Jago River.

SAVANNAH SPARROW - Fairly common breeder. The species was seen or heard most days observers were afield. Savannah sparrows were present on the study area 1 June when researchers arrived. The species was most frequently associated with Riparian habitats and Wet, Moist, or Tussock Dwarf Shrub Tundra which had substantial prostrate shrub cover interspersed with dense sedge or grass cover. The first nest was found 21 June (Fig. 6) in Tussock Dwarf Shrub habitat; it had 4 eggs which subsequently hatched by 26 June; on 7 July the young had fledged. Two nests were found on 25 June, both in Riparian Willow, and both with 4 chicks. Both nests subsequently checked 1 July still had 4 chicks which were then banded; by 5 July both nests had fledged. The latest observations on the study area were 21-23

July when many savannah sparrows were seen in the Marie Mt. area, and on 24 July when many were seen in the shrub communities south of VABM Bitty, along the Jago River.

FOX SPARROW - Rare summer resident and possible breeder. The species was represented by a single observation of a pair flying over medium-height willows on the south-facing slopes of VABM Bitty 10 km south of camp.

WHITE-CROWNED SPARROW - Rare summer resident. A pair was seen on 1 and 3 July and a single bird was seen on 2 July in medium-height willows on the south-facing slope of VABM Bitty 11 km south of camp.

LAPLAND LONGSPUR - Abundant breeder. The species was seen every day researchers were afield, and was present on the study area when camp was set up 1 June. Breeding was noted in all 5 habitat types censused, but at varying densities: most abundant in Riparian (mean 7.8 nests and/or territories/km²); intermediately abundant in Moist Sedge, Moist Sedge-Shrub, and Tussock Dwarf Shrub (3.5, 3.7, and 4.0 nests/territories/km²), and least abundant in Wet Sedge (2.5 nests/territories/km²).

Intensive courtship displays were noted 1 June until 11 June (when observers departed the study area for a week). Display flights were again noted 17 June but of decreasing intensity until 24 June, when the latest flight song was observed. The first nests were found 10 June, both on Moist Sedge Tundra 1 km west of camp (Fig. 6). During the period 10-21 June, most nests contained eggs (Fig. 7). The most frequent clutch size was 5 (54%) out of a range of 4-7. The nest success rate was 91% and hatching success was 81% out of 20 nests followed. The first hatching was noted 20 June, and the latest hatching noted 6 July (Fig. 7.). The resultant range in nest initiation dates, based on back-dating using an incubation period of 10-14 days (Harrison 1978) was 6-10 June to 22-26 June. During the period 23 June to 4 July, most nests had chicks. The earliest date that chicks of nearly fledgling size were found, hence allowing banding, was on 29 June. By the period 5 to 12 July, fledgling longspurs had become abundant on the censuses. Shortly thereafter, a discernible vacation of Moist Sedge, Moist Sedge-Shrub and Tussock Dwarf Shrub habitats by longspurs was coincident with a marked increase in longspurs in Riparian plots (see Results and Discussion of variability due to season). By 9 August adult and juvenile longspurs flocked in premigratory staging, and represented the latest observation on the study area.

SMITH'S LONGSPUR - Rare summer visitant. Only one observation was made, a single bird calling in Moist Sedge Tundra near camp on 25 July.

SNOW BUNTING - Rare summer visitant. The species was represented by a single observation of 1 bird in a rocky area on the Jago River 2 km north of Marie Mt., 35 km south of camp in the foothills region.

REDPOLL - Fairly common breeder. Redpolls were seen most days researchers were in Riparian habitats, where a majority of observations occurred. The first observation was made on 2 June in low willows 2 km south of camp. The first nest was found on 23 June located 0.3 m high in a 1 m tall willow shrub in Riparian habitat 4 km northeast of camp (Fig. 6). A female "hoary" type was incubating on 23 and 29 June. On 23 June the nest contained 2 eggs

and 3 young; on 29 June it contained 5 young; by 10 July the young had apparently fledged. A second nest containing 14 eggs was found in a Riparian plot on 25 June; on 1 July it contained 5 eggs; by 5 July 3 eggs were hatched, 2 were unhatched; and on 14 July 4 live and 1 dead chicks were present. Incubation of the first nest probably began about 8 June, based on back-dating the known hatch date using an incubation period of 15 days (Harrison 1978). The latest observation was on 11 August.

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