

Birds of Nuvagak Point, Northeastern Alaska

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ABSTRACT. Fifty-two bird species were observed between 12 June and 4 July 1970 in the coastal plain near Nuvagak Point, northeastern Alaska. Habitat preferences were studied. Nesting was established or seemed probable in 25 species, and a further 5 may have been breeding. Among these were 2 species of *Gaviiformes*, 7 *Anseriformes*, 16 *Charadriiformes*, and 2 *Passeriformes*. Most birds were associated with some form of surface waters. Among the 8 predators, 6 were largely rodent hunters. Between mid June and early July, these species decreased markedly in abundance together with Brown Lemmings.

RÉSUMÉ. Oiseaux de la pointe Nuvagak dans le nord-est de l'Alaska. Dans la plaine côtière de la pointe Nuvagak dans le nord-est de l'Alaska, l'auteur a observé 52 espèces d'oiseaux entre le 12 juin et le 4 juillet 1970. Il a étudié leurs préférences en ce qui regarde l'habitat. Pour 25 espèces, la nidification est certaine ou probable: 5 autres espèces ont peut-être niché. Parmi ces espèces, on compte 2 *Gaviiformes*, 7 *Anseriformes*, 16 *Charadriiformes* et 2 *Passeriformes*. La plupart des oiseaux semblent associés à une forme quelconque d'eaux de surface. Des 8 prédateurs, 6 sont largement chasseurs de rongeurs. Entre la mi-juin et le début de juillet, ces espèces ont beaucoup diminué en abondance, en même temps que le lemming brun.

РЕЗЮМЕ. Птицы в районе мыса Нувагапак северо-восточной Аляски. В период с 12 июня по 4 июля 1970 г. на береговой равнине вблизи мыса Нувагапак северо-восточной Аляски наблюдались 52 вида птиц. Были изучены места преимущественного обитания птиц различных видов. Гнездование было установлено или казалось вероятным для 25 видов, а в случае 5 видов было замечено высидывание птенцов. Среди наблюдавшихся птиц были 2 вида *Gaviiformes*, 7 *Anseriformes*, 16 *Charadriiformes* и 2 *Passeriformes*. Места обитания большинства птиц были связаны с тем или иным типом поверхностных вод. Среди 8 хищников 6 были большей частью охотниками за грызунами. В период с середины июня по начало июля количество птиц этих видов значительно уменьшилось одновременно с уменьшением численности лемминга бурого.

INTRODUCTION

The avifauna of northern Alaska has been the subject of several recent studies (e.g. Kessel and Cade 1958; Maher 1959; Kessel and Schaller 1960; Williamson *et al.* 1966; Childs 1969), but there are few reports from the area between the Colville and Mackenzie River mouths. The bird fauna is still little known in parts of this area where much interest now is focused on potential oil deposits with the possibility of future exploitation and faunal changes.

The following observations were made between 12 June and 4 July 1970 near Nuvagak Point, 69°53'N., 142°20'W., in the Arctic National Wildlife Range, Alaska (Fig. 1).

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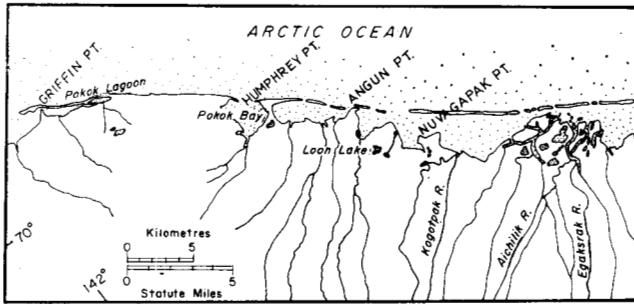


FIG. 1. Nuvagak Point and the surrounding area, northeastern Alaska.

STUDY AREA

The arctic coastal plain at Nuvagak Point is about 20 km. wide, restricted to the south by the foothills of the 3,000-m. high Romanzoff Mountains. Elevated glacial deposits are lacking, and the plain is extremely flat (Fig. 2). The largest elevation near the coast is the point, reaching 6 m. above sea level. The terrain is poorly drained and marshy over great areas, and tundra polygons are common, but lakes are few.

Most of the area visited is within the "Demarcation Point" of the Geological Survey maps, quadrangles D-2 and D-3 (scale 1:63360). In this paper the Nuvagak Point peninsula is usually referred to as "the Point".

CLIMATE

On 12 June, about 30 per cent of the ground was covered by snow, most of which melted during the following week. Day temperatures were between 4°C. and 10°C., whereas at night -1°C. to -3°C. was the average range. There were 3 days of fog, and short rain showers on two occasions. Cloud cover at the Point was usually 10 to 50 per cent. During the day winds of 3 to 8 m./sec. were usual, whereas the nights were calm. The weather seemed unusually favourable, since fog, snow, and strong winds otherwise are common (Brooks 1915, and R. Haynee, personal communication). The temperature of many tundra ponds (10 to 50 cm. deep) was about 10°C. on 17 June.

The dates of abundant flowering of the following common plants were: *Saxifraga oppositifolia* 12 June, *Geum glaciale* 14 June, *Ranunculus nivalis* 15 June, *Caltha palustris* 19 June, *Pedicularis kanei* 22 June, *Parrya nudicaulis* 28 June, *Primula borealis* 28 June, *Androsace chamaejasme* 28 June, *Silene acaulis* 28 June, *Polemonium boreale* 2 July.

HABITATS

The following classification largely follows that of Kessel and Cade (1958) from the Colville River area. With some additions it applies to Nuvagak Point, where the following habitats are represented.

SEDGE-GRASS MARSH covers most of the area. It is wet, with many ponds, and several cm. of standing water after snow melt-off in June. *Carex* sp. dominate the vegetation. (Fig. 2).

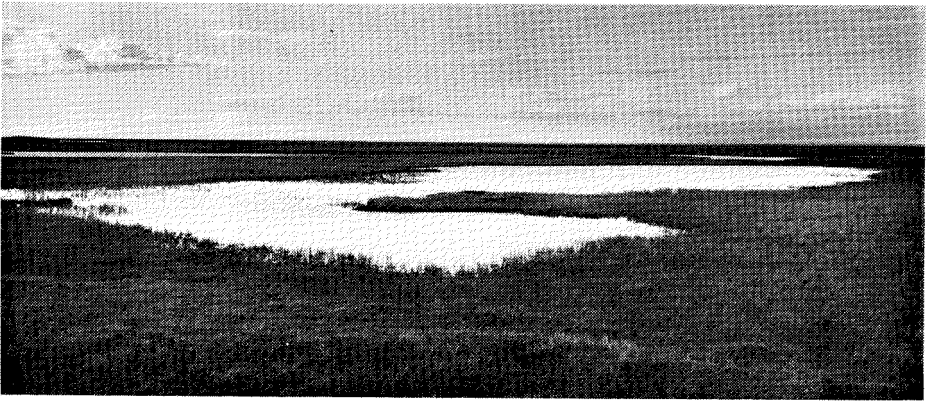


FIG. 2. Sedge-grass marsh, with the border of a tundra polygon in the foreground. The pond is frequented by Red-throated Loon (*Gavia stellata*), Oldsquaw (*Clangula hyemalis*) and Red Phalarope (*Phalaropus fulicarius*).

TUSsock-HEATH TUNDRA also is widely distributed, especially at the elevated point, which is better drained than the surroundings. The 10- to 20-cm. high tussocks largely consist of *Eriophorum* sp. Pingos (30- to 50-cm. high peat mounds) are common in this and the previous habitat.

ALLUVIAL DEPOSIT AREAS occur in the Aichilik and Egaksrak River deltas, and north of Pokok Lagoon. Both areas are dry and sandy. In the delta, about 0.1 km.² are dunes.

LACUSTRINE WATERS and TUNDRA-LACUSTRINE WATER EDGES are mainly found in sedge-grass marsh, where ponds are common. These are only 0.5 to 1 m. deep, and probably freeze to the bottom in winter. Underwater vegetation is sparse, and the bottom consists of peat and detritus. There are only 5 or 6 lakes with a depth of several metres. Islands occur only in "Loon Lake" (Fig. 1).

FLUVATILE WATERS are common. During snow melt-off many streams are 5 to 10 m. wide, but their water flow soon decreases, and in early July the river beds largely consist of coarse gravel.

Habitat types, described by Kessel and Cade (1958), which do not occur near the Point, are dwarf shrub and tall brush. The few existing *Salix* shrubs are scattered and prostrate, in general not higher than the herbaceous vegetation. Dry tundra is also lacking, and the few riparian cut banks are less than 2 m. high and unimportant as a bird habitat.

There are some coastal habitats not included by Kessel and Cade. At the sea shore there is usually a 1 to 2 m. high cut peak bank above the shore gravel. Spits and bars occur at the mouths of the rivers. A 50- to 100-m. wide sand and silt reef, devoid of vegetation, encloses the 2- to 3-m. deep lagoon.

In June, open water was restricted to the river mouths. Still in early July the ocean outside the reef was ice-covered with the exception of some leads.

MAMMALS

Rodents are those typical of the coast tundra, namely collared lemming (*Dicrostonyx torquatus*) and brown lemming (*Lemmus trimucronatus*) (cf. Bee and Hall 1956). Tundra vole (*Microtus oeconomus*) has been found on Barter Island, 55 km. to the northwest (Barkalow 1952).

Four brown lemmings were seen 12 to 20 June, when snow still covered parts of the tundra, and carcasses were common among pellets on pingos used by predators. No lemming was seen after 20 June. The population thus was markedly lower than in 1969, when J. C. Bartonek (U.S. Fish and Wildlife Service, Fairbanks) saw several brown lemmings during a visit to the Point on 3 August (personal communication).

A collared lemming was seen in the Aichilik River delta. There was also a colony of arctic ground squirrels (*Citellus undulatus*). Another colony was found near Angun Point.

Arctic foxes (*Alopex lagopus*) were common, several being seen most days. Figures obtained during bird census work gave a rough estimate of 0.2 individuals per km.² (standard error (S.E.) = 0.1). The foxes were usually running in slow gallop across the tundra, investigating the ground during short pauses. All foxes seemed to be stragglers, and no den was found.

Several grizzly bears (*Ursus horribilis*) were seen from a helicopter on the tundra near Nuvagapak Point by a geologist team (R. Haynee, personal communication). Caribou (*Rangifer arcticus*), many with calves, came up to the coast during mid June. A large herd (seen from a helicopter) moving northwestward about 20 km. to the southwest of Nuvagapak Point on 3 July, was estimated by R. Haynee to comprise about 15,000 animals.

BIRDS

Unless otherwise stated, the following description applies to the area between Angun Point and the Aichilik River mouth, from the coast to about 4 km. inland. Most observations were made in a 10 km.² area around Nuvagapak Point. The area between Griffin Point, 25 km. to the northwest, and Egaksrak River, 10 km. southeast of Nuvagapak Point, was visited briefly.

Density figures are rough estimates, since no systematic census was taken except for rodent predators. Five transect counts were made in the 10 km.² area around the Point. In the flat terrain, most jaegers, owls, and other large and conspicuous birds were probably recorded.

Arctic loon (*Gavia arctica*).

Several pairs were breeding near the Point. On 28 June a nest, built of detritus and containing 2 eggs, was found on the shore of the lake west of the Aichilik mouth.

Loon Lake, although smaller than 1 km.², held a remarkably dense loon population. On 23 June, there were at least 4 pairs of arctic, and 1 pair of red-throated loons in its central parts, and a further 2 pairs of the latter species in nearby ponds. The number of loons was similar on two other visits, 17 June and 2 July. Territorial calls of both species were often uttered, and there were many agonistic encounters between different pairs. The loons and other species, e.g. glaucous gulls, were probably attracted to this lake by the protected nest places on the islands, which occurred in no other lake.

Feeding arctic loons often visited the lakes 2 to 3 km. southwest of the point, where sticklebacks were common. The river mouths of the lagoon were also frequented, and loons (species not determined) often flew out to the ocean, probably visiting leads in the sea ice.

Red-throated loon (*Gavia stellata*).

Being even more common than the arctic loon, its density was close to 1 pair per km.² in parts of the tundra. An empty nest, and another with two eggs, were found west of the Aichilik river mouth on 28 June. Both were built of detritus in wet sedge vegetation at 30- to 40-m.-wide ponds (Fig. 2).

The 2 loons differed markedly in their habitat preference, the arctic using larger breeding waters than the red-throated loon.

Whistling swan (*Olor columbianus*).

Five to 7 pairs occurred between Angun Point and Aichilik River, usually near river mouths. A nest with 5 eggs was found on an island in the delta on 27 June. Another pair, at the south side of Nuvagapak Point, was probably disturbed by aircraft traffic, and left the area towards the end of June.

Canada goose (*Branta canadensis*).

Two birds were seen in the delta on 27 June.

Black brant (*Branta nigricans*).

The most common goose. At the Point, 3 birds passed north on 14 June, 13 north on 15 June, and 2 south on 17 June. On 23 June, 35 birds rested on mud flats south of Angun Point. 20 birds were on mud flats at the Aichilik mouth on 28 June. 4 birds flew northwest at Pokøk Bay 2 July. There were no signs of breeding in the area.

White-fronted goose (*Anser albifrons*).

One passed northwest at the Point on 14 June, and 5 flew north across the Aichilik mouth on 15 June.

Lesser snow goose (*Chen hyperborea*).

Near the Point, snow geese were seen on the following occasions: 20 flying southeast on 13 June, 45 northwest on 14 June, 14 northwest on 20 June, and 23 northwest on 21 June. Two birds were foraging in the marsh 4 km. south of the Point on 27 June.

Mallard (*Anas platyrhynchos*).

A male and 2 females were seen in marsh ponds near Angun Point on 17 June, and another male in a pond at the delta on 28 June. The same day, there was a male in a pond at Nuvagapak Point.

Mallards breed north of the tree limit in the nearby Mackenzie delta (Porsild 1943). Possibly, breeding occurs in the Nuvagapak Point area, too.

Pintail (*Anas acuta*).

Together with the oldsquaw this was the most common duck. Although no nest was found, the birds were apparently breeding. In some marsh areas there were several pairs per km.²

During mid June, flocks of 4 to 20 birds, mostly males, were often seen. There were only 5 females among 46 birds foraging in the marsh south of the Point on 15 June.

Green-winged teal (*Anas carolinensis*).

A pair occurred in ponds at the Point during June. A male was seen in the marsh south of the Point on 15 June.

Brooks (1915) found this species at Demarcation Point, and it breeds in the Mackenzie delta (Porsild 1943). The breeding range possibly reaches into this part of Alaska.

Oldsquaw (*Clangula hyemalis*).

Many tundra ponds held a pair of oldsquaw, the most abundant waterfowl with a density of several pairs per km.² in suitable areas (cf. Fig. 2).

In Scandinavia O. Pehrsson (paper in preparation) found that oldsquaws often nest near shallow ponds, which dry up or freeze to the bottom in winter. These waters, which hold no fish, are rich in euphyllopods (*Polyartemia forcipata*), an important food, particularly for the young during the first weeks after hatching. In waters containing fish, predation probably eliminates the slowly swimming euphyllopods, and oldsquaws rarely use these waters for feeding; the distribution of fish thus indirectly influences their choice of feeding waters.

For comparison, 12 ponds near the Point were sampled with hand net (mesh 1 mm.). Euphyllopods (*Polyartemiella hazeni*) were abundant in 3 of them, and rare or absent in the rest. The former 3 ponds had no outflow, and no fish were seen, whereas sticklebacks were common in several of the other ponds. Oldsquaws were foraging in the 3 waters with euphyllopods, and in 2 of the other 9 ponds. In this sample of observations, oldsquaws

thus showed a significant preference for feeding waters where euphyllpods were common (one-tailed Fishers' exact test, $p < 0.05$), a situation similar to that in Scandinavia. Oldsquaws showed territorial behaviour in the ponds, calling and attacking conspecific birds which tried to alight.

Many oldsquaws were feeding in river mouths in the lagoon during the morning. Their numbers increased towards the end of June. On 27 June, there were 120 birds in the lagoon south of the Point, and 73 north of it on 1 July. Males were more common than females/juveniles.

Common eider (*Somateria mollissima*).

Flocks were seen passing along the coast on 3 occasions; 2 males at the delta 16 June, and 2 at the reef outside the Point on 19 June, all flying northwest, and 4 males together with 11 females/juveniles flying southeast on the latter occasion.

King eider (*Somateria spectabilis*).

King eiders were common, usually occurring in pairs in small tundra ponds also frequented by Oldsquaws. Twenty birds of both sexes lay in the lagoon on 28 June.

Spectacled eider (*Lampronetta fischeri*).

A pair rested on a pond in the delta on 16 June.

White-winged scoter (*Melanitta deglandi*).

Six birds flew northwest near Angun Point on 17 June.

Surf scoter (*Melanitta perspicillata*).

During the last week of June, a large flock of surf scoter males were foraging in the lagoon, 2 to 4 km. northwest of the Aichilik mouth. On 28 June, there were 1,200 ducks on these waters, at least 980 being surf scoter males. No females were seen. The nearest known breeding ground is the Mackenzie delta (Porsild 1943). Fifty scaups (*Aythya* sp.) lay among the scoters.

The last days in June, flocks of 50 to 100 scoters passed over the Point during morning and evening, heading northwest. All identified birds were surf scoter males. The last flock, 110 individuals, passed on 2 July, at which date most of them had left Nuvagapak Lagoon.

Red-breasted merganser (*Mergus serrator*).

Three pairs were seen in streams near the lagoon. On 2 July, I counted 10 birds at different streams between Griffin Point and Nuvagapak Point.

Rough-legged hawk (*Buteo lagopus*).

A few individuals hunted the coast tundra. Between Griffin Point and Nuvagapak Point there were 4 birds on 2 July. The nearest suitable breeding cliffs are about 20 km. inland.

Marsh hawk (*Circus cyaneus*).

Seven observations were made, all of immature or female marsh hawks. On 2 July, 2 birds were seen between Griffin and Nuvagapak Point.

Gyr Falcon (*Falco rusticolus*).

A gyrfalcon flew northwest along the coast at Pokok Lagoon on 2 July.

Willow ptarmigan (*Lagopus lagopus*).

Dixon (1943) found willow ptarmigan breeding near Humphrey Point. It probably breeds near Nuvagapak Point too, where 3 pairs occupied territories.

In mid June, the females had almost finished moult to summer plumage, whereas the males retained much of the winter plumage until the end of the month.

Rock ptarmigan (*Lagopus mutus*).

According to Brooks (1915) rock ptarmigans are found near the coast only during spring and after the breeding season, which is spent in the foothills of Brooks Range. However, rock ptarmigans occurred in the area during my whole visit, the distance between pairs being 1 to 3 km. They were usually found along streams bordered by well-drained ground where the vegetation differed from the surrounding marshes and included *Salix* shrubs. Ptarmigan cocks of both species, still largely in winter plumage, displayed at pingos and in flight during morning and evening in early and mid June.

Sandhill crane (*Grus canadensis*).

During several visits, a pair was seen foraging at marshes in the delta. A third bird was found in the same area on 27 June. Three cranes were seen in the marsh northwest of Pokok Bay on 2 July.

Semipalmated plover (Charadrius semipalmatus).

A single bird passed along the river south of the Point on 15 June.

American golden plover (Pluvialis dominica).

Two pairs occupied territories on dry ridges along the river south of Angun Point, and a third pair 2 km. southwest of Nuvagapak Point. The birds often displayed, and were probably breeding. Brooks (1915) recorded breeding near Demarcation Point.

Black-bellied plover (Squatarola squatarola).

Seen only once. A calling bird passed along the river south of the Point on 14 June. Together with the few observations of Brooks and Dixon, this indicates that the black-bellied plover, if breeding at all, is rare between Griffin Point and Demarcation Point.

Dotterel (Eudromias morinellus).

A dotterel flew northwest 100 m. overhead across the Point on the evening 19 June. The weather was clear and calm, and the bird could be followed during about half a minute. The characteristic call (with which I am familiar from Scandinavia) was uttered repeatedly.

Ruddy turnstone (Arenaria interpres).

Found along several of the larger streams, e.g. Kogotpak River, and the stream southwest of Angun Point. 6 to 8 pairs were distributed along this water from the mouth to 3 km. up the stream. Coarse gravel areas were characteristic of the habitat.

Whimbrel (Numenius phaeopus).

Seen several times 3 to 4 km. southwest of the Point. Display was heard 20 June and 29 June. A flock of 5 birds was seen here on 20 June, and another of 8 north of Pokok Bay on 2 July.

Pectoral sandpiper (Erolia melanotos).

This and the semipalmated sandpiper were the most common shorebirds. Sedge-grass marsh was its main habitat, in which the display grounds were located. In some areas there were probably over 20 pairs per km.², and the distance between males sometimes was less than 50 m.

In mid June, display (see Pitelka 1959) occurred during most of the day. In early July, display activities ceased, and the birds gathered in flocks. On 2 July, 3 flocks of 10, 15 and 15 birds were seen between Griffin Point and Nuvagapak Point.

Baird's Sandpiper (Erolia bairdii).

A single bird and a flock of 5 were observed on 2 July in a dry area near the shore 2 km. southeast of Pokok Lagoon. The single bird warned repeatedly at me, and was possibly breeding. Brooks (1915) and Dixon (1943) found Baird's Sandpiper breeding at Demarcation Point and Humphrey Point.

Dunlin (Erolia alpina).

A dunlin was seen on 18 and 21 June in the marsh 3 km. southwest of the Point. On the last date, the bird was displaying. Dixon found it breeding at Humphrey Point.

Long-billed dowitcher (Limnodromus scolopaceus).

Seen 4 times, always in sedge-grass marsh: 2 birds 3 km. southwest of the Point on 20 June, 1 at the shore of Loon Lake 23 June, 2 near Pokok Lagoon on 2 July, and a flock of 4 near Angun Point on 2 July.

Stilt sandpiper (Micropalama himantopus).

Seen on 23 June and 2 July in sedge-grass marsh between Angun Point and the stream in the southwest. On the last date two birds warned, flying around and above me a few metres overhead, while a third individual performed a vocalized flight display nearby. Brooks (1915) found stilt sandpipers near Demarcation Point under conditions suggesting breeding, and Gabrielson and Lincoln (1959) mention a report indicating breeding at Barter Island. These records suggest that the breeding range may extend from the Mackenzie district (Höhn 1959) about 100 km. beyond the Alaska border.

Semipalmated sandpiper (Ereunetes pusillus).

A common breeder in sedge-grass marsh, also occurring in tussock-heath tundra. The density was on the order of 20 pairs per km.² in the former habitat. Until about 25 June, display occurred all day, although most often during early morning. The birds displayed solitarily, hovering 5 to 15 m. high while vocalizing, sometimes continuing a minute without interruption.

A nest found on 19 June contained 4 eggs, and another found on 20 June held 1. Both were in tussocks in sedge-grass marsh.

Red phalarope (*Phalaropus fulicarius*).

Red phalaropes occurred in freshwater ponds in sedge-grass marsh, where most ponds held a pair (Fig. 2). The density in areas with many ponds probably was over 10 pairs per km.²

When feeding, the birds often swam or walked in sedge vegetation in shallow water. Contrary to northern phalaropes, they picked deep down for food, dipping the head below the surface. Northern phalaropes, which frequented less vegetated ponds, usually picked food from the surface.

A nest with 4 eggs was found in sedge-grass marsh on 25 June.

Northern phalarope (*Phalaropus lobatus*).

Near the Point a few pairs occurred in ponds along the landing strip. In sparsely vegetated ponds in the delta, where about a dozen pairs were seen, northern phalaropes were more common than red phalaropes.

Pomarine jaeger (*Stercorarius pomarinus*).

Pomarine jaegers were most common near the Point in mid June, with an estimated density of 2.4 birds per km.² (standard error = 0.6). Brown lemmings, the main food, were hunted in sedge-grass marsh and tussock-heath. When lemmings became scarce towards the end of June, hunting success decreased markedly in spite of increased hunting efforts. During 35 hours on 20 to 22 June, a male of a breeding pair caught 6 lemmings, but none in 24 hours on 24 to 26 June. During the latter time he spent over one hour tearing lemming burrows, a method used only shortly on two occasions during the previous period. Towards the end of June, most pomarine jaegers left without breeding. On 2 July only 3 birds were seen between Griffin Point and Nuvagapak Point.

One pair was breeding in sedge-grass marsh 3 km. southwest of the Point. The nest with 2 eggs was found on 16 June. The eggs disappeared on 29 June, probably being taken by an arctic fox. The birds left the place a day later.

A behaviour study of the pomarine jaeger is published elsewhere (Andersson 1973).

Parasitic jaeger (*Stercorarius parasiticus*).

The density was estimated at 0.9 individuals per km.² (S.E. = 0.2) near the Point. Parasitic jaegers were also seen in the delta and along the reef, where no other jaegers occurred. The numbers decreased very little during June, and parasitic jaegers seemed less dependent on lemmings than the two other jaegers. However, only one pair was breeding near the Point. The nest with 2 eggs was found on 26 June on the elevated border of a tundra polygon. This pair was seen hunting Lapland longspurs. No catch was observed. Twenty light morph birds were seen among a total of 57 individuals recorded.

Long-tailed jaeger (*Stercorarius longicaudus*).

Long-tailed jaegers hunted lemmings near the Point during mid June. Groups of 2 to 4 birds engaged in aerial displays. Many pairs were seen, but there were no signs of breeding. The density was estimated at 0.8 birds per km.² (S.E. = 0.3). Towards the end of June, long-tailed jaegers became scarce, and those remaining gathered in flocks. Between Griffin Point and Pokok Bay on 2 July, 5 and 8 birds were seen. The same day, T. Schmidt and J. Fisher (personal communication) recorded a flock of about 50 birds circling near Kongakut River, 20 km. southeast of Nuvagapak Point.

Glaucous gull (*Larus hyperboreus*).

Six pairs were breeding on inaccessible islands in Loon Lake. On the reef outside the Point, a nest with 1 egg was found on 19 June.

Glaucous gulls often patrolled the tundra, but their main feeding habitat was the sea coast, especially the river mouths in the lagoon.

Herring gull (*Larus argentatus*).

An adult was seen at the Point on 12 June.

Sabine's gull (*Xema sabini*).

Nine individuals, all adult, were observed. Most birds were flying along the coast. One was feeding in mud flats at the Aichilik mouth.

Brooks and Dixon found several Sabine's gulls in this area. Breeding occurs in the Mackenzie district (Anderson 1913; Porsild 1943).

Arctic tern (*Sterna paradisaea*).

Two birds incubated 27 June on islands in the Aichilik delta, and breeding probably occurred on the reef too. Arctic terns were usually feeding in tundra ponds.

Two flocks were recorded: 23 birds flying south across Aichilik River on 16 June, and 15 flying southeast in the delta on 27 June.

Snowy owl (*Nyctea scandiaca*).

In mid June, up to 5 snowy owls were recorded within 2 km. of the Point, usually perching on pingos. During this period, the density was estimated at 0.3 individuals per km.² (S.E. = 0.1). Towards the end of June, most snowy owls left the area, and on 2 July only 4 birds were seen between Griffin Point and Nuvagapak Point. There were no signs of breeding.

On 3 August 1969, J. Bartonek (personal communication) found two pairs of snowy owls near Nuvagapak Point.

Short-eared owl (*Asio flammeus*).

A common predator, with an estimated density of 1.9 individuals per km.² (S.E. = 0.6) in mid June. Numbers decreased towards the end of the month, but there were still about one individual per km.² in early July. No breeding was recorded.

Bartonek observed no short-eared owl in 1969, in spite of the abundance of lemmings in that year.

Horned lark (*Eremophila alpestris*).

Seen once on the shore near Pokok Lagoon on 2 July.

Raven (*Corvus corax*).

A raven often visited the camp. Two birds were seen 21 June on the tundra 4 km. southwest of the Point.

Redpoll (*Acanthis sp.*).

Redpolls (species not determined) on several occasions passed over the Point.

Lapland longspur (*Calcarius lapponicus*).

A very common breeder, especially on tussock heath. The density in some areas probably was in the order of 20 to 30 pairs per km.²

Snow bunting (*Plectrophenax nivalis*).

Mainly distributed along the shore, especially near ruins of Eskimo camps and in driftwood areas. A nest with 6 young, about one week old, was found on 1 July on a log in a cabin at Griffin Point. Another pair was seen carrying food near a driftwood pile in the delta on 28 June.

DISCUSSION

Fifty-two bird species were recorded near Nuvagapak Point. Their status and habitat distribution is summarized in Table 1.

Nests of 10 species were found. Evidence of a further 15 indicated breeding, and another 5 species were possibly breeding.

Most birds on the arctic coastal plain are associated with some form of surface water (Kessel and Cade 1958). Near Nuvagapak Point, about 23 of the 30 potential breeders belong to this category. Rodent predators is another important group, 6 of the 8 raptors, jaegers and owls present being largely rodent hunters. Kessel and Cade discuss the reduction in number of passerine species on coastal plain in comparison to foothill and alpine tundras. They list 26 breeding passerines from the latter area, and 19 from the foothills. Childs (1969) recorded 17 passerines in the Pitmegea River region, and Maher (1959) 9 in the foothills near Kaolak River. Only 2 passerines were found breeding on the coastal plain near Nuvagapak Point.

When comparing the Colville and Kaolak River areas, Maher concluded that the distribution of many passerines depends on height and areal extent of willow shrub. In the Colville area, 13 passerines were breeding in tall brush (average height about 3 m.), whereas there were only 5 species in the 1.5 m. high riparian

Table 1. Habitat preferences of birds near Nuvagapak Point.

Species	Habitats										Note
	1	2	3	4	5	6	7	8	9	10	
<i>Gavia arctica</i>				N	F				F		
<i>Gavia stellata</i>				N	F	F					
<i>Olor columbianus</i>			N	F							
<i>Branta canadensis</i>				F							
<i>Branta nigricans</i>				F	F						
<i>Anser albifrons</i>											†
<i>Chen hyperborea</i>				F							
<i>Anas platyrhynchos</i>	N?			F	F						
<i>Anas acuta</i>	(N)			F							
<i>Anas carolinensis</i>	N?			F	F						
<i>Aythya sp.</i>									F		
<i>Clangula hyemalis</i>	(N)				F				F		
<i>Somateria mollissima</i>											†
<i>Somateria spectabilis</i>	(N)				F				F		
<i>Lamproreitta fischeri</i>					F						
<i>Polysticta stelleri</i>											††
<i>Melanitta deglandi</i>											†
<i>Melanitta perspicillata</i>									F		
<i>Mergus serrator</i>					(N)	F					
<i>Buteo lagopus</i>	F	F									
<i>Circus cyaneus</i>	F	F									
<i>Falco rusticolus</i>											†
<i>Lagopus lagopus</i>	(N) F										
<i>Lagopus mutus</i>	F	(N) F									
<i>Grus canadensis</i>	N?F			F							
<i>Charadrius semi-palmatus</i>											†
<i>Pluvialis dominica</i>		(N) F									
<i>Squatarola squatarola</i>											†
<i>Eudromias morinellus</i>											†
<i>Arenaria interpres</i>						(N) F					
<i>Numenius phaeopus</i>	N?F										
<i>Erolia melanotos</i>	(N) F										
<i>Erolia bairdii</i>		(N) F									
<i>Erolia alpina</i>	(N) F										
<i>Limnodromus scolopaceus</i>	N?F										
<i>Micropalama himanthopus</i>	(N) F										
<i>Ereunetes pusillus</i>	N F	N F									
<i>Phalaropus fulicarius</i>	N			F	F						
<i>Phalaropus lobatus</i>				(N) F	F						
<i>Stercorarius pomarinus</i>	N F	F									
<i>Stercorarius parasiticus</i>	N F						F	F	F	F	
<i>Stercorarius longicaudus</i>	F	F									
<i>Larus hyperboreus</i>	F	F		N F			F	N F	F	F	
<i>Larus argentatus</i>											†
<i>Xema sabini</i>								F	F		
<i>Sterna paradisaea</i>					F				N	F	
<i>Nyctea scandiaca</i>	F	F									
<i>Asio flammeus</i>	F	F									
<i>Eremophila alpestris</i>											†
<i>Corvus corax</i>	F	F					F				
<i>Acanthis sp.</i>											† †
<i>Calcarius lapponicus</i>	(N) F	(N) F									
<i>Plectrophenax nivalis</i>							N F				

1. sedge-grass marsh; 2. tussock-heath tundra; 3. alluvial deposits; 4. tundra-lacustrine water edge; 5. lacustrine waters; 6. fluvial waters; 7. sea shore; 8. spits and bars; 9. lagoon; 10. ocean; N: nest found; (N): probably breeding; N?: possibly breeding; F: foraging; †: only transient birds observed; ††: found breeding at Humphrey Point by Dixon (1943).

shrub at Kaolak River. This trend reaches an extreme on the coastal plain near Nuvagapak Point, where the 10- to 30-cm.-high prostrate shrub is of little importance to birds, possibly with the exception of redpoll and ptarmigan.

On the other hand, the sedge-grass marsh, inhabited by about 10 species of shorebirds, is less rich in the foothill area, where Maher recorded 6 species. Waterfowl also are more abundant at Nuvagapak Point, with 16 observed and 8 probably breeding species, as compared to 5 and 3 respectively at Kaolak River. The difference is obviously due to the abundant fresh-water ponds and marshes near Nuvagapak Point, and to the presence of the lagoon, where several duck species feed. The sea shore, however, seems of little importance as a bird habitat. Also sandspits and bars are barren, since ice action prevents the growth of vegetation, and no seaweed is washed ashore. The most important feeding stations along the coast are river mouths in the lagoon, which become free from ice in early summer, forming an important waterfowl foraging area.

Until mid June, when brown lemmings were still seen on the tundra, predators were abundant. The following decrease in the lemming population was paralleled by a diminishing number of predators. Towards the end of June, most pomarine jaegers and snowy owls had left the area, and other predators were less common.

After snow melt-off, lemmings were exposed to predators on the frozen ground with only short remains of vegetation from the previous year (cf. Pitelka *et al.* 1955; Maher 1970). Census estimates suggest that there were about 7 avian rodent predators per km.², plus an arctic fox per 5 to 10 km.² (mustelids were not studied). The predator density thus seemed relatively large in relation to the moderate rodent population in June. The number of rodent prey required to maintain a predator population of this size probably is on the order of 15 to 30 lemmings per day/km.² It therefore seems likely that predation played an important role in the decrease of lemmings observed during June.

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