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ECOLOGY OF THE LONG-TAILED SKUA
(*STERCORARIUS LONGICAUDUS* VIEILLOT, 1819)
AT SCORESBY SUNN, EAST GREENLAND.
PART TWO: ARRIVAL, SITE TENACITY AND DEPARTURE

J. DE KORTE

*Institute of Taxonomic Zoology (Zoologisch Museum), University of Amsterdam, P.O. Box 20125, 100 HC
Amsterdam, The Netherlands*

ABSTRACT

Arrival, site tenacity and departure in populations of Long-tailed Skuas were investigated, at Kap Stewart, in 1973 and 1974, and at Kaerelv, Gåseelv and Ugleelv in 1975. The first birds of this species arrived singly or in small groups on 21 May along the ice edge, and 27 May inland. In areas with snow-free patches they established territories within a few days after arrival. Site tenacity through years was recorded in many cases. Territorial birds, regardless of breeding success frequented their territories with or without their partner until mid-August. Immatures were first seen at sea on 13 June, and on land 21 June; they joined groups of roaming non-territorial adults, non-breeding birds and failed breeders. Immatures had departed from the tundra by the end of July and were not seen at sea after mid-August.

INTRODUCTION

During 1973, 1974, and 1975, I studied the Long-tailed Skua in the Scoresby Sund area. In part one of this series of papers (de Korte 1977), I gave a description of the study area and the weather and local ice conditions, as well as data on distribution and densities for 1973 and 1974 at Kap Stewart and 1975 at Kaerelv, Gåseelv and Ugleelv.

In 1979, J. M. Hansen and N. O. Jensen carried out a wader study at Kaerelv from 18 May to 3 August (Hansen 1981). Following my suggestion, they conducted their study in the Kaerelv area, and agreed, in addition to their

own work, to collect data in line with my original study of 1975. After having finished their fieldwork they kindly forwarded these data to me for inclusion in this paper (Hansen in litt. 1981, 1982). In 1979, snow-cover was similar to 1975 for corresponding dates. This indicates similar spring and weather conditions in both years. In 1979, a census area of 26 km² was chosen, which overlapped about three quarters of the 1975 census area and which as a whole was shifted somewhat to the south (fig. 1). The 1979 census area reached from the stream just north of the localities of the 1975 nests no. 6 and no. 7 down to the river Damelv. In 1979, ten territorial pairs were found, eight of which were

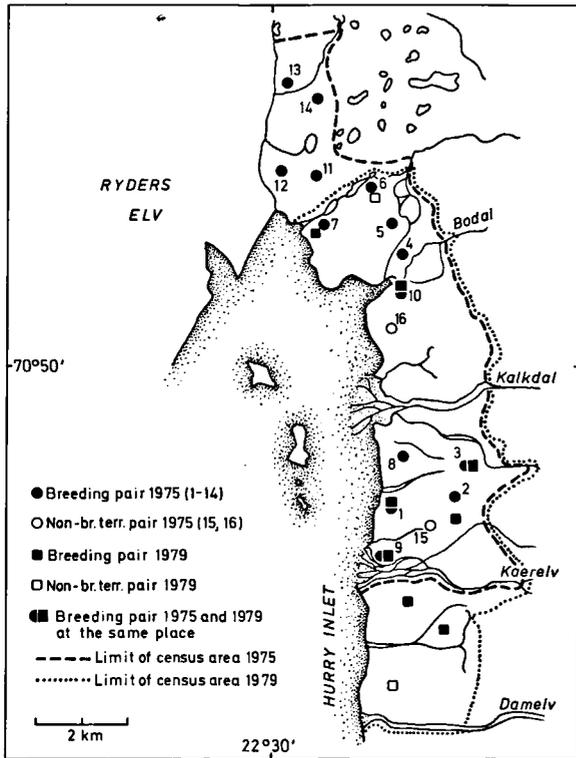


Fig. 1. Kaerelv study area with distribution of Long-tailed Skua population in 1975 (after de Korte 1977) and 1979 (after Hansen 1982).

breeding which equals a total density of 0.38 pairs per km² and a breeding density of 0.31 pairs per km². In 1975, in the same area, 12 pairs defended territories, ten bred with a total density of 0.46 pairs per km² and a breeding density of 0.38 pairs per km². In 1975 no pairs established territories between Kaerelv and Damelv Rivers, but in 1979 three pairs did; two of these were breeding.

RESULTS

Site tenacity through years

Long-tailed Skuas occupy large territories (de Korte 1977) which can be defined as all purpose territories, within which courtship, mating, nesting and food-seeking usually occur (Hinde 1956). The hunting areas of adjacent pairs may overlap to some extent (Andersson 1971). Of four pairs ringed in 1973 at Kap Stewart, one

pair returned in 1974 to its former territory and one female had with an other male a territory of which the core was two km away from her former territory core (de Korte 1977). In 1975 ten pairs were ringed with aluminum and colour rings at Kaerelv (nos. 1-10 in fig. 1). The male of pair no. 5 was shot on or before 15 June 1977 near Scoresbysund by a Greenlander, presumably along the ice edge (K. Kampp in litt. 1983). In 1979, the male of pair no. 1 and both partners of pair no. 10 returned to and bred in their 1975 territories. One of these birds still carried both metal and colour rings, one had lost the colour ring and one had lost the metal ring. Probably in four years some birds had lost both their aluminum and colour rings. Andersson (1981) concluded that aluminum rings on Long-tailed Skuas wear rapidly and steel rings should be used instead. It is quite possible that in 1979 more birds returned to their former territories without being detected. In 1979 unringed pairs had nests close to the places where in 1975 pair no. 3, no. 7 and no. 9 bred (Hansen 1981, de Korte 1977).

Arrival and site tenacity through summer

In 1973, the ice edge was relatively far from land (de Korte 1977). On 23 May, we saw the first Long-tailed Skuas along the ice edge near Rathbone Ø (fig. 2) about 30 km north of the entrance of the Scoresby Sund Fjord; a group of five flying north and a single one flying south. On 14 June, we arrived at the study area near Kap Stewart in southeast Jameson Land, at which time at least two pairs had established territories (mean snow-cover 60%). By 24 June, all 12 territories of that year had become established (mean snow-cover 40%). At least 50% of territorial pairs had eggs but no young hatched as a result of nest desertion and predation (own observations). Until 23 July we regularly visited the territories of two pairs (no. 4 and no. 5 of fig. 9 in de Korte 1977) that had lost their eggs in the first week of July. Both partners of the pair were present in or in the vicinity of the territory in 50%, one partner was present in 13% and none were present in 37%

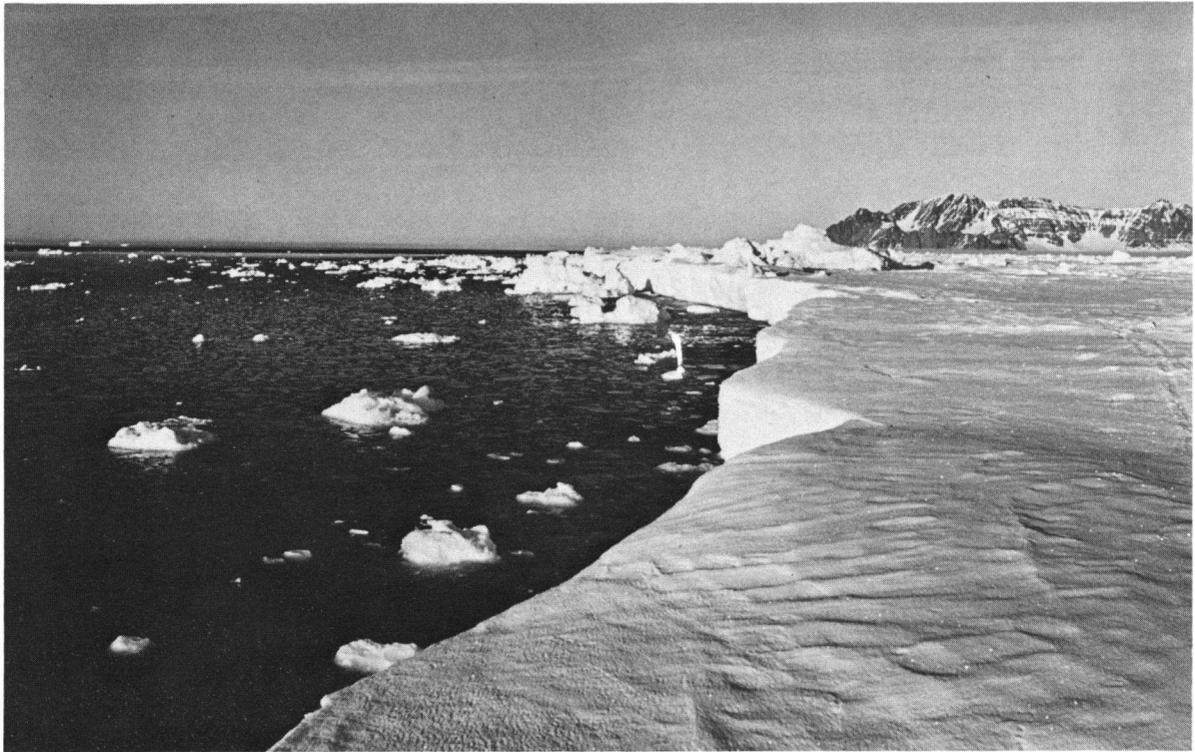


Fig. 2. Ice edge near Rathbone Ø (looking south) on 23 May 1973, when Long-tailed Skuas were seen for the first time at sea. Photo J. de Korte.

of the times (16) we visited them. After 30 July, not a single Long-tailed Skua was seen on the tundra at Kap Stewart (fig. 4). In Kjøveland about 150 km further inland to the northwest some pairs without young were still showing territorial behaviour (Gliding cum Long Call, cf. Andersson 1971) on 13 August, and on 17 August single birds were still in these territories and other solitary birds were seen flying inland.

In 1974, the ice edge ran very close along Kap Tobin at the north entrance of the Scoresby Sund Fjord and a tongue of open water extended into the fjord as far as Kap Stewart. Long-tailed Skuas were recorded on 21 May (two), 22 May (one), and 23 May (one) along the ice edge near Kap Tobin (K. Kunaq pers. comm. 1974, Meltofte 1976b). Along the ice edge near Kap Stewart we did not see them until 28 May, when during a 12 hours watch (1.00-13.00 hours) 77 flew inland at great heights. They flew singly and in groups of three

to five. On 28 May we saw also five on a snow-free patch on the tundra near the coast of southern Jameson Land (mean snow-cover more than 95%, fig. 3). They flew inland after being disturbed. On 29 May, 28 more birds were seen during a 12 hours watch (1.00-13.00 hours) flying at great heights in groups of five to seven, coming from the open sea and heading northwest into Jameson Land. A few groups of three were foraging at sea. On 30 May, at Modiolaelv (see de Korte 1977) one bird showed territorial behaviour (Slow Wing-beat) directed against two single birds flying southeast to the sea. In the first week of June, when the weather was clear, groups of three to six birds continued to fly west into the Scoresby Sund Fjord and Jameson Land. On days with inclement weather this inland migration was not observed and only some single birds were seen foraging at sea. Later in June and July, land and seaward movements were seen daily.

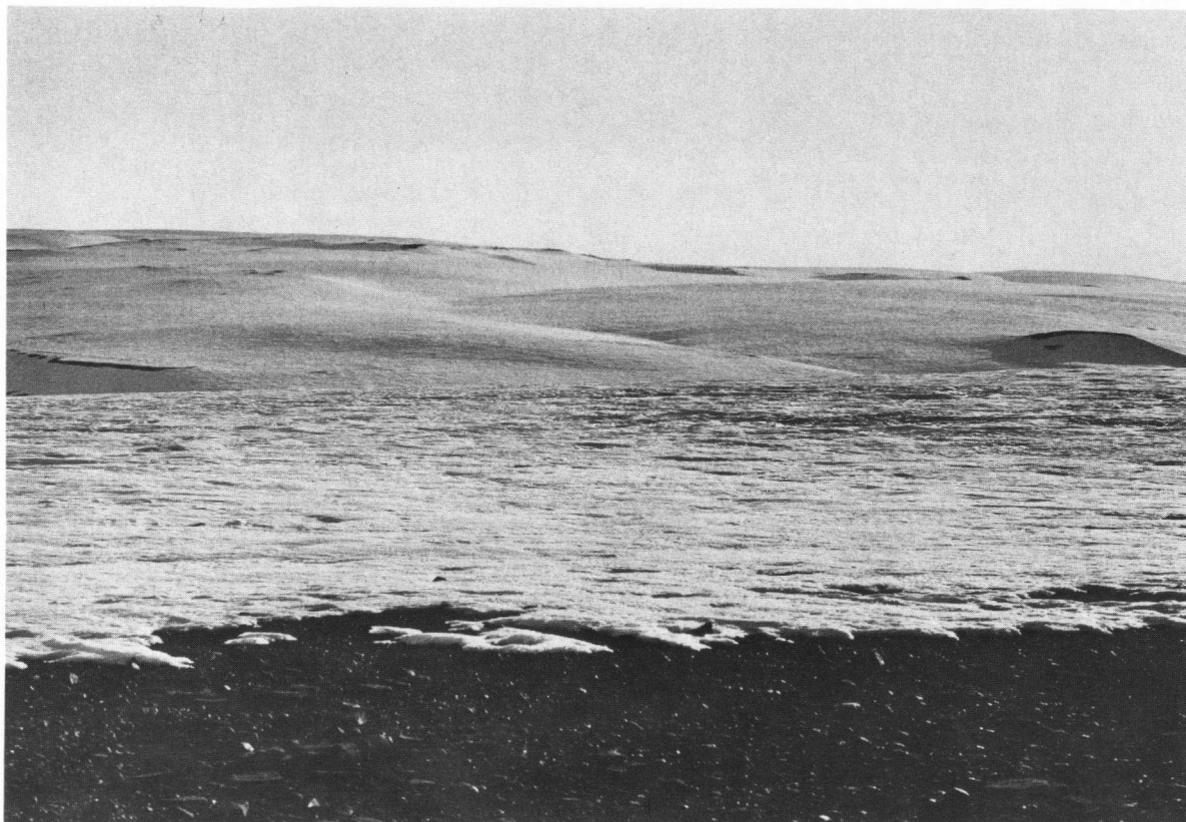


Fig. 3. Kap Stewart Study area (looking north) on 28 May 1974, when Long-tailed Skuas for the first time that year flew inland. Photo J. de Korte.

At sea the birds mostly forage in groups of four and five. On 17 June, in the valley of Modiolaelv eight pairs had established adjacent territories (mean snow-cover 40%). In the fourth week of June in the study area at Kap Stewart, there were six territories (mean snow-cover 60%), six less than in 1973; no more pairs established territories in 1974. The unoccupied territories all were in areas where snow-cover in the fourth week of June was more than 80%. In 1974 no eggs were produced. Until 23 July we regularly visited the territories of two pairs (no. 4a and no. 5 of fig. 9 in de Korte 1977) one of which (no. 5) had returned to its previous year's territory. Both partners of these two pairs were present in 62%, one in 13% and none in 25% of the times (18) we visited them. At Kaerelv in the last week of July at times three pairs were in their territories and an additional four single birds showed territorial behaviour. Single birds

and pairs were seen now and then on the tundra until 13 August, when birds still showed territorial behaviour (Gliding cum Long Call).

In 1975, the ice edge had about the same position as in 1973. The first Long-tailed Skua arrived at Kaerelv in the afternoon of 27 May, when four birds flew around above the tundra (mean snow-cover 70%); later in the evening two single birds were seen. On 28 May, two birds were seen together in Gåseelv. At Kaerelv single birds were migrating north; in addition three single birds and three pairs were present in a part of the study area which later in the year would have 12 territorial pairs. That evening we noticed territorial display (Gliding cum Long Call and Slow Wing-beat) for the first time. By 29 May 50% of the future territories were claimed by at least one partner of the pair. On 30 May, four single birds and five pairs were present in the same area (75% of future

territories claimed). On 31 May, 1 and 2 June, which were days with inclement weather, there were only two single birds and one pair in the area. By 6 June (mean snow-cover 50%), most birds were paired, with at least one of the pair remaining on the territory. By 10 June, all territories had become established with both partners permanently in or near the territory. In the valley of Ugleelv (see fig. 13 in de Korte 1977) all territorial birds were seen in pairs on 6 June (mean snow-cover 20%), and no new territories became established after this date. At Kaerelv prolonged and aggressive territorial disputes (Rapid Wing-beat) were noticed between pairs no. 9 and no. 15 (fig. 1) until the last week of June. The latter pair was one of the two pairs that did not produce eggs that year. Eighty-eight percent of the territorial pairs had eggs but no young fledged as a result of exposure, starvation and predation (own observations). After losing its eggs or young, each bird of the breeding pairs nos. 1 to 10 (fig. 1) was seen incidentally with or without its partner in its territory until the last week of July and each bird of three of these pairs was seen with intervals until the second week of August. On 13 August, two came from the sea and stayed half an hour together in their territory, whereafter one of them returned to the sea; the other followed after about ten minutes.

In 1979, a single Long-tailed Skua arrived at Kaerelv on 28 May. On 29 May a pair was seen (mean snow-cover 70%). In the next days many birds were seen spread over the tundra, mainly in pairs. Courtship was observed for the first time on 31 May (mean snow-cover 60%). Eighty percent of the pairs had eggs, but no young fledged. By 3 August, all pairs were still occupying territories (Hansen 1982).

Flocking, immatures and departure

In the last week of May and the first days of June, birds that had not (yet) established a territory were sometimes seen flying around on the tundra in small flocks (fig. 4). These flocks decreased in size until mid-June, when all territories of the year had become established. In

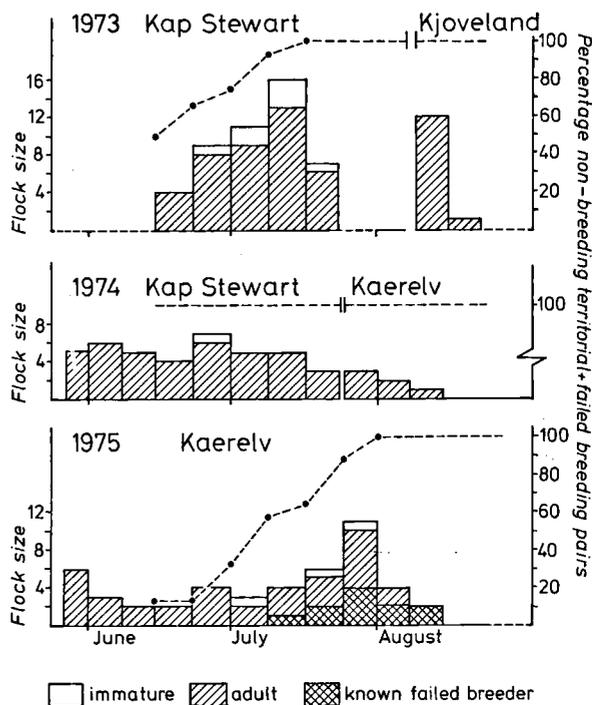


Fig. 4. Largest flocks of Long-tailed Skuas seen in each quarter of the month and percentages of territorial pairs comprising non-breeding territorial pairs + failed breeding pairs in different years and areas. Broken abscissa indicates period with no observers in study area.

the fourth week of June, flock size increased again, but thereafter the pattern differed between years (see discussion below). The extent of breeding failure, the increase in flock size and the sighting of marked birds indicated that most or all non-breeding territorial birds and failed breeders joined the flocks, whereas marked birds still with eggs or young never were seen in the flocks. Failed breeders, with or without their partner, were mostly seen in flocks that foraged in the neighbourhood of their territory. On 26 June 1973, however, we observed a bird without its mate, 20 km from its nest where it had lost its eggs the day before, in a group of eight adults (birds in adult summer plumage, cf. Roselaar in Cramp & Simmons 1983). The five birds I collected from this group had not established a territory that year (judging from gonads and status of incubation patches).

In 1973, immatures (birds not in juvenile or adult plumage, Cramp & Simmons 1977) were

seen on the tundra, always in company of adults, from 26 June until 23 July and at sea until 10 August. Along the ice edge near Kap Tobin on 25 July immatures and adults were foraging at sea in groups of up to five and flying north and south. Five adults collected there were females, that never had bred and that had not had a territory that year (judging from oviducts and status of incubation patches). During extensive boat trips crossing the Scoresby Sund Fjord in the fourth week of August and during visits to the north and south entrance of the fjord in the last week of August and the first week of September, I did not see a single Long-tailed Skua.

In 1974, immatures were observed at sea from 13 June until 14 August and on land, always in company of adults, from 21 June until 3 July (fig. 4). In the last week of July and the first week of August single adults and groups of up to seven which also contained immatures were flying south along the coast of Hurry Inlet. On 27 August, Meltofte (1976b) saw a single bird above the sea in the inner parts of Scoresby Sund.

In 1975, immatures were seen on land, always in company of adults, from 30 June until 27 July (fig. 4). In the last week of July and the first half of August single adults and groups of up to three some of which contained immatures were flying south along the coast of Hurry Inlet.

In 1979 immatures were not seen at all; by 3 August no migrational movements had been observed (Hansen in litt. 1981).

DISCUSSION

Figure 5 presents recorded dates of first observations of Long-tailed Skuas in Northeast Greenland. In addition Schaanning (1933) mentions arrival at Mackenzie Bugt at the end of May in 1929 and 1930. The Peary Land observations are from the Independence Fjord area, except for those done in 1917, which are from the area near the mouth of J. P. Koch Fjord (fig. 6).

It appears from fig. 5 that for the same areas, records of arrival differ from year to year. At

Scoresby Sund there is a difference of eight days (27 May to 4 June), at Hochstetter Forland ten days (27 May to 6 June), at Germania Land ten days (28 May to 7 June), and at Southern Peary Land seven days (1 June to 8 June). However, during the four years of this study at Scoresby Sund, the whole day was spent intensively looking for this species, which resulted in similar dates for the first birds arriving. I observed that upon arrival, the Long-tailed Skuas stayed only a short time on the breeding grounds. They would then disappear and depending on weather and snow conditions, show up again after one or more days. If one is not continuously watching the future breeding places one may easily miss such prospecting visits. If only a few passing birds are seen, because the area does not have a local breeding population as is the case at Jørgen Brønlund Fjord (J.B. in fig. 6) in Southern Peary Land (Meltofte 1976a) chances of missing the first migrants are great. Thus it is probable that many of the late dates in fig. 5 do not represent the real first arrival dates. In different areas in the same spring, arrival on the tundra generally is recorded later to the north (fig. 5). However, the earliest arrivals ever recorded on the tundra at Scoresby Sund (27 May), Mackenzie Bugt (29 May), Hochstetter Forland (27 May), and Germania Land (28 May) differ very little from each other and are on average four days earlier than the earliest sighting in Southern Peary Land (1 June). They are about a week later than the earliest sighting along the ice edge at Scoresby Sund (21 May). Our observations of southward flying Long-tailed Skuas on the first day of observation along the ice edge (fig. 2) and sightings of southward flying birds on the first and second day of observation at Wollaston Forland (Rosenberg *et al.* 1970) indicate that after arrival at the Northeast Greenland coast, the first Long-tailed Skuas some days fly back and forth along the ice edge before they fly inland. The greater part of the population probably arrives along the ice edge in the last week of May and very soon continues to fly inland or to the north. Sea ice conditions around Greenland are given in fig. 6. From Scoresby Sund to eastern

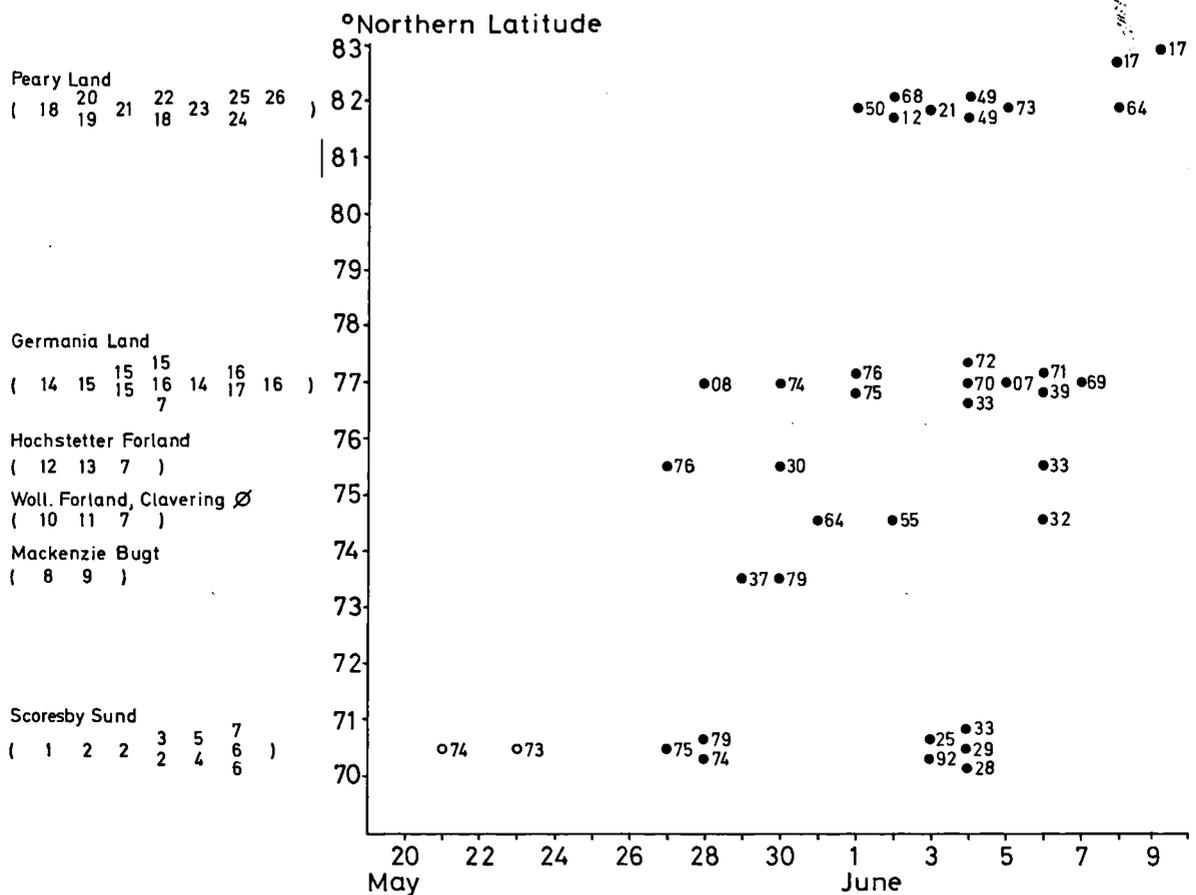


Fig. 5. First observation records of Long-tailed Skuas in Northeast Greenland from 1892 (92) to 1979 (79) at sea (open symbols) and at land (closed symbols). (1) K. Kunaq pers. comm, 1974. Meltofte 1976b, (2) own obs., (3) Hansen (1981), (4) Bay 1894, (5) Pedersen 1926, (6) Pedersen 1930, (7) Pedersen 1934, (8) Bird & Bird 1941, (9) Blomquist & Elander in prep., (10) Rosenberg *et al.* 1981, (13) Løppenthing 1932, (14) Manniche 1910, (15) Meltofte 1977, (16) Meltofte 1975, (17) Pedersen 1942, (18) Johnsen 1953, (19) Freuchen 1915, (20) Andersen 1970, (21) Koch 1926, (22) Just 1967, (23) Meltofte 1976a, (24) Røen 1965, (25) Rasmussen 1928, (26) Wulff 1934.

Peary Land exists a series of polynyas, which with interannual variations in extension, each May can be found at about the same positions along the land-fast ice edge (Vinje 1982). In 1973 and 1979 ice conditions in May were about the same as in 1975, but in 1974 the polynyas were much smaller (U.K. Climatological Services Sea Ice Maps 1973-1979). Long-tailed Skuas do not breed south of Scoresby Sund (de Korte 1977) and in spring they have never been observed along the coasts south of Scoresby Sund (Chapman 1932, Helms 1926, Salomonsen 1950) though on 3 August 1933 a few flocks were observed off

Miki's Fjord (Degerbøl & Møhl-Hansen 1935). As migrating seabirds prefer fast ice edges as a migration route but avoid them when bordered with heavy pack ice (own observations, McLaren 1982) we can assume that they do not cross the East Greenland sea ice earlier than near Scoresby Sund where they first can find open water along the land-fast ice. There and farther north they have ample opportunity to forage in the polynyas along the ice edge, which are relatively rich in food (Bradstreet 1982, Bradstreet & Cross 1982). Long-tailed Skuas collected along the ice edge in May and on the day they came first to land were all extremely

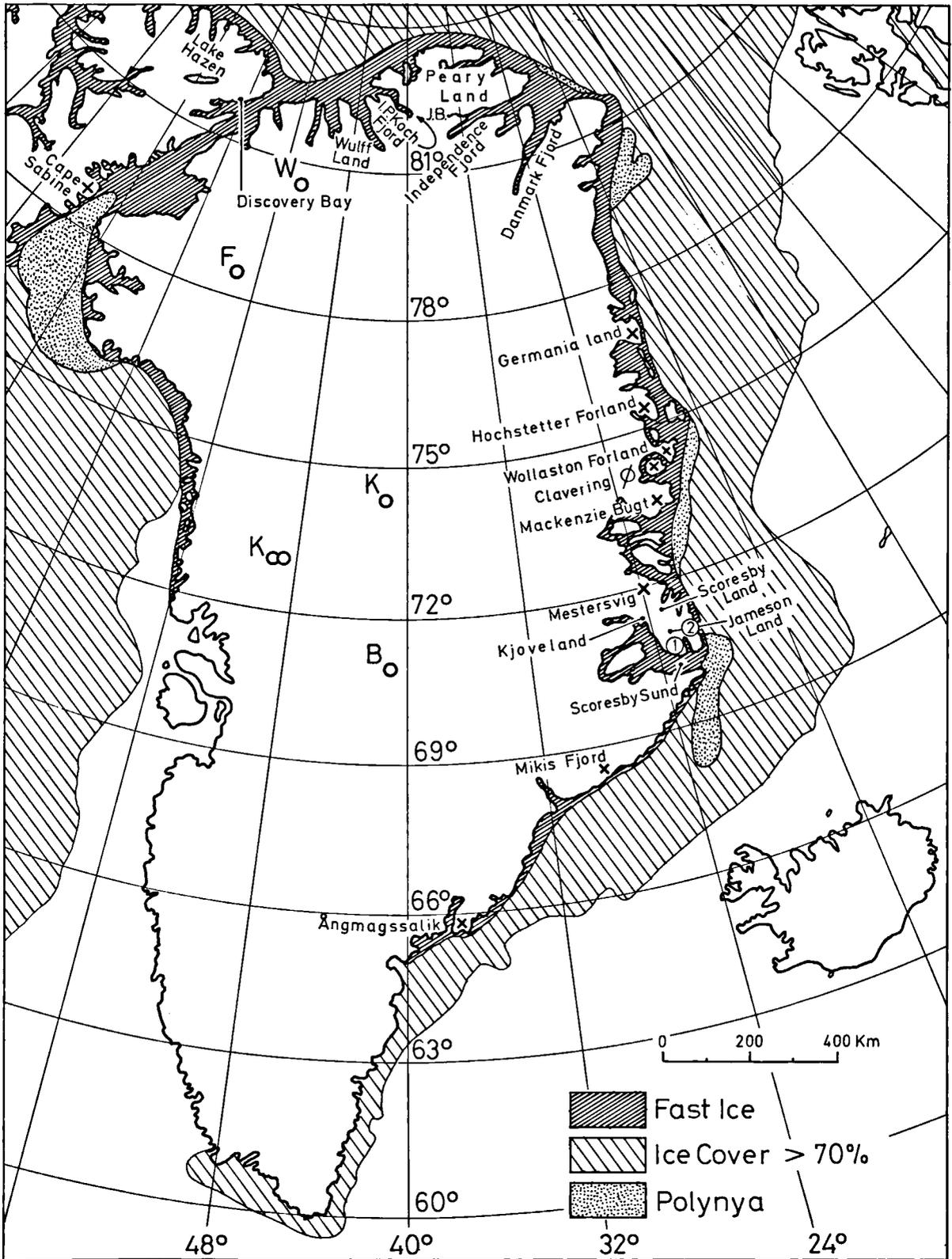


Fig. 6. Map of Greenland with sea ice conditions at the end of May 1975 (after U.K. Climatological Services sea ice maps 1975). B, F, K and W indicate ice cap observations of skuas by Bourlière (1952), Freuchen (1915), J. P. Koch (1913) and Wulff (1934); 1 and 2 indicate Kap Stewart study area and Kaerelv study area respectively.

fat (own observations). Northward migration over sea and staying at sea for some time makes it possible that from Scoresby Sund to Germania Land Long-tailed Skuas can arrive on the tundra at about the same date. Probably they arrive somewhat later in Peary Land due to the greater distance from open water, to which they have to return in case they can not find enough food on land.

Løppenthin (1932) and Johnsen (1953) speculated about a migratory divide in Northeast Greenland and supposed that in spring Long-tailed Skuas came from the open water of West Greenland and crossed the ice cap to reach Southern Peary Land. This assumption was based on an observation on the ice cap at 78°35'N, 50°W, where five Long-tailed Skuas were flying west on 28 August 1912 (Freuchen 1915) and on the fact that Long-tailed Skuas are not seen during spring in «Agmagssalik and that they show up at about the same time on different localities in Northeast Greenland. As explained above the last two points are not necessarily in favour of this hypothesis. The ice cap observation refers to the autumn migration. In autumn Long-tailed Skuas are sometimes seen in inland areas and far north of the breeding grounds while spring records from these areas are extremely rare (Bent 1921, Collett & Nansen 1900, Glutz von Blotzheim & Bauer 1982). Moreover Freuchen's observation was made relatively close to the western edge of the inland ice and the birds could have come as well from North Greenland. On 12 August 1917, Wulff (1934) also saw two Long-tailed Skuas on the ice cap close to the northern rim (fig. 6). J. P. Koch (1913) reported a skua (Struntjaeger) on 8 June at about 74½°N, 41°W, one on 24 June at about 73°N, 49°W and one, coming from northwest and disappearing to the west, on 25 June 1913 at about 73°N, 49½°W. According to his description these skuas probably were Long-tailed Skuas. Judging from the relatively late dates and flight direction, the observations from 24 and 25 June do not pertain to breeding birds on spring migration but to roamers from West Greenland, where Long-tailed Skuas breed

(Kampp 1982, Salomonsen 1950) and where they are frequently met at sea (Salomonsen 1950, Stone 1892, specimens in Zool. Museum Copenhagen). The skua from 8 June (flight direction unknown) could have been a late spring migrant. Bourlière (1952) reported an observation of skuas (Labbes) on the ice cap at 70°45'N, 40°42'W, but did not give date and flight direction. Long-tailed Skuas in spring migrate northward at Germania Land (Meltofte 1975, in litt. 1981), at Danmark Fjord (Freuchen 1915) and Independence Fjord (L. Koch 1926) and westward at Jørgen Brønlund Fjord (Meltofte 1976a). This indicates that they arrive from the south and the east at Southern Peary Land. In autumn they fly in opposite direction (Meltofte 1976a). Assuming that the Long-tailed Skuas prefer the shortest route between open water and their breeding grounds, the birds west of Wulff Land come from the open water off Northwest Greenland (fig. 6). I did not collect arrival dates from that part of Greenland, but from Cape Sabine close to the open North Water between Ellesmere Island and Greenland there is an observation of 23 May 1884 (Greely 1886 in Bent 1921) and at Discovery Bay on Ellesmere Islands some were seen on the breeding grounds on 28 May 1876 (Hart 1880). At Lake Hazen they were present on the breeding grounds on 29 May 1963 (Maher 1970). In Northwest Greenland the arrival probably takes place on about the same dates, which are very similar to those of Northeast Greenland.

It is still a point of discussion as to whether Long-tailed Skuas arrive paired (Dementiev 1969, Maher 1974) or unpaired and subsequently pair at the breeding grounds (Parmelee & MacDonald 1969, Parmelee *et al.* 1967, Portenko 1973). The following is a brief outline of data about first observations in Northeast Greenland as related to the sighting of singles or pairs. The sequence of the authors is based on the sequence of areas and dates in fig. 5. Bay (1894) reported a single bird as first arriving, Pedersen (1926, 1930) groups along the outer coast (pairs inland on the following days), Blomquist & Elander (in prep.) a single (two on

the second day, the greater part of the population arriving within a week), Rosenberg *et al.* (1970) three (a group of nine on the second day), Conradsen (1957) a single, Meltofte *et al.* (1981) a single (singles and pairs four days after), Løppenthin (1932) a single, Manniche (1910) a single in 1907 (followed by couples which took immediately possession of breeding territories), a pair in 1908, Meltofte (1977) a single in 1975 (four and six on the fourth day), Meltofte (1975, in litt. 1981) a single in 1969 (three and a single on the second day, a single and four on the third day), three in 1970 (a single on the second day, two, one, four and one on the third day), Johnsen (1953) a single, Freuchen (1915) a single (seven on the third day), Just (1967) four, Meltofte (1976a) a single in 1968 (three on the third day), six in 1973, Røen (1965) a single, Rasmussen (1928) three (many on the second day), Wulff (1934) a single. These observations are in accordance with ours in that they pertain to single birds and small groups of odd and even numbers, but rarely to two birds together. We found that the birds of our study area appeared quite synchronously and in some cases mated with previous partners in previous year's territories. Fidelity to the old breeding area and mating with the old partner was also found by Andersson (1981) in Lapland, Maher (1970) at Lake Hazen in Canada and Taylor (1974) on Bathurst Island in Canada. Obviously the territory serves as a rendezvous throughout summer and from one season to the next. Williamson (1965) ascertained, that in the closely related Arctic Skua *Stercorarius parasiticus* a more or less synchronous return of former mates was a requirement for re-establishing a pair bond between them. The rather synchronous returns to the territory and subsequent fast pair formation with the previous year's mate may give the impression that the pairs have been formed before arrival.

If conditions are favourable, Long-tailed Skuas are defending a territory within a few days after arrival. If not (fig. 3), they do not settle and are flying back and forth between the breeding area and the sea, which in East

Greenland is relatively close to the breeding grounds. In the areas surveyed in 1974, 1975 and 1979 territories became established after snow-cover was less than two-thirds. In 1974, the thaw had only progressed thus far in the fourth week of June at Kap Stewart. At that time the numbers of pairs occupying a territory was half that of the previous year. No more pairs settled, illustrating the importance of a sufficient area of uncovered ground for the establishment of territories in tundra birds (cf. de Korte *et al.* 1981). However, in June 1973, when Collared Lemmings (*Dicrostonyx groenlandicus*), which is a very important food item for the Long-tailed Skua in Northeast Greenland (own observations, Løppenthin 1943, Salomonsen 1950), were quite often seen on small bare spots, some Long-tailed Skuas had established territories in an area where snow-cover still was 80%. Meltofte *et al.* (1981) reported territorial Long-tailed Skuas when snow-cover was more than two-thirds and Collared Lemmings were crowding on the bare spots.

In 1973, 1974 and 1975 non-breeding territorial birds and failed breeders left their territories at times but they all came back to these until the fourth week of July and some of them were seen there until mid-August. The fact that all five adults, collected on 25 July at sea along the outer coast, not had had territories and 9 or 10 birds, collected from flocks on the tundra on 10 August, had had territories that year indicates that non-territorial adults just like immatures are departing from the tundra before August. It also indicates that territorial birds do not depart before that month, though Andersson (1976) reported from Lapland and Manniche (1910) and Pedersen (1942) from Northeast Greenland that in poor breeding years all birds leave the area in June and few remain in July. The observations of Hjort (1976) and O'Brien & Greenwood (1974) in Northeast Greenland and Maher (1971) at Ellesmere Island of territorial birds showing up in mid-August after many days of negative observations, support my view that territorial birds regardless of breeding success stay in or keep

coming back to their territory until August. The flocking of immatures, non-breeding territorial birds and failed breeders showed different patterns in different years and areas (fig. 4). Kap Stewart 1973 and Kaerelv 1975 were quite similar but in 1975 maximum flock size was reached two weeks later than in 1973. This may be correlated with 100% breeding failure which occurred two weeks later in 1975. In Kjøveland flock size was still considerable in the second week of August 1973, while at Kap Stewart all birds had disappeared. On 4 August 1962 (moderate breeding success) Hall (1966) saw flocks of up to 60 in Kjøveland; Bay (1894) also saw large flocks in the inner fjord regions on 9 August 1891 (rather poor breeding success). The inner fjord regions have a more equable climate than our study areas and a richer vegetation on which the Long-tailed Skuas feed in August (berries of *Arctostaphylos alpina*, *Empetrum hermaphroditum*, and *Vaccinium uliginosum*, de Korte in prep.), and may temporarily attract birds from elsewhere. The difference between Kap Stewart 1973 and 1974 was striking. In 1974, flocks remained small because immatures and non-territorial adults did not join them and because the number of territorial birds was smaller than the previous year. In addition, territory holders when not in their territories foraged at sea rather than staying on the tundra. Green & Greenwood (1978) noted in 1974 about the same pattern of territory break-down and flocking in Scoresby Land. The difference was that at their site further north (fig. 6) some eggs were laid and maximum flock size in July (11) was somewhat larger. In 1963, 1970 and 1983 flock size was also very small in Jameson Land and Scoresby Land though breeding success was high (Hall & Waddingham 1966, Smart & O'Brien 1971, D. Boertmann in litt. 1983, S. Newton in litt. 1984). Hansen (1982) and Meltofte *et al.* (1981) observed that in good lemming years failed breeders stayed continuously in their territories until mid-August. In years with plenty of food on the tundra territorial pairs seem to stay all the time in their territories independent of breeding success and do not forage outside them.

As in 1973, 1974 and 1975 no fledged young were produced in the study areas, I do not have observations about departure in successful breeding years. The following is a short outline of published data about departure and last observations in successful breeding years in Northeast Greenland from north to south (see fig. 5): At Germania Land in 1906 departure in small flocks end of August (Manniche 1910), in 1933 departure between 25 and 30 August (Pedersen 1934); at Hochstetter Forland in 1933 departure about 30 August (Pedersen 1934), in 1976 parents with fledged young present on 16 August (Meltofte *et al.* 1981); at Clavinger Ø in 1932 departure about 30 August (Pedersen 1934); at Mackenzie Bugt in 1928 migration until mid-September (Pedersen 1934, Schaanning 1933), in 1937 last one shot on 1 September (Bird & Bird 1941); at Scoresby Sund in 1924 a juvenile on 2 October (Pedersen 1926), in 1962 pairs with flying youngsters on 16 August, by 3 September they all had disappeared (Hall 1966), in 1963 parents with flying juveniles present on 21 August (Hall & Waddingham 1966), in 1970 pairs with flying juveniles present on 23 August (Smart & O'Brien 1971); at Angmagssalik a juvenile on 21 September 1905 (Helms 1926). Summarizing, in successful breeding years, parents with juveniles can remain on the tundra until the end of August and in September juveniles are still at sea off Northeast Greenland.

In the field I could not determine with certainty whether immatures were in their second, third or fourth calendar year and in some cases it was even difficult to distinguish between immatures and adults with traces of winter-plumage (cf. de Korte 1972). I collected 9 immatures (three in 1973, two in 1974 and four in 1975), the skins of which are in the Institute of Taxonomic Zoology in Amsterdam. In the Zoological Museum in Copenhagen I studied nine immature skins from Northeast Greenland and in the Smithsonian Institute in Washington D.C. I studied three from Alaska. Twenty of these 21 immatures collected on or near the breeding grounds were third calendar year birds or older. One collected by me, was a se-

cond calendar year bird. The three second calendar year birds I saw in Copenhagen and the four I saw in Washington all had been collected on the open sea. This indicates that immatures rarely come to the breeding grounds before their third calendar year though Meltofte *et al.* (1981) mentioned observations of second calendar year immatures in 1976 at Hochstetter Forland. A Long-tailed Skua probably attains full adult plumage in its fourth or fifth calendar year (Roselaar in Cramp & Simmons 1983). So the absence of immatures on the breeding grounds in 1979 is explained by the very low production of juveniles in the preceding years 1973 to 1978 (own observations, Sessions 1979, Hansen 1982). After the very productive year 1972 (pers. comm. local people, Hansen 1982) one would expect many third calendar year birds in 1974. At sea these immatures were seen earlier than in 1973 and 1975, but they frequented the tundra much less than in 1973 and 1975 and were not seen inland after the first week of July. Green & Greenwood (1978) reported in the summer of 1974 only one immature in Scoresby Land. At sea we saw them in 1974 until mid-August just like in 1973. At Germania Land in 1906 and at Hochstetter Forland in 1937 there was a large production of young but in the complete non-breeding years of 1907 and 1939 immatures were not seen at all on the tundra, though in the first half of July 1939 they were common at sea (Manniche 1910, Pedersen 1942). I conclude that in unproductive years immatures and non-territorial adults only pay some short prospecting visits to the tundra shortly after they have arrived along the coast in the second half of June. Thereafter they remain at sea. In more productive years immatures and non-territorial adults congregate to some extent on the tundra, where they are most numerous in July. They disappear from land in the second half of that month, but are still seen along the coast and at sea near the breeding places until mid-August.

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