The significance of Jameson Land, East Greenland, as a moulting and breeding area for geese: results of censuses 1982-1984

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(Med et dansk resumé: Betydningen af Jameson Land, Østgrønland, som fældnings- og yngleområde for gæs: resultater af optællinger 1982-1984)

INTRODUCTION

In connection with a planned oil exploration in Jameson Land, East Greenland (71°N, Fig. 1), a study of the goose populations has been carried out since 1982 as part of an environmental baseline study (Madsen 1984). The goose studies have been carried out by the Zoological Museum, University of Copenhagen, as consultants for the Greenland Fisheries and Environment Research Institute under the Ministry for Greenland. The aim has been 1) to evaluate the importance of the area as a breeding and moulting ground, 2) to investigate the ecology and behaviour of the geese, and 3) to evaluate the possible effect of disturbance from drilling operations and associated activities on the goose populations.

From earlier reports parts of Jameson Land are known to be breeding and moulting areas for Barnacle Geese *Branta leucopsis* and Pink-footed Geese *Anser brachyrhynchus* (Marris & Ogilvie 1962, Hall 1963, Hall & Waddingham 1966, Marris & Webbe 1969, Ferns & Green 1975, Meltofte 1976). The Barnacle Geese are part of the East Greenland population breeding between 78°N (north of Germania Land) (Meltofte 1975) and 70°N (Scoresby Sund) (Bay 1894) and wintering in Scotland and western Ireland. At present (1983) the population numbers c. 25,000 birds (Ogilvie 1983a). The Pink-feet belong to the population breeding in Iceland and in East Greenland between 76°30'N (Hochstetter Forland) (Meltofte et al. 1981) and 66°20'N (Tugtilik-Nigertussoq) (Ray 1973). The population counts c. 90,000 birds (1982) (Ogilvie 1983b). A part of the East Greenland summer population is made up by non-breeders undertaking a moult migration from Iceland in the second half of June (Taylor 1953, Christensen 1967).

This paper summarizes the results of three years censuses (1982-84) of the goose populations in Jameson Land, including three aerial surveys of the area. Data on major phenological events such as timing of moult and breed-

ing are presented, and observations from other parts of the breeding ranges of the two goose species briefly reviewed. Detailed results from the 1982 and 1983 field seasons have been published (Madsen & Boertmann 1982, Madsen et al. 1984). The results from the ecological work and the impact study will be published elsewhere.

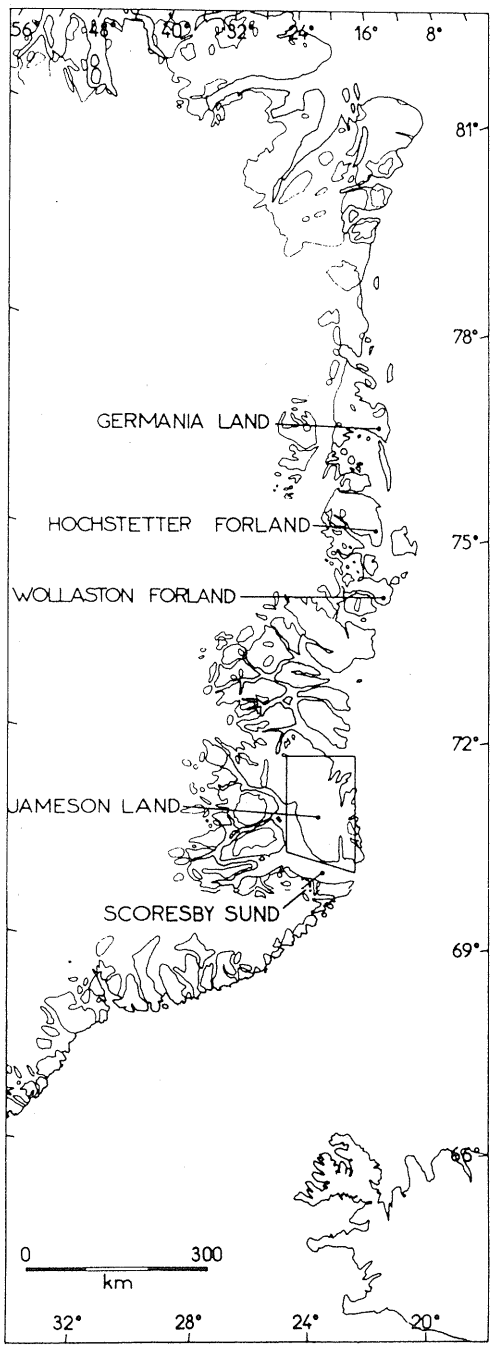

Fig. 1. Map of Northeast Greenland and Iceland with the study area framed.
Kort over Nordøstgrønland og Island med undersøgelsesområdet indrammet.

STUDY AREA

Most of Jameson Land (Fig. 2) is a lowland tundra, gradually rising from SW to a northern and eastern plateau reaching 700-1000 m a.s.l. The plateau is cut by rivers forming several valleys, e.g. Ørsted Dal and Schuckert Dal. The western part, Heden, is flat tundra characterized by many rivers, lakes and ponds. The vegetation on the lowland tundra is mainly dwarf scrub heath. The primary goose habitats

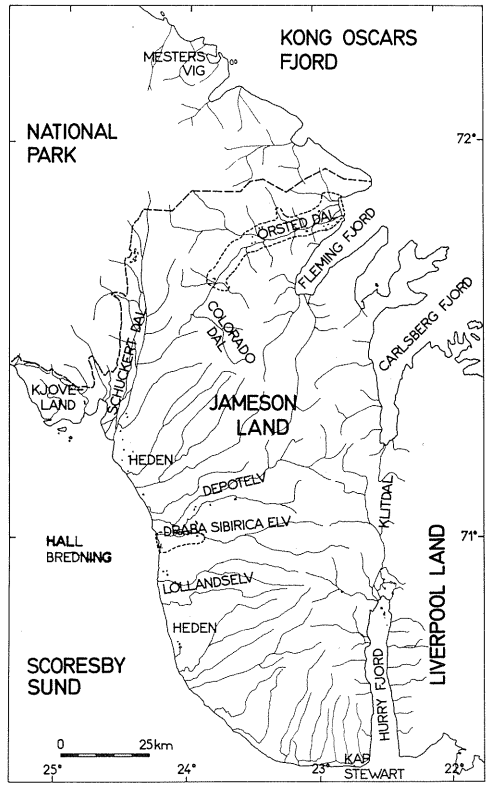

Fig. 2. Map of Jameson Land. Reference areas are framed with dashed lines. The border of the Northeast Greenland national park is indicated by heavy dashed line.
Kort over Jameson Land. Referenceområder er indrammet med stiplede linier. Grænsen for den nordøstgrønlandske nationalpark er angivet.

are graminoid marshes and wet grasslands adjacent to lakes and streams, and salt marshes along certain coast lines (for further details see Bay & Holt 1984).

METHODS

The field work was carried out 29 June to 3 August 1982, 29 June to 26 August 1983 and 15 June to 1 August 1984. Two types of censuses were performed:

1) Ground counts in reference areas. Population size and productivity was assessed in two reference areas each year: on Heden around Draba Sibirica Elv and in Ørsted Dal (Fig. 2). In 1983 and 1984 Ørsted Dal was visited by an English/Irish goose study group (D. Cabot & S. Newton pers. comm.) which performed the counts following the 1982 outlines given by Madsen & Boertmann (1982).
2) Aerial surveys. In order to get an overall impression of the distribution and numbers of geese, aerial surveys were carried out in 1982 (a reconnaissance flight 29-30 June), 1983 (full surveys 15-18 July and 22-25 August) and 1984 (full survey 20-21 July). Except from the 1982 survey, the same routes were flown in 1983 and 1984, covering all main water systems (lakes, rivers and coast lines). Mid-July was chosen, as experiences in 1982 showed that non-breeding geese were moulting at that time and concentrated along rivers, lakes and coasts, and because all nests had hatched and the families frequented the same habitats as the non-breeders (routes and further details are given by Madsen et al. 1984). In 1982 and 1983 the surveys were conducted with a one-engined Cessna 206, in 1984 with a two-engined Partinavia Observer with optimal outlook. Flight speed was generally 65-75 knots in July, while a faster speed was used in August 1983 (80-100 knots) when the geese had regained flight. Flight level was c. 400 feet above ground. The surveys were performed by two observers, and most goose flocks were checked with 10× binoculars and records kept on tape recorders.

The timing and duration of the flight feather moult of non-breeders and breeders was recorded by observation of flocks. In 1984 a census of the breeding geese in a 23 km² inland area around Draba Sibirica Elv was conducted and the fate of the nests and timing of hatching recorded.

Tab. 1. Population composition of geese in the reference area in Ørsted Dal, mid-July 1982-84.
Bestandssammensætning af gæs i referenceområdet i Ørsted Dal i midten af juli 1982-84.

	1982	1983	1984
Anser brachyrhynchus			
Non-breeders *Ikke-ynglende*	970	387	313
Parents *Forældrefugle*	0	62	12
Pulli *Pulli*	0	79	21
Branta leucopsis			
Non-breeders *Ikke-ynglende*	1184	1246	1017
Parents *Forældrefugle*	48	114	98
Pulli *Pulli*	49	116	87

RESULTS

The breeding populations

The counts in the reference areas (Tabs 1 and 2) and the aerial surveys (Fig. 3) showed that the breeding populations are small and scattered. The breeding Barnacle Geese are mainly distributed in the northern valleys where they breed on steep cliffs in colonies of 10-30 pairs, and the distribution pattern is determined by available nest sites (a full account on the breeding in Ørsted Dal will be given by Cabot and Newton elsewhere). In addition, de Korte (1973, 1974) and Meltofte (1976) mention

Tab. 2. Population composition of geese in the reference area around Draba Sibirica Elv, mid-July 1982-84.
Bestandssammensætning af gæs i referenceområdet omkring Draba Sibiria Elv i midten af juli 1982-84.

	1982	1983	1984
Anser brachyrhynchus			
Non-breeders *Ikke-ynglende*	1202	1167	752[a]
Parents *Forældrefugle*	14	30	32
Pulli *Pulli*	19	48	60
Branta leucopsis			
Non-breeders *Ikke-ynglende*	136	155	132
Parents *Forældrefugle*	4	0	2
Pulli *Pulli*	5	0	1

Note: a) an additional 350 had abandoned the area due to helicopter disturbance few days prior to the census.

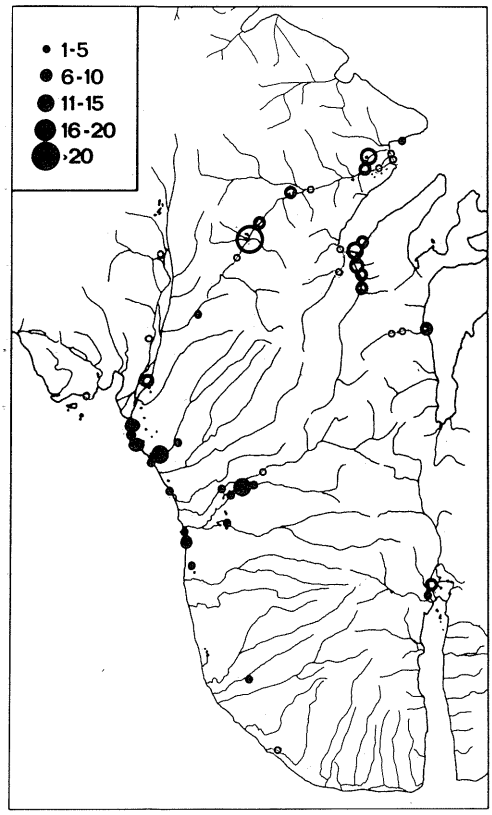

Fig. 3. Distribution of goose families recorded by aerial survey in mid-July 1984. Circles are Barnacle Geese, filled circles Pinkfeet.
Fordelingen af gåsefamilier ved flytælling i midten af juli 1984. Cirkler angiver Bramgæs, udfyldte cirkler Kortnæbbede Gæs.

small colonies around Kap Stewart and on Fame Øer in Hurry Fjord.

As evidenced by the post-hatching distribution of families (Fig. 3), most Pinkfeet breed on Heden. However, some Pinkfoot families are surely overlooked by the aerial surveys, because the geese sometimes walk far inland; the map thus only gives a relative distribution. In Ørsted Dal 53 nesting pairs were found in 1984 (Cabot & Newton pers. comm.), but only five families were counted later in July. Breeding pairs have also been found in the Hurry Fjord region and around Kap Stewart (de Korte 1973, 1974, Meltofte 1976, Madsen et al. 1984). Pinkfeet mostly nest along rivers with steep banks or on small islands or lake borders. The pairs generally nest in small colonies of 2-5 nests with 10-20 m between neighbours.

In the 23 km^2 census plot around Draba Sibirica Elv 15 pairs nested in 1984. Only six nests hatched (40%); the rest were predated, in most instances probably by Arctic Foxes *Alopex lagopus*, which were numerous in the area (two dens). On one occasion egg robbing by an Arctic Skua *Stercorarius parasiticus*, on another by a Long-tailed Skua *S. longicaudus*, was observed. In both cases the predation was caused by the observer flushing the goose from an uncovered nest.

By the aerial survey in 1984, where the goose families were more easily recognized due to the improved outlook, a total of 75 families of Pinkfeet and 140 families of Barnacle Geese was observed. A simultaneous ground count in Ørsted Dal (Cabot & Newton pers. comm.) showed that the aerial survey gave a reasonably good estimate of the number of Barnacle Goose families (aerial count: 64 families, ground count: 49 families; the discrepancy is probably explained by non-breeding pairs or failed breeders associated with the families counted as breeders by the aerial survey). From the reference area around Draba Sibirica Elv it was indicated that the aerial survey underestimated the number of Pinkfoot families, approximately by 50%.

Therefore, an estimate of the size of the breeding populations can only be tentative. The population of successfully breeding Barnacle Geese is estimated at 150-200 pairs, of Pink-footed Geese at 150-250 pairs, in 1984. A success rate for nests of 40% indicates that twice that number of Pinkfoot pairs may attempt to breed. From observations in Ørsted Dal (Cabot & Newton pers. comm.), the predation rate for Barnacle Geese seems to be of the same magnitude as for Pinkfeet (though the

Tab. 3. Brood sizes in different areas and years. Sample sizes are given in brackets.
Kuldstørrelser i forskellige områder og år. Antal kuld er angivet i parentes.

	1982	1983	1984
Anser brachyrhynchus			
Heden	2.7 (7)	2.7 (25)	3.7 (18)
Ørsted Dal	–	2.6 (31)	3.5 (6)
Mesters Vig	–	–	3.0 (4)
Branta leucopsis			
Heden	–	2.3 (3)	2.2 (9)
Ørsted Dal	2.0 (25)	2.0 (57)	2.1 (42)
Mesters Vig	–	–	2.3 (25)

Tab. 4. The number of adult geese counted during three complete aerial surveys in 1983 and 1984.
Antallet af adulte gæs talt ved tre fuldstændige flytællinger i 1983 og 1984.

	July 15-18, 1983		August 22-25, 1983		July 20-21, 1984	
Locality *Lokalitet*	*Branta leucopsis*	*Anser brachyrhynchus*	*Branta leucopsis*	*Anser brachyrhynchus*	*Branta leucopsis*	*Anser brachyrhynchus*
Ørsted Dal	1263	382	298	667	1115	255
Coloradodal	362	530	152	183	741	261
Schuckert Dal	334	68	24	453	273	0
Kjoveland	291	288	20	175	450	480
Fleming Fjord	392	160	96	404	262	100
Carlsberg Fjord	12	0	17	46	161	60
Klitdal	474	0	86	116	387	46
Hurry Fjord	22	74	0	393	20	2
Heden North[a]	990	670	132	1291	398	1415
Heden Central[b]	1511	2385	401	855	773	1480
Heden South[c]	493	1004	110	917	429	831
Total	6144	5561	1336	5500	5009	4930

Notes: a) from Schuckert Dal to Depotelv (excl.), b) from Depotelv to Lollandselv (excl.), c) from Lollandselv to Kap Stewart.

predation pressure is not so much on nests as on goslings). The breeding population of Barnacle Geese is thus estimated at 300-400 pairs, the Pinkfoot population at 300-500 pairs. These estimates are rough, and numbers may vary between years (Tabs 1 and 2). 1984 seems to have been a good breeding season.

The majority of the Barnacle Goose nests hatch from around 28 June to 5 July (range in Ørsted Dal in 1984 was 27 June to 11 July (Cabot & Newton pers. comm.)), with the Pinkfeet 3-7 days later. Average brood size of Barnacle Geese was 2.0-2.3 pulli/brood (Tab. 3). Pinkfeet had bigger broods, on average varying between 2.6 and 3.7 pulli/brood (mid-July), with bigger broods in 1984 compared to the previous two years.

Parents of Barnacle Geese moult from around 20 July and regain flight in mid-August (1983). Parents of Pinfeet moult approximately 5 days later and regain flight by 20-25 August.

The non-breeding population

The major part of the goose population in Jameson Land is comprised by non-breeders summering in the area and moulting remiges (Tabs 1 and 2). By the two complete aerial surveys in July 1983 and 1984 the total adult population was estimated at 11,700 and 9,950 individuals, respectively (Tab. 4), with an even numerical distribution between the two species and with a high dominance of non-breeders. When ground counts and aerial counts in the reference areas are compared, a good accordance between the results is apparent (Madsen et al. 1984). The estimated 175 and 200 successfully breeding pairs of Barnacle and Pink-footed Geese, respectively, comprise only 6-8% of the population in both species.

Inside the reference areas, the non-breeding population of Barnacle Geese was stable through the three census years (Tabs 1 and 2). The Pinkfoot population in Ørsted Dal declined (Tab. 1), probably due to human disturbance mainly from ground activities (including round-ups of geese for ringing in 1984). In the reference area around Draba Sibirica Elv the Pinkfoot population was similar in numbers in 1982 and 1983 (Tab. 2). In 1984 helicopter operations in the area few days prior to the census probably displaced part of the population.

In mid-July the non-breeding, moulting geese were concentrated along rivers, lakes and coast lines (Fig. 4). The Pinkfeet were mainly distributed along the coast of Hall Bredning, along rivers and on lakes on Heden, in Kjoveland and in Ørsted Dal and Coloradodal. The Barnacle Geese were similarly distributed, but were also observed in the Fleming Fjord region and in Klitdal and Schuckert Dal. Except from the northern valleys, Jameson Land almost exclusively serves as a moulting area for the Barnacle Geese.

In 1983 the mean flock size of moulting Pinkfeet was 42.6 (range 1-240) individuals, and of Barnacle Geese 32.1 (range 1-350) individuals.

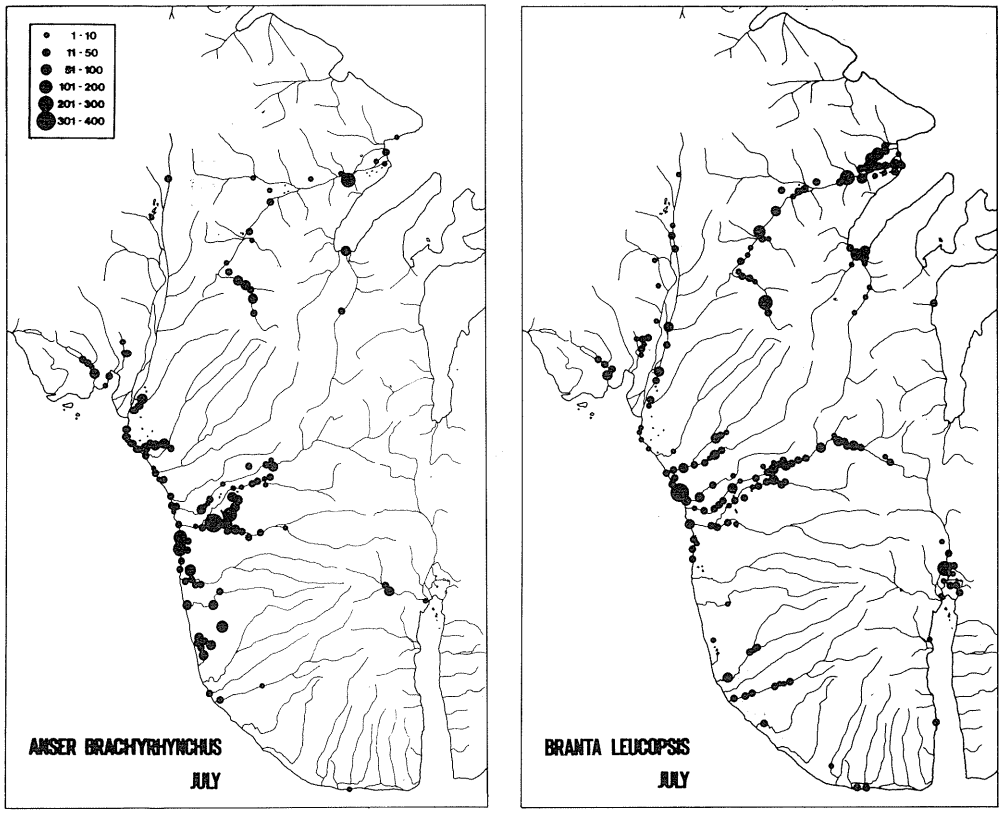

Fig. 4. Distribution of Pinkfeet and Barnacle Geese recorded by aerial survey in mid-July 1983.
Fordelingen af Bramgæs og Kortnæbbede Gæs ved flytælling i midten af juli 1983.

When the aerial survey in August 1983 was performed, the non-breeding geese had regained flight. The number of Pinkfeet was almost identical to the July number (Tab. 4), whilst the number of Barnacle Geese had declined from 6,140 to 1,340 individuals. The geese had abandoned the moulting grounds completely, and those remaining had dispersed to marshes not used during moult or to inland tundra areas (Fig. 5), especially on western Jameson Land, but also in Ørsted Dal, Fleming Fjord and the Hurry Fjord region. The mean flock size of Pinkfeet had declined significantly to 20.7 (range 2-75) individuals (χ^2=43.5, df=5, P⟨0.001), and the flock size of Barnacle Geese to 17.1 (range 1-150) individuals (χ^2=12.0, df=4, P⟨0.05).

Arrival of non-breeders and timing of moult

In 1984 the field season on Heden started prior to the arrival of the non-breeding geese. The populations of non-breeders of both species arrived on the moulting grounds between 23 June and 7 July (Fig. 6). The geese arrived in small flocks, and skeins at high altitudes were not seen at all. Mean flock size of Pinkfeet observed flying around in the area was 5.0 individuals (n=81, range 1-16), of Barnacle Geese 4.0 individuals (n=26, range 1-17). Flight activity peaked 21 June to 1 July for both species (Fig. 6).

The first Pinkfoot with shed remiges was seen on 30 June, but on the major moulting place in the area it was estimated that most geese were not in full moult until 6 July, about one week after peak arrival (Fig. 6). One flock of Barnacle Geese was in full moult on 30 June, 3-4 days after the arrival, whereas another flock was starting moult one week later.

The general impression from all three years is that there is high synchronisation of moult within flocks, but up to one week's variation between flocks. Generally, non-breeding Pink-

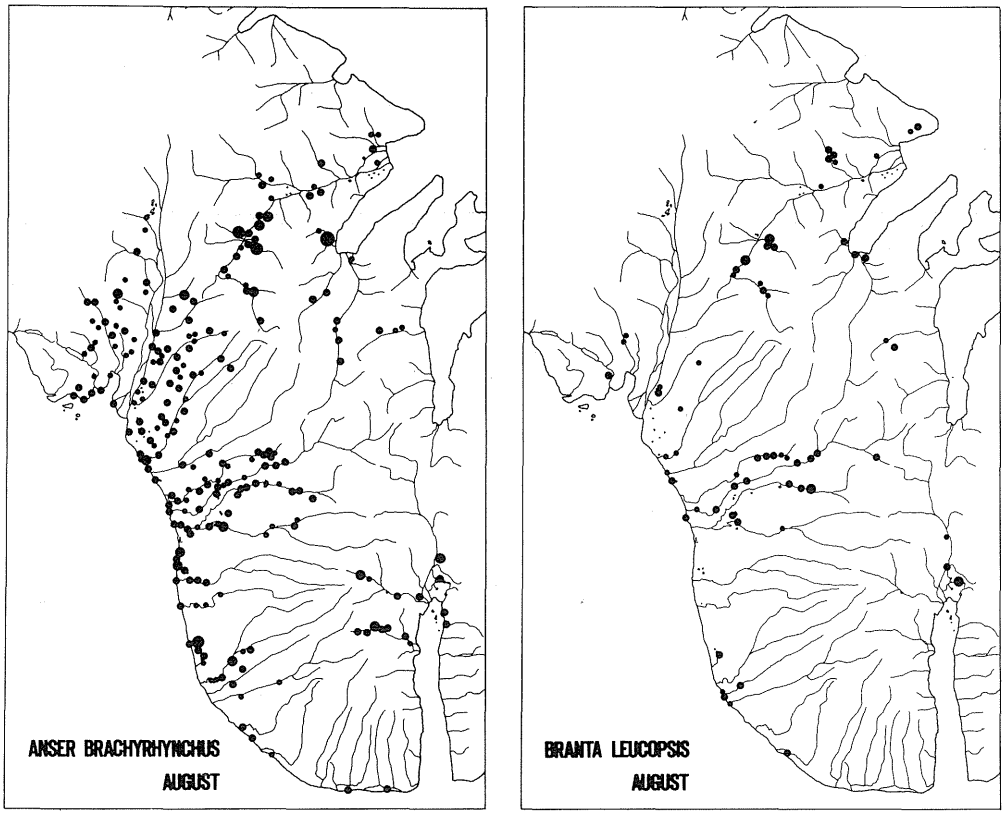

Fig. 5. Distribution of Pinkfeet and Barnacle Geese recorded by aerial survey by the end of August 1983. Scale as in Fig. 4.
Fordelingen af Bramgæs og Kortnæbbede Gæs ved flytælling i slutningen af august 1983. Skala som i Fig. 4.

feet initiate moult 5-10 July (range 29 June to 15 July) and regain flight 1-5 August (range 27 July to 10 August). The Barnacle Geese initiate moult 3-7 July (range 24 June to 8 July) and regain flight 26 July to 1 August (range 25 July to 3 August). In a flock of Barnacle Geese kept under observation throughout the flightless period, the geese regained flight in 23-25 days, which is in accordance with observations from Svalbard (Owen & Ogilvie 1979).

DISCUSSION

The surveys have revealed that Jameson Land is of prime importance as a moulting place as well as a breeding area for geese in East Greenland. In July the area houses 20-25% of the entire East Greenland population of Barnacle Geese. From data on population dynamics obtained on the wintering grounds on Islay in Scotland (Ogilvie 1983a) and on Inishkea in Ireland (Cabot & West 1983) it can roughly be calculated that about 1500 pairs in the population breed successfully each year. Jameson Land contributes with at least 150 pairs (10%) of the successfully breeding segment of the population.

Moulting concentrations of Barnacle Geese of the same size as recorded in Jameson Land are not known from other parts of the breeding range. In Hudson Land Hjort (1976) estimated the population (mostly non-breeders) at 1500 Barnacle Geese (1973), and from Germania Land and Hochstetter Forland flocks of 100-150 and 300, respectively, have been recorded (Meltofte 1975, Meltofte et al. 1981). The high numbers of moulting Barnacle Geese in Jameson Land in the southern part of the breeding range, and the fact that an immigration of non-breeding birds takes place in the second half of June, indicates that non-breeders undertake a moult migration in southerly directions. The exact origin of the non-breeders is unknown, and from literature there are no reports

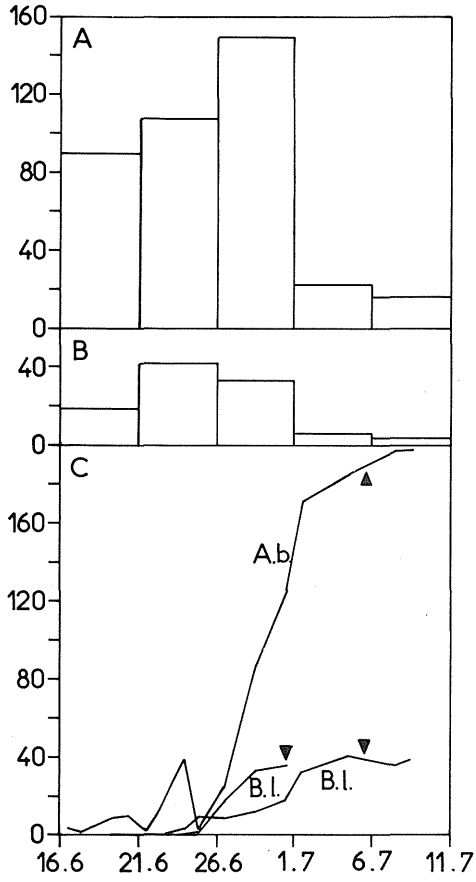

Fig. 6. Arrival of non-breeding geese on the moulting grounds on Heden, 1984. A: number of flying Pinkfeet observed in 5-day periods; B: do. Barnacle Geese; C: the build-up of moulting flocks of Pinkfeet (A.b.) and Barnacle Geese (B.l., two localities). Triangles indicate when most geese had shed remiges. *Ankomsten af ikke-ynglende gæs på fældningspladser på Heden i 1984. A: antal flyvende Kortnæbbede Gæs set i 5-dages perioder; B: do. Bramgæs; C: opbygningen af fældningsflokke af Kortnæbbede Gæs (A.b.) og Bramgæs (B.l.). Trekanter angiver hvornår de fleste gæs havde fældet svingfjerene.*

of south-migrating Barnacle Geese in June. Meltofte (1977) noticed that the numbers of non-breeders declined in June near colonies in Germania Land and suggested that they moved towards west. The immigrants to Jameson Land may come from colonies in the southern half of the breeding range, and the migration cannot be regarded as »genuine moult migration« (D III type, Salomonsen 1968), but rather as a smaller assembly of geese in a »local« moulting center (D II type, Salomonsen 1968). However, moult migration in a southerly direction is exceptional among goose populations, which usually undertake a northward moult migration (Salomonsen 1968, Owen 1980). The only hitherto known exceptions from this rule are small segments of German Greylag Geese *Anser anser* moving west (Ogilvie 1978) and East Siberian Brants *Branta bernicla* moving southeast to Alaska (Palmer 1976).

The number of moulting Pinkfeet in Jameson Land is likewise the highest recorded in Northeast Greenland. Other known concentrations are: 1000 in Germania Land (Meltofte 1975), 3000 on Hochstetter Forland (Meltofte et al. 1981), 1700 in Hudson Land (Hjort 1976), 1400 in the region between Hudson Land and Kong Oscars Fjord (Goodhart & Wright 1958) and 130 on Wollaston Forland (Rosenberg et al. 1970). With the proviso that the information stems from different years, the total number of moulting Pinkfeet accounted for in East Greenland, incl. Jameson Land, sums up to c. 12,000 geese. From data on population dynamics (Ogilvie 1978, 1983b) the non-breeding segment of the population is calculated to be c. 50,000 geese. In Iceland only 2-3000 non-breeding moulting geese have been observed (Gardarsson & Sigurdsson 1972), and the moult migration to East Greenland probably involves 40,000-50,000 geese. Thus only 25-30% of the moulting population is actually accounted for in East Greenland. However, immense areas in East Greenland are still unexplored by ornithologists.

Since 1961 goose counts have been carried out six times in mid-July in Ørsted Dal (Tab. 5). For the Barnacle Geese there is a good correlation between the number in the valley and in the entire population. In the period 1961-78 the total population increased from 14,000 to 34,000 geese, and since then the population has declined to 25,000 in 1983 (Ogilvie 1983a). The same trend is found in Ørsted Dal. For the Pinkfeet the development in the valley is not correlated to population development. Since 1961 the total population has increased from 59,000 to 90,000 individuals in 1982 (Ogilvie 1978, 1983b), while the population in Ørsted Dal has been fluctuating without significant trends. The Pinkfeet are extremely sensitive to human disturbance on the breeding and moulting grounds (Meltofte 1975, Meltofte et al. 1981, Madsen 1984), and the mere passage by

Flock of moulting Pink-footed Geese on a pond on Heden, Jameson Land, ult. July 1984. Staunings Alper are seen in the background. Photo: C. R. Olesen.
Flok af fældende Kortnæbbede Gæs på dam på Heden, Jameson Land, ult. juli 1984. I baggrunden ses Staunings Alper.

humans through the valley can make the geese abandon the area.

Several papers have concurrently reported on the northward moult migration in June (Conradsen 1957, Rosenberg et al. 1970, Meltofte 1975, 1976, 1977, Hansen 1981, Meltofte et al. 1981). Mean date of the first skein of geese seen is 20 June (n=7), of the last 6 July (n=6) (range 14 June to 12 July), and generally the migration culminates in the last days of June. Mean flock size varies between 16 and 27 individuals (range 2-100). In 1984 no migrating skeins were observed in the inland of Jameson Land, and the moulting population was gradually built up by small flocks of geese. This indicates that the migrating flocks have split up prior to dispersal to the moulting grounds, e.g. on staging areas along the coasts.

The time of arrival of the breeding populations of both species in spring is documented by several authors. Mean date of first sighting is 20 May for the Pink-footed Goose (range 9-29 May, n=14), and likewise 20 May for the Barnacle Goose (range 16-27 May, n=16) (Bay 1894, Pedersen 1926, 1930, Løppenthin 1932, Petersen 1941, Conradsen 1957, Rosenberg et al. 1970, de Korte 1973, 1974, de Korte & Bosman 1975, Meltofte 1975, 1976, 1977, Hansen

Tab. 5. Goose counts in Ørsted Dal, 1961-84.
Gåsetællinger i Ørsted Dal 1961-84.

	1961[a]	1963[b]	1974[c]	1982[d]	1983[e]	1984[e]
Anser brachyrhynchus						
Adults	300	225	394	970	449	325
Pulli	0	25	83	0	79	21
Branta leucopsis						
Adults	450	564	1518	1232	1360	1115
Pulli	23	172	170	49	116	87

Sources *Kilder:* a) Marris & Ogilvie (1962), b) Hall & Waddingham (1966), c) Ferns & Green (1975), d) present study, e) Cabot & Newton pers. comm. (present study).

1981, Meltofte et al. 1981), and the reports generally state that most geese arrive between 20 May and 5 June.

The hatching dates recorded in this study are in agreement with dates from other parts of the breeding ranges (Pinkfeet: Hardy 1979, Meltofte et al. 1981; Barnacle Geese: Madsen 1925, Rosenberg et al. 1970, Meltofte 1975, 1977). From the dates it is calculated that egg laying in both species is initiated in the first 10 days of June, which is in accordance with the observation by Meltofte et al. (1981) that Pinkfeet on Hochstetter Forland started egg laying from the end of May to 10 June (1976). Compared to the breeding schedule of Pinkfeet nesting in Iceland, the egg laying is approximately 10 days delayed (Scott et al. 1953, Inglis 1977).

The 40% success of nests found in Jameson Land in 1984 is similar to the success of Pinkfoot nests on Hochstetter Forland in 1976 (42%) (Meltofte et al. 1981). In Thjorsarver in Iceland Gardarsson (1976) found a hatching success of 58%, and Inglis (1977) a nest success of 59%, and also compared to other goose populations the success in East Greenland is low (see Tab. 6 in Ogilvie 1978). Predation by Arctic Foxes seem to be the main cause of the low success.

Following moult, the major part of the non-breeding Barnacle Geese left Jameson Land, while the Pinkfeet remained although they went to other habitat types (Madsen et al. 1984). Possibly the Barnacle Geese went to areas in the inner Scoresby Sund fiord.

For both species the emigration from East Greenland takes place from approximately 25 August to 15 September (Meltofte 1976, Madsen et al. 1984), but southward movements apparently start somewhat earlier (c. 10-20 August) in the northern ranges (Meltofte 1975, Meltofte et al. 1981). Parts of the populations probably congregate in the Scoresby Sund fiord region prior to emigration. Meltofte (1976) thus reported of hundreds of geese of both species migrating into the fiord system during late August and early September.

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DANSK RESUMÉ

Betydningen af Jameson Land, Østgrønland, som fældnings- og yngleområde for gæs: resultater af optællinger 1982-1984

I forbindelse med en planlagt olieeftersøgning i Jameson Land har Zoologisk Museum siden 1982 foretaget undersøgelser af Bramgæs og Kortnæbbede Gæs i området (Fig. 1 og 2). Et af formålene har været at vurdere områdets betydning for gæs og kortlægge bestandenes udbredelse.

Ved optællinger fra landjorden i to referenceområder (Fig. 2) samt ved flytællinger har det vist sig, at området især er fældningsområde. I juli huser området ca. 10-12.000 gæs, hvoraf anslået 92-94% er ikkeynglende fugle (Tab. 1, 2 og 4). Antallet af ynglepar er anslået til 300-400 par Bramgæs og 300-500 par Kortnæbbede Gæs, men antallet af succesrige par er betydeligt lavere p.g.a. predation, især fra Polarræve.

Ikke-ynglende Kortnæbbede Gæs ankommer fra Island i slutningen af juni for at gennemgå svingfjersfældningen (Fig. 6). Samtidig ankommer Bramgæs fra det østgrønlandske område. I en 3-4 ugers periode er fuglene ude af stand til at flyve (Bramgæssene ca. 5.-28. juli, de Kortnæbbede Gæs ca. 7. juli til 1. august), hvor de koncentreres omkring elve, på søer og ved kysterne (Fig. 4). Efter endt fældning forlader de fleste Bramgæs området (Tab. 4, Fig. 5), hvorimod de Kortnæbbede Gæs forbliver indtil borttrækket til Island i begyndelsen af september.

Jameson Land er det største, kendte fældningsområde for Bramgæs i Østgrønland og et af de vigtigste yngleområder. I juli opholder 20-25% af den samlede østgrønlandske bestand (ca. 25.000) sig i området, og ca. 10% af ynglebestanden befinder sig her. Ligeledes er området det største, kendte fældningsområde for Kortnæbbet Gås i Østgrønland.

REFERENCES

Bay, E. 1894: Hvirveldyr. – Meddr Grønland 19(1): 1-51.

Bay, C. & S. Holt 1984: Botaniske undersøgelser i Jameson Land, 1983. – Report, Grønlands Fiskeri- og Miljøundersøgelser, Grønlands Botaniske Undersøgelser.

Cabot, D. & B. West 1983: Studies on the Population of Barnacle Geese *Branta leucopsis* Wintering on the Inishkea Islands, Co. Mayo. 1. Population Dynamics 1961-1983. – Irish Birds 2: 318-336.

Christensen, N.H. 1967: Moult migration of Pinkfooted Goose (*Anser fabalis brachyrhynchus* Baillon) from Iceland to Greenland. – Dansk Orn. Foren. Tidsskr. 61: 56-66.

Conradsen, F.R. 1957: Ornithologiske iagttagelser ved Daneborg, N.Ø. Grønland. – Dansk Orn. Foren. Tidsskr. 51: 12-18.

Ferns, P.N. & G.H. Green 1975: Observations of Pink-footed and Barnacle Geese in the Kong Oscar Fjord region of north-east Greenland, 1974. – Wildfowl 26: 131-138.

Gardarsson, A. 1976: Population and production of the Pink-footed Goose *(Anser brachyrhynchus)* in Thjórsárver, 1971-1974. – University of Iceland, Reykjavik (Icelandic with English summary).

Gardarsson, A. & J.B. Sigurdsson 1972: Rannsoknir a heidagaes *(Anser brachyrhynchus)* 1971, Adrar attruganir i Pjorsarverum 1971. – Icelandic National Energy Authority, Reykjavik.

Goodhart, J. & T. Wright 1958: North-east Greenland Expedition 1956. – Wildfowl Trust Ann. Rep. 9: 180-192.

Hall, A.B. 1963: Goose observations from Scoresby Land, 1962. – Wildfowl Trust Ann. Rep. 14: 94-97.

Hall, A.B. & R.N. Waddingham 1966: The breeding birds of Ørsted Dal, East Greenland, 1963. – Dansk Orn. Foren. Tidsskr. 60: 186-197.

Hansen, J.M. 1981: Hurry Fjord ekspeditionen 1979. Avifaunistical survey. – Report, Nat. Hist. Mus., Århus.

Hardy, D.E. 1979: Observations on geese of the Kong Oscars Fjord region of North-east Greenland, 1971. – Dansk Orn. Foren. Tidsskr. 73: 185-189.

Hjort, C. 1976: Notes on the bird fauna of Hudson Land and Hold With Hope, Northeast Greenland, 1973. – Dansk Orn. Foren. Tidsskr. 70: 35-44.

Inglis, I.R. 1977: The breeding behaviour of the Pink-footed Goose: behavioural correlates of nesting success. – Anim. Behav. 25: 747-764.

Korte, J. de 1973: Nederlandse Groenland Expeditie 1973. – Report, Inst. Taxonom. Zool., Amsterdam.

Korte, J. de 1974: Nederlandse Groenland Expeditie 1974. – Report, Inst. Taxonom. Zool., Amsterdam.

Korte, J. de & C. Bosman 1975: Nederlandse Groenland Expeditie 1975. – Report, Inst. Taxonom. Zool., Amsterdam.

Løppenthin, B. 1932: Die Vögel Nordostgrönlands zwischen 73°00' und 75°30'N.Br. – Meddr Grønland 91(6).

Madsen, C. 1925: Ornithologiske iagttagelser fra Østgrønland. I. Bramgaasen *Anser leucopsis.* – Dansk Orn. Foren. Tidsskr. 19: 33-37.

Madsen, J. 1984: Study on the possible impact of oil exploration on goose populations in Jameson Land, East Greenland: a progress report. – Norsk Polarinst. Skr. 181.

Madsen, J. & D. Boertmann 1982: Gåseundersøgelser i Jameson Land 1982. – Report, Grønlands Fiskeriundersøgelser. Zool. Mus., Copenhagen.

Madsen, J., D. Boertmann & C.E. Mortensen 1984: Gåseundersøgelser i Jameson Land 1983. – Report, Grønlands Fiskeri- og Miljøundersøgelser. Zool. Mus., Copenhagen.

Marris, R. & M.A. Ogilvie 1962: Ringing of Barnacle Geese in Greenland in 1961. – Wildfowl Trust Ann. Rep. 13: 53-64.

Marris, R. & A.H.F. Webbe 1969: Observations of birds in East Greenland, 1966. – Dansk Orn. Foren. Tidsskr. 63: 161-170.

Meltofte, H. 1975: Ornithological Observations in Northeast Greenland between 76°00' and 78°00'N. Lat. 1969-71. – Meddr Grønland 191(9).

Meltofte, H. 1976: Ornithological observations from the Scoresby Sund Area, East Greenland, 1974. – Dansk Orn. Foren. Tidsskr. 70: 107-122 (Danish with English summary).

Meltofte, H. 1977: Ornithological observations in Germania Land, Northeast Greenland, 1975. – Dansk Orn. Foren. Tidsskr. 71: 81-94 (Danish with English summary).

Meltofte, H., M. Elander & C. Hjort 1981: Ornithological observations in Northeast Greenland between 74°30' and 76°00'N. lat., 1976. – Meddr Grønland, Biosci. 3.

Ogilvie, M.A. 1978: Wild Geese. – Poyser, Berkhamsted.

Ogilvie, M.A. 1983a: The numbers of Greenland Barnacle Geese in Britain and Ireland. – Wildfowl 34: 77-88.

Ogilvie, M.A. 1983b: Numbers of geese in Britain and Ireland, 1982-1983. – Wildfowl 34: 172.

Owen, M. 1980: Wild Geese of the World. – Batsford, London.

Owen, M. & M.A. Ogilvie 1979: Wing molt and weights of Barnacle Geese in Spitsbergen. – Condor 81: 42-52.

Palmer, R.S. 1976: Handbook of North American Birds, Vol 2. – Yale Univ. Pr., New Haven.

Pedersen, A. 1926: Beiträge zur Kenntnis der Säugetier – und Vogelfauna der Ostküste Grönlands. – Meddr Grønland 68(3): 149-249.

Pedersen, A. 1930: Fortgesetzte Beiträge zur Kenntnis der Säugetier- und Vogelfauna der Ostküste Grönlands. – Meddr Grønland 77(5): 341-507.

Petersen, J. 1941: Dagbogsoptegnelser om Fuglenes Forekomst ved Scoresbysund Station fra Efteraaret 1934 til Sommeren 1935. – Dansk Orn. Foren. Tidsskr. 35: 123-125.

Ray, H.P.C. 1973: Some notes on the birds observed in the Kungmiut and Tugtilik Areas of East Greenland during the summer of 1967. – Dansk Orn. Foren. Tidsskr. 67: 43-52.

Rosenberg, N.T., N.H. Christensen & B. Gensbøl 1970: Bird observations in Northeast Greenland. – Meddr Grønland 191(1).

Salomonsen, F. 1968: The moult migration. – Wildfowl 19: 5-24.

Scott, P., J. Fischer & F. Gudmundsson 1953: The Severn Wildfowl Trust Expedition to Central Iceland, 1951. – Wildfowl Trust Ann. Rep. 5: 79-115.

Taylor, J. 1953: A possible moult-migration of Pink-footed Geese. – Ibis 95: 638-642.

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