Migration and winter ranges of birds in Greenland

An analysis of ringing recoveries

PETER LYNGS

More than 280 000 birds have been ringed in Greenland since 1926, resulting in 15 498 recoveries of 43 species. Additionally, 1947 birds of 45 species ringed abroad have been recovered in Greenland. Most of the recoveries are of species economically important in Greenland, such as eiders, auks and gulls.

This paper presents an analysis of the entire Greenland recovery material, the first since 1967. The emphasis is on movements and winter ranges of different bird populations breeding or occurring in Greenland, but summarised information on known population sizes and distributions is also given.

(*Med et dansk resumé: Trækforhold og vinteropholdssteder for fugle i Grønland*)

Contents

Razorbill, Kippaku, Upernavik, W Greenland. Photo: P. Lyngs.

Introduction

In 1967 Finn Salomonsen – who organised and led the Greenland bird ringing scheme for almost 33 years – published the book *Fuglene i Grønland* (Birds of Greenland). Much of the information was based on the 6700 recoveries of birds ringed in Greenland available at that time. Since the book was published the number of recoveries has doubled, but apart from a few papers dealing with single species (e.g. Kampp et al. 1988, Kampp 1988, 1991) very little of the material has been analysed. As Greenland is presently facing increasing wildlife management problems, there has been a growing need to extract and present the information in the recovery data set.

This paper presents a mainly narrative analysis of the 15 498 recoveries of birds ringed in Greenland and the 1947 recoveries of birds ringed abroad and recovered in Greenland up to 2002. Emphasis is placed upon the movements of different bird populations breeding or occurring in Greenland as shown by the recoveries, but recent information on population sizes, distribution and movements shown by satellite telemetry is also summarised.

The Greenland bird migration systems

As a starter – before plunging into a myriad of details – this section provides a broad overview of the Greenland bird migration systems, based on the information extracted from the recoveries. For some species breeding in Greenland, e.g. Red-necked Phalarope *Phalaropus lobatus*, Sabine's Gull *Larus sabini* and Snowy Owl *Nyctea scandiaca*, little or no information is available on their migration, and such species are not considered here.

Species wintering or summering in Greenland. Ravens *Corvus corax*, Rock Ptarmigans *Lagopus mutus* and White-tailed Eagles *Haliaeetus albicilla* remain in Greenland all year (but may still perform considerable movements) as do many Gyrfalcons *Falco rusticolus*. A number of seabird species breeding in W and NW Greenland winter in the Open Water Region (i.e. the coastal area between southern Disko Bay at 69ºN and Nanortalik at 60ºN) of SW Greenland: Great Cormorant *Phalacrocorax carbo*, Mallard *Anas platyrhyrnchos*, diving ducks (Common Eider *Somateria mollissima*, Long-tailed Duck *Clangula hyemalis* and Red-breasted Merganser *Mergus serrator*), large gulls (Iceland Gull *Larus glaucoides*, Glaucous Gull *Larus hyperboreus* and Great Black-backed Gull *Larus marinus*) and auks (Black Guillemot *Cepphus grylle*, Common Guillemot *Uria aalge*, Brünnich's Guillemot *Uria lomvia* and Razorbill *Alca torda*). Generally, northern breeders winter farther north than southern breeders. However, perhaps as much as half the W Greenland population of Brünnich's Guillemot and maybe also Razorbill winters off Newfoundland/Nova Scotia on the Canadian coast, an area that biogeographically could be considered as an extension of the Open Water Region.

On the other hand, large numbers of Brünnich's Guillemots chiefly originating from the NW Baffin Bay of Canada also winter in the Open Water Region, mostly in the northern parts. Likewise, large numbers originating mainly from Svalbard, Jan Mayen and Iceland winter primarily in the southern parts of the Open Water Region. Numbers of Little Auks *Alle alle* from Svalbard and perhaps Jan Mayen and E Greenland also winter in the Open Water Region as do some Icelandic Long-tailed Ducks. Unknown, but probably relatively small numbers of predominantly young Glaucous Gulls from Svalbard and Jan Mayen winter in SE and SW Greenland. Most of the Common Eiders breeding in NE Canada from Hudson Strait northwards also seem to winter in the Open Water Region, northern breeding birds apparently wintering farther north in the Open Water Region than southern birds. Large numbers of King Eiders *Somateria spectabilis* from the Canadian Arctic moult and winter in W Greenland. Many Purple Sandpipers *Calidris maritima* also winter in the Open Water Region. Whether these include birds from outside Greenland (i.e. Iceland), and whether some W Greenland birds winter elsewhere, is not known; the Purple Sandpiper has a complex migration system that is still poorly understood.

Many birds from abroad summer in Greenland waters. Varying numbers of Great Shearwaters *Puffinus gravis* breeding in the South Atlantic moult off the W and SE coast. A few imm. South Polar Skuas *Stercorarius maccormicki* also reach Greenland waters, while large numbers of mainly imm Black-legged Kittiwakes *Rissa tridactyla* from the entire European breeding range spend most of the summer and early autumn along the W

and SE coast. Great Skuas *Stercorarius skua* from Iceland and the British Isles and large numbers of imm. Northern Fulmars from the eastern North Atlantic and the Canadian Arctic also occur in these waters during summer.

Pink-footed Geese from Iceland moult in NE Greenland during late summer. Many waders and the Brent Goose *Branta bernicla* breeding in NE Canada pass Greenland on their annual migrations to and from Europe/Africa, mostly crossing the inland-ice en route. However, few of these birds will normally stage in Greenland.

Pelagic species wintering in the North Atlantic. Northern Fulmars *Fulmarus glacialis* and Black-legged Kittiwakes from Greenland become truly pelagic outside the breeding season. Both species winter somewhere in the western part of the North Atlantic, occasionally reaching the coast of W Europe. At least during autumn and spring, the waters off Newfoundland and Labrador are important areas especially for imm. birds of both species.

Species wintering in Iceland. Little is known about the movements of birds breeding in E Greenland, the most likely candidates for wintering in Iceland. Common Eiders breeding in NE Greenland do winter there, and most of the Iceland Gulls seen in Iceland during winter probably originate from the Greenland E coast, though birds from W Greenland also occur. Some E Greenland Gyrfalcons and Purple Sandpipers likewise winter in Iceland.

Species wintering in Europe and W Africa. A handful of species winter exclusively in western Europe: The Red-throated Diver *Gavia stellata* winters in W European waters from the North Sea south to the Bay of Biscay. Three species of geese winter on the British Isles, using Iceland as a staging site in both spring and autumn. The Pink-footed Goose *Anser brachyrhynchus* breeding in NE Greenland winters in E Scotland and NE England. The White-fronted Goose *Anser albifrons* breeding in W Greenland winters in W Scotland and Ireland, crossing the inland-ice en route to and from the breeding areas. The Barnacle Goose *Branta leucopsis* breeding in NE Greenland winters in W Scotland and W Ireland. Another goose species, the Brent Goose *Branta bernicla* breeding in low numbers in NE Greenland winters in Denmark and in NE England. Red Knots *Calidris canutus* breeding in high-arctic Greenland winter from western France northwards to the German Wadden Sea with the British Isles as the most important wintering area. In spring, Red Knots stage in Iceland (mainly birds breeding in NW Greenland and Canada) and northern Norway (mainly birds breeding in NE Greenland). From there, they migrate directly to breeding grounds, birds breeding in the NW crossing the inland-ice. The spring migration routes are reversed in autumn, with the exception that fewer Nearctic Red Knots seem to stage in Iceland, and that few, if any stage in Norway.

Two wader species, the Sanderling *Calidris alba* and the Ruddy Turnstone *Arenaria interpres*, winter both in W Europe and W Africa. The Sanderlings breeding in NE Greenland winter on Old World Atlantic coasts from the British Isles southwards to at least Ghana. Some Sanderlings moult shortly after arriving in W Europe, while others continue farther south after refuelling. Most birds from the first group probably remain to winter in W Europe, primarily the British Isles, while birds from the other group winter in W Africa. Only a minor proportion of the NE Greenland Sanderlings appear to use Iceland as a stopover site in spring and autumn. The small population of Sanderlings breeding in NW Greenland probably winters in the Americas. Ruddy Turnstones breeding in Greenland winter along E Atlantic coasts from Iceland and central Norway south to Mauritania in W Africa; presumably mostly north of Morocco. Some birds from NW Greenland and NE Canada pass SW Greenland in autumn, probably on their way directly to the British Isles, while others cross the inland-ice en route to staging sites in Iceland. In spring it appears that many of the birds breeding in NW Greenland and NE Canada use Iceland as a staging site before crossing the inland-ice, while many of the birds breeding in NE Greenland use the British Isles as a final spring staging site before migrating directly to the breeding grounds.

Species wintering in W Africa. Three species winter exclusively in W Africa: Ringed Plover *Charadrius hiaticula*, Dunlin *Calidris alpina* and Northern Wheatear *Oenanthe oenanthe*. Some Northern Wheatears may perform a transoceanic migration directly from southern Greenland to Africa, while others move to W Europe and then south to western Africa in one or two stops. In spring, they move more or less directly to W Europe (mainly the British Isles) and onwards. Many may stage in Iceland, most likely birds breeding in W Greenland that need to refuel before crossing the inland-ice. Though not identical, the migration routes of the two waders are much the same. Generally, both move from Greenland to staging sites in W Europe, mainly the British Isles, and then on

to W Africa in one or two steps. In spring this route is reversed. Iceland does not seem to be an important staging site for these species, perhaps with the exception of Ringed Plover in autumn.

Species wintering in America. A number of Greenland species winter in North America. The increasing population of Canada Geese *Branta canadensis* in W Greenland winter in NE USA, while the huge population of Little Auks in NW Greenland primarily winters off Newfoundland. Perhaps as much as half the W Greenland population of Brünnich's Guillemots also winter off Newfoundland and Nova Scotia as does a part of the small Razorbill population. At least some Gyrfalcons from NW Greenland also winter in North America (Canada). Male Peregrine Falcons *Falco peregrinus* winter in South America, females in the Carribean and southern USA. Although small numbers of Mealy Redpolls *Carduelis flammea*, Lapland Buntings *Calcarius lapponicus* and Snow Buntings *Plectrophenax nivalis* may winter in the southern parts of SW Greenland, the great majority of these populations migrates to North America to winter in southern Canada and northern USA.

Species wintering elsewhere. Most of the Ivory Gulls *Pagophila eburnea* of northern Greenland seem to winter along the ice edge in the Labrador Sea and Davis Strait, perhaps circumnavigating Greenland on their annual migration. The Arctic Tern *Sterna paradisaea* winters in the Antarctic, performing the most impressive migration of any Greenland bird; its annual travels may exceed 40 000 km. Snow Buntings from NE Greenland winter on the Russian steppe, using staging sites in northern Norway en route, while small numbers of Snow Buntings, Mealy Redpolls and Lapland Buntings from E Greenland regularly occur in W Europe.

The Greenland bird ringing system

In June 1926 Alfred Bertelsen, a medical doctor stationed in Uummannaq town, ringed the first bird in Greenland. Up to 1934 Bertelsen organised the ringing of 681 birds – mainly Black-legged Kittiwakes, Snow Buntings and eiders – which resulted in 115 recoveries (Bertelsen 1948). Before 1944 some 300 birds were also ringed by other persons, including a few birds ringed under foreign ringing schemes (Kampp 1999).

After the Second World War, Finn Salomonsen established a formal bird ringing scheme in Greenland in cooperation with the Zoological Museum at the University of Copenhagen (ZMUC), the Ministry of Greenland and the Carlsberg Foundation (Salomonsen 1947, 1956, 1966, Mattox 1970, Kampp 1999). The ringing system designed by Salomonsen was unique. From 1946 onwards until 1984 the ringers, mostly local Greenlanders, were paid a small amount of money for each bird ringed. Rings and specially designed notebooks were distributed through local officials, who also paid the ringers at the end of the season and forwarded the ringing reports to ZMUC. Around 1953, the payment for ringing an eagle was equivalent to $ 1.5, an auk 17 cents and a passerine 2 cents. As ringing of eagles were a treat for the few, this system facilitated large scale ringing of colony-nesting birds, such as auks, gulls and terns.

Large numbers of birds were ringed, especially during the 1960s and -70s (Fig. 1). Most of the birds were ringed in the northwestern districts, i.e. from Disko Bay north to Upernavik. These districts held the highest numbers of colony-breeding birds and were the poorest. As the transition from subsistence to a market economy took place, the financial incentive offered became too small for the Greenlanders to encourage them to ring birds. After 1963, birds were also ringed by bird ringing expeditions, but the costs of travelling often proved prohibitive. The numbers of ringed birds dropped steeply after 1980 and in 1984 the payment system was stopped altogether. Since then, most birds

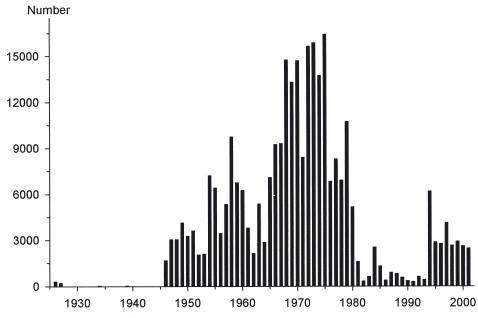


Fig. 1. Annual number of birds ringed in Greenland 1926-2001.
Årligt antal ringmærkede fugle i Grønland 1926-2001.

Kaj Kampp, leader of the Greenland ringing department in Copenhagen since 1984. Photo: P. Lyngs.

Finn Salomonsen and a Greenland ringer. Salomonsen initiated the Greenland ringing scheme in 1946. Photo: S. Brun.

have been ringed by scientific expeditions, special projects, weather station personnel and the Sirius military sledge patrol in NE Greenland.

Since 1946, a small reward has been paid to people returning a ring (both Greenland and foreign) still attached on the leg of the bird. In the 1960s the reward was about 25 cents per returned ring, rising to about $ 3 at present; since 1985 the reward has been paid by the Greenland Home Rule. At present, most rings are returned to local officials who forward them to the Greenland Institute of Natural Resources. The rings and details of the finding circumstances are then forwarded to ZMUC, who still file the recoveries and supply the rings to be used in Greenland.

The Greenland bird hunting legislation

As the majority of all recoveries in Greenland refer to shot birds, an overview of changes in Greenland hunting legislations is pertinent. Up until 1978, numerous changes to bird hunting regulations affected local and single species seasons, but generally most bird species did not have a closed season. The most important of these changes to legislation were: In 1924 paired, moulting and breeding Eiders were protected during summer in SW Greenland south of Kangerlussuaq/Søndre Strømfjord. At the same time the Rock Ptarmigan was protected in W Greenland south of Sisimiut during May-July. All geese breeding in NE Greenland north of Ittoqqortoormiit/Scoresbysund were protected in 1951. In 1960, the Puffin *Fratercula arctica* was fully protected, a closed season for Great Cormorants was introduced during Mar-Sep and the White-tailed Eagle was protected from Nuuk district and northward. In 1964, the Harlequin Duck *Histrionicus histrionicus* was fully protected, followed by the Gyrfalcon, Peregrine Falcon and Snowy Owl in 1971. In 1973, the White-tailed Eagle was fully protected throughout Greenland.

Hunting legislation covering W Greenland from Upernavik and southward was enacted in Jan 1978 (Table 1). This legislation stipulated that all birds within the area were protected, but that the 30 species listed in Table 4 had an open hunting season, generally lasting from 16 Aug to 14 Jun. However, young non-breeding skuas, gulls, Black-legged Kittiwakes and White-fronted Geese in flocks of more than five birds could be hunted in the closed season as could young, non-breeding Eiders, King Eiders and Long-tailed Ducks in flocks of more than five birds north of Nassuttooq/Nordre Strømfjord. Shooting of Black-legged Kittiwakes and Brünnich's Guillemots away from the breeding colonies was allowed until 1 Jul in Ummannaq (but this was revised in Oct 1979 to allow guillemot hunting all summer) and throughout the summer in Upernavik. During the open season, professional hunters could shoot and sell unlimited numbers of birds (except for a daily bag limit of

Table 1. Overview of closed seasons introduced by the two main pieces of Greenlandic bird hunting legislation in the 20th century. The 1978 legislation dealt with W Greenland only, the 1988 with all of Greenland. For details, see text. *Oversigt over fredningstider i de to vigtigste jagtlovsbestemmelser i det 20nde århundrede. 1978-bestemmelsen omfattede kun V Grønland fra Upernavik og videre sydpå, 1988-bestemmelsen hele Grønland. Se i øvrigt teksten for detaljer og undtagelser.*

	1978	1988
Red-throated Diver *Gavia stellata*	15 Jun - 15 Aug	01 Jun - 15 Aug
Great Northern Diver *Gavia immer*	15 Jun - 15 Aug	01 Jun - 15 Aug
Northern Fulmar *Fulmarus glacialis*	15 Jun - 15 Aug	01 Jun - 15 Aug
Great Shearwater *Puffinus gravis*	15 Jun - 15 Aug	
Great Cormorant *Phalacrocorax carbo*	01 Apr - 30 Sep	01 Apr - 30 Sep
Pink-footed Goose *Anser brachyrhynchus*		01 May - 15 Aug
Greater White-fronted Goose *Anser albifrons*	15 Jun - 15 Aug	01 May - 15 Aug
Barnacle Goose *Branta leucopsis*		01 May - 15 Aug
Mallard *Anas platyrhynchos*	15 Jun - 15 Aug	01 Jun - 15 Aug
Common Eider *Somateria mollissima*	15 Jun - 15 Aug	01 Jun - 30 Sep
King Eider *Somateria spectabilis*	15 Jun - 15 Aug	01 Jun - 15 Aug
Long-tailed Duck *Clangula hyemalis*	15 Jun - 15 Aug	01 Jun - 15 Aug
Red-breasted *Merganser Mergus serrator*	15 Jun - 15 Aug	01 Jun - 15 Aug
Rock Ptarmigan *Lagopus mutus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Ringed Plover *Charadrius hiaticula*	15 Jun - 15 Aug	
Red Knot *Calidris canutus*	15 Jun - 15 Aug	
Purple Sandpiper *Calidris maritima*	15 Jun - 15 Aug	
Ruddy Turnstone *Arenaria interpres*	15 Jun - 15 Aug	
Red-necked Phalarope *Phalaropus lobatus*	15 Jun - 15 Aug	
Pomarine Skua *Stercorarius pomarinus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Arctic Skua *Stercorarius parasiticus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Long-tailed Skua *Stercorarius longicaudus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Iceland Gull *Larus glaucoides*	15 Jun - 15 Aug	01 Jun - 15 Aug
Glaucous Gull *Larus hyperboreus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Great Black-backed *Gull Larus marinus*	15 Jun - 15 Aug	01 Jun - 15 Aug
Black-legged Kittiwake *Rissa tridactyla*	15 Jun - 15 Aug	01 Jun - 15 Aug
Common Guillemot *Uria aalge*	15 Jun - 15 Aug	15 Mar - 15 Oct
Brünnich's Guillemot *Uria lomvia*	15 Jun - 15 Aug	15 Mar - 15 Oct
Razorbill *Alca torda*	15 Jun - 15 Aug	
Black Guillemot *Cepphus grylle*	15 Jun - 15 Aug	01 Jun - 15 Aug
Little Auk *Alle alle*	15 Jun - 15 Aug	01 Jun - 15 Aug
Common Raven *Corvus corax*	15 Jun - 15 Aug	01 Apr - 30 Jun

50 eiders), while non-professional hunters were only allowed to shoot for their own consumption.

In May 1988, a new hunting law was introduced, covering all of Greenland (Table 1). A total of seven species was removed from the list of bird species with an open season, while two were added. Generally the closed season was prolonged by two weeks, for some species considerably more. From Disko Bay north to Upernavik, the Common Eider was protected during 1 Jun – 15 Aug, Brünnich's Guillemot during 1 Jun – 31 Aug (but dispensations for extending the guillemot hunting in Upernavik into Jun were regularly given). In Avanersuaq and Ittoqqortoormiit, hunting of Glaucous Gull, Little Auk, Brünnich's Guillemot and Raven was allowed all year round. In Ittoqqortoormiit, Barnacle Goose and Pink-footed Goose were protected from 1 Jun to 31 Aug, but shooting of migrating birds along the ice edge was allowed until 1 Jul. Hunting of guillemots (including Black Guillemot) was only allowed for professional and semi-professional hunters. In Sep 1989, a new law was enacted giving all hunters living permanently in Greenland the right to shoot Brünnich's Guillemots, with a bag limit of 10 guillemots per hunting trip for non-professional hunters. New and stricter legistation was introduced in early 2002, but as it is not relevant for the recovery distributions, it is not detailed here.

The changes in hunting legislation are considered to have had only a limited influence on the temporal and spatial distribution of the recoveries within Greenland, partly because 87% of all recoveries in W Greenland were reported before 1978 (94% before 1988), partly because the legislation apparently was slow to take effect.

Material and methods

A total of 283651 birds of 53 species has been ringed in Greenland up to 31 Dec 2001, resulting in 15498 recoveries/controls of 43 species (Table 2, Fig. 1, 2). About 14% of the recoveries are of birds ringed in E Greenland, 86% in W Greenland; among these 52% were ringed in Upernavik and Uummannaq combined. The majority (79%) of the recoveries are of colonial seabirds (mainly auks, eiders and gulls). A total of 139857 birds was recovered in Greenland, 1628 in other countries. Among birds recovered in W Greenland from Nanortalik to Upernavik, the majority (78%) were reported as killed by man, 1% were caught in fishing nets, while for 8% no recovery cause was given; numerous other recovery causes were given for the remaining 13% (including two birds hit by a car). Among 9315 recoveries of seabirds (Northern Fulmars, Great Cormorants, diving ducks, auks and gulls) from this area, 90% were killed and 1% were caught in fishing and seal nets; for 8% no recovery information was given. Salomonsen (1947, 1948, 1949, 1950a, 1952, 1955, 1957, 1959, 1961, 1965, 1967a, 1971a, 1971b, 1979a) published lists of ringing totals and recoveries abroad up to 1974, and a list of foreign recoveries in Greenland before 1971. No lists have been published since.

A total of 1947 birds of 45 species ringed abroad has been recovered in Greenland up to 31 Dec 2001 (Table 2, Fig. 2). Of these, 1791 (92%) were ringed in Great Britain (400), Canada (386), Iceland (289), Russia (277), Svalbard (266) and mainland Norway (173), the remaining in 17 other countries including the Antarctic and Mauritania. Most (80%) of the foreign birds reported were seabirds (1545; 764 Black-legged Kittiwake, 543 Brünnich's Guillemot), 94 were geese, 73 ducks and 199 waders; only 6 were passerines. 85% of the foreign birds were reported as shot or caught, while for 8% no recovery cause was given. Most of the birds (1638; 84%) were recovered in W Greenland between Upernavik and Nanortalik.

Compared with recovery information from other countries, the data from within Greenland is unique in several ways. For example, most of the recoveries refer to shot birds that were largely recovered before closed hunting seasons were generally introduced in 1978, and the recoveries are, due to the geographical shape of Greenland, roughly distributed along a north-south axis. A detailed breakdown of the material is given under the species concerned.

Under the heading RECOVERIES, the recovery data of birds ringed is presented, as well as details of foreign birds recovered in Greenland. In this section, the abbreviation GRC refers to recoveries of birds ringed in Greenland, FRC to recoveries of birds ringed abroad and recovered in Greenland. In the MOVEMENTS section, present knowledge on distribution and population size is summarised, and movements of the various populations are described and discussed.

The bird species are listed in the sequence used by Voous (1977). The age terminology shown in Table 3 is used throughout the paper. In all temporal analyses presented, only recoveries with a date

Table 3. The age terminology used in this the paper.
Aldersangivelser anvendt i denne artikel.

Abbreviation	Full	Note	Example
C[1]	calendar year	from Jan 1 to Dec 31	2C = second calendar-year (between a half and one and a half years old)
Y[1]	year of life	follows the breeding season (approx. birthdate)	2Y = second year of life (between 1 and 2 years old)
W	winter	covers the period Sep - Apr	2W = second winter (roughly one and a half years old)
S	summer	covers the period May - Aug	2S = second summer (roughly two years old)
ad.	adult	mature bird in full adult plumage	
imm.	immature	non-adult	
juv.	juvenile	young, fledged bird in first plumage of true feathers	
chick		young, not yet fledged bird	
older		includes all birds not ringed as chicks	

[1]A + after the age term indicate that the bird(s) are of the given age or older (e.g. 3Y+ = third year of life or older).
Et + efter aldersangivelsen viser at fuglen er af den givne alder eller ældre (3Y+ = tredje leveår eller ældre).

Tabel 4. The geographical subdivisions of Greenland used in this paper. For details, see text and Map 1.
Inddelingen af Grønland. Forkortelserne for hver distrikt er brugt i hele artiklen; se i øvrigt tekst og Kort 1.

Greenlandic	Danish/English	Abbr.	Coordinate of town
Avanersuaq	Thule	AVA	77°28'N 69°14'W
Upernavik	Upernavik	UPV	72°47'N 56°10'W
Uummannaq	Umanak	UMA	70°41'N 52°07'W
Qeqertarsuaq	Godhavn	QEQ	69°15'N 53°52'W
Ilulissat	Jakobshavn	ILU	69°14'N 51°03'W
Aasiaat	Egedesminde	ASI	68°42'N 52°52'W
Qasigiannguit	Christanshåb	ASI	68°49'N 51°11'W
Kangaatsiaq	Kangatsiaq	KAN	68°19'N 53°28'W
Sisimiut	Holsteinsborg	SIS	66°56'N 53°38'W
Maniitsoq	Sukkertoppen	MAN	65°25'N 52°53'W
Nuuk	Godthåb	NUU	64°12'N 51°41'W
Paamiut	Frederikshåb	PAA	62°00'N 49°40'W
Narsaq	Narsaq	QAT	60°55'N 46°04'W
Qaqortoq	Julianehåb	QAT	60°43'N 46°02'W
Nanortalik	Nanortalik	QAT	60°08'N 45°14'W
Ammassalik	Ammassalik	AMM	65°36'N 37°38'W
Ittoqqortoormiit	Scoresbysund	ITT	70°29'N 21°58'W
	Nordøstgrønland Northeast Greenland	NEA	
	Nordgrønland North Greenland	NOR	

accuracy of within two weeks of the date coded or less (Euring codes 0-4) have been included. All distances and directions given are loxodrome, calculated using the formulae in Imboden & Imboden (1972). A list of longevity records is given in Appendix 1.

With few exceptions, the municipalities of W Greenland have been used as geographical sub-divisions (Map 1, Table 4). In two areas, however, some small municipalities are joined under the name of the largest town: Nanortalik, Narsaq and Qaqortoq/Julianehåb have been combined under the name "Qaqortoq", while Aasiaat/ Egedesminde and Qasigiannguit/Christianshåb have been combined under the name "Aasiaat". Also, the small municipality of Ivittuut/Ivigtut is included in Paamiut/Frederikshåb. In some situations Qeqertarsuaq/Godhavn, Ilulissat/Jakobshavn, Qasigiannguit/Christianshåb and Aasiaat/ Egedesminde are combined and collectively called Disko Bay. Thus, the division used in this paper are practically the same as those used by Boertmann (1994), and roughly similar to the former districts referred to in Salomonsen's works. Towns are referred to using the Greenlandic name only. For other localities both the Greenlandic and Danish name are given where possible. The municipalities and subdivisions used in the present paper are referred to as districts and identified by a three-letter abbreviation in capitals (Table 4). "East Greenland" refers to the districts of NOR, NEA, ITT and AMM combined, while "West Greenland" refers to the remaining districts. Note that the districts AVA, NOR and NEA approximately form the high-arctic zone, while the remaining districts form the low-arctic zone. In the species account, the coastal area between southern Disko Bay and Nanortalik (i.e. between 69ºN and 60ºN) is referred to as the Open Water Region, an area that is very important for wintering seabirds (e.g. Merkel et al. 2002 and references therein).

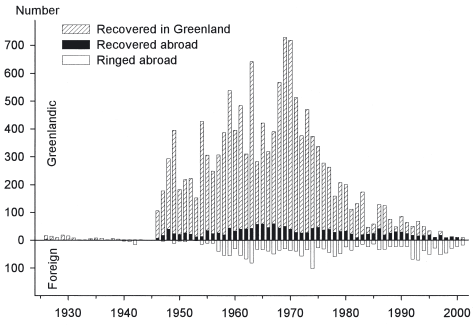
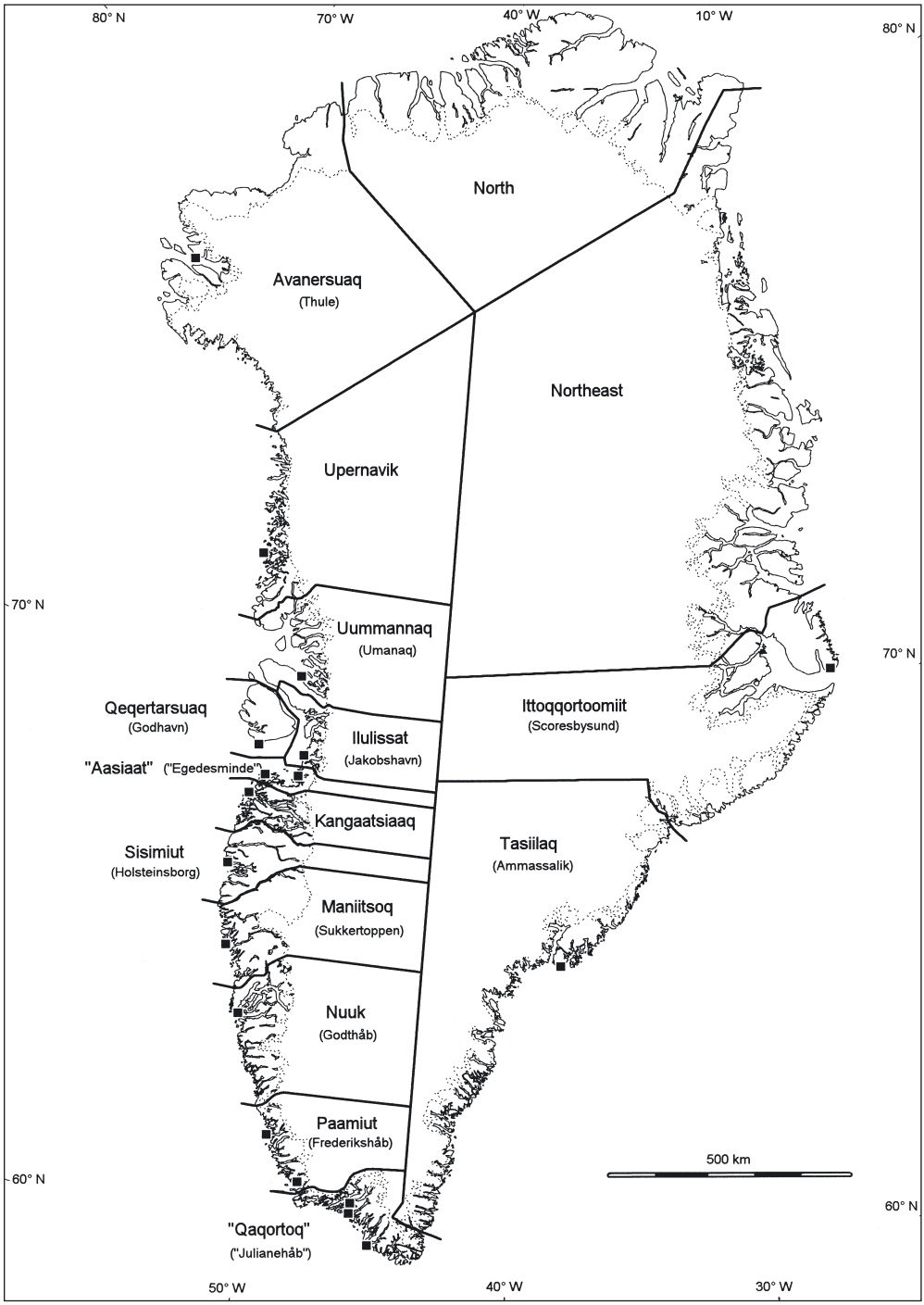


Fig. 2. Annual numbers of recoveries 1926-2001. Recoveries of birds ringed in Greenland are shown upwards, while recoveries in Greenland of birds ringed abroad are shown downwards.
Årligt antal genfund 1926-2001. Genfund af fugle ringmærket i Grønland er vist opad, mens genfund af udenlandske fugle i Grønland er vist nedad.

Table 2. Number of birds ringed in Greenland 1926-2001. The number of Greenland birds recovered as well as the number of birds ringed abroad and recovered in Greenland are also given.
Antal fugle ringmærket i Grønland 1926-2001 sammen med antallet af genmeldte grønlandske fugle og antallet af udenlandske fugle genmeldt i Grønland.

	1926-1945	1946-1974	1975-2001	Total	Recovered	Foreign recoveries
Red-throated Diver *Gavia stellata*		93	13	106	15	
Great Northern Diver *Gavia immer*		1		1		
Northern Fulmar *Fulmarus glacialis*	2	15456	3650	19108	713	28
Great Shearwater *Puffinus gravis*						4
Manx Shearwater *Puffinus puffinus*						1
Northern Gannet *Sula bassana*						1
Great Cormorant *Phalacrocorax carbo*		1657	63	1720	289	
Pink-footed Goose *Anser brachyrhynchus*		73	29	102	15	39
White-fronted Goose *Anser albifrons*	13	1380	347	1740	416	18
Canada Goose *Branta canadensis*		1	152	153	76	2
Barnacle Goose *Branta leucopsis*		1563	930	2493	722	23
Brent Goose *Branta bernicla*						12
Teal *Anas crecca*						3
Mallard *Anas platyrhynchos*		515	8	523	60	
Pintail *Anas acuta*						2
Ring-necked Duck *Aythya collaris*						1
Eider *Somateria mollissima*	87	4348	2030	6465	2134	48
King Eider *Somateria spectabilis*	2	6421	31	6454	1475	8
Harlequin Duck *Histrionicus histrionicus*		10	51	61	2	1
Long-tailed Duck *Clangula hyemalis*		230	3	233	32	10
Red-breasted *Merganser Mergus serrator*		73	1	74	5	1
White-tailed Eagle *Haliaeetus albicilla*		144	38	182	41	
Merlin *Falco columbarius*						1
Gyrfalcon *Falco rusticolus*		81	147	228	14	
Peregrine *Falco peregrinus*		90	2427	2517	393	22
Rock Ptarmigan *Lagopus mutus*		174	51	225	26	
Oystercatcher *Haematopus ostralegus*						3
Ringed Plover *Charadrius hiaticula*		174	187	361	12	12
Golden Plover *Pluvialis apricaria*		1		1		
Red Knot *Calidris canutus*		41	92	133	4	137
Sanderling *Calidris alba*		328	282	610	4	4
Baird's Sandpiper *Calidris bairdii*		5	2	7		
Purple Sandpiper *Calidris maritima*		293	20	313	37	3
Dunlin *Calidris alpina*		226	495	721	24	4
Ruddy Turnstone *Arenaria interpres*		257	343	600	27	36
Red-necked Phalarope *Phalaropus lobatus*		414	51	465	2	
Grey Phalarope *Phalaropus fulicarius*		21	25	46		
Pomarine Skua *Stercorarius pomarinus*		15		15		
Arctic Skua *Stercorarius parasiticus*		101	6	107	22	6
Long-tailed Skua *Stercorarius longicaudus*		19	133	152	2	
Great Skua *Stercorarius skua*						82
South Polar Skua *Stercorarius maccormicki*						1
Sabine's Gull *Larus sabini*			46	46		
Black-headed Gull *Larus ridibundus*						5
Lesser Black-backed Gull *Larus fuscus*						3
Herring Gull *Larus argentatus*						3
Iceland Gull *Larus glaucoides*	19	2512	99	2630	64	1
Glaucous Gull *Larus hyperboreus*	32	2892	161	3085	247	31
Great Black-backed Gull *Larus marinus*		350	101	451	99	4
Black-legged Kittiwake *Rissa tridactyla*	381	12596	56	13033	811	764
Ivory Gull *Pagophila eburnea*		231		231	61	29
Arctic Tern *Sterna paradisaea*		51647	23068	74715	523	1
Common Guillemot *Uria aalge*			324	324	21	3
Brünnich's Guillemot *Uria lomvia*	4	58838	19558	78400	3142	543
Razorbill *Alca torda*		136	54	190	11	2
Black Guillemot *Cepphus grylle*		10262	426	10688	1337	13
Little Auk *Alle alle*		9806	2538	12344	597	18
Atlantic Puffin *Fratercula arctica*		121	21	142	8	8
Snowy Owl *Nyctea scandiaca*			7	7		
Meadow Pipit *Anthus pratensis*		3	5	8		
Buff-bellied Pipit *Anthus rubescens*			1	1		
Northern Wheatear *Oenanthe oenanthe*		2724	1560	4284	35	
Common Raven *Corvus corax*		118	384	502	85	
Mealy Redpoll *Carduelis flammea*		531	9399	9930	31	
Arctic Redpoll *Carduelis hornemanni*	8	1	115	124		
Lapland Bunting *Calcarius lapponicus*	29	2978	4241	7248	119	
Snow Bunting *Plectrophenax nivalis*	155	13204	5993	19352	1168	6
Total	732	203155	79764	283651	15498	1947



Map 1. Map of Greenland showing the geograpical subdivisions used in this paper. In W Greenland the borders roughly follow the borders of the municipalities. Note however that "Qaqortoq" refers to the united municipalities of Nanortalik, Qaqortoq/Julianehåb and Narsaq, while "Aasiaat" refers to the united municipalities of Qasigiannguit/Christianshåb and Aasiaat/Egedesminde. The thin dotted line demarcates the inland-ice and larger ice caps, major towns are shown by filled squares.

Kort 1. Grønland med den her anvendte inddeling. Se i øvrigt tekst og Tabel 3. Den tynde stiplede linie viser udbredelsen af indlandsis, fyldte firkanter de større byer.

Species accounts

Red-throated Diver

Gavia stellata

RECOVERIES

15 GRC (Table 5, Map 2) of birds ringed in Jul-Aug 1950-1979.

Upernavik: A juv. ringed near Aappilattoq was shot near Kristianssand, Norway (3280 km ESE), in Nov 98 days later. Three birds were shot near the ringing site 0 (7 days), 1 and 2 years later, respectively.

Uummannaq: A juv. ringed somewhere in UMA was shot in QEQ two years later.

Qeqertarsuaq: A bird ringed near Aamaruutissat/Skansen was shot in early Sep 64 days later 40 km away.

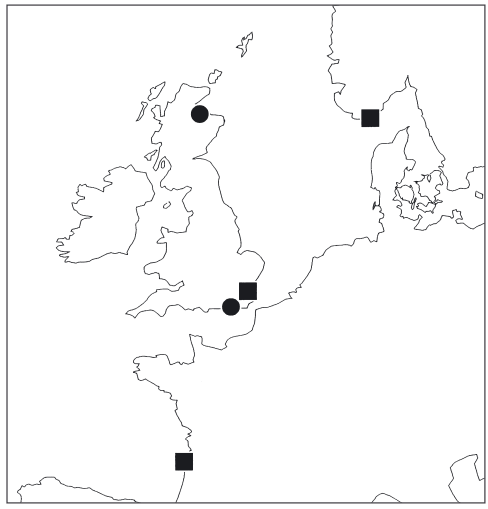
Ilulissat: An ad. bird ringed near Saqqaq was found dead in Dordogne, France (4100 km SE), in Feb nine years later. Three recoveries in Greenland were essentially local: One was shot near the ringing site in late Sep, 50 days after ringing. Two were shot <50 km and <120 km from the ringing site two and three years later, respectively.

Aasiaat: A juv. ringed near Ikamiut was found dead in Essex, England (3400 km SE), in Oct nine years later.

Ammassalik: A bird ringed at Qulleq in the southernmost part of AMM was shot nearby 22 days later.

Ittoqqortoormiit: An ad. bird ringed Aug 1979 was caught in a fishing net off northwestern Iceland 15 May 1998.

Northeast Greenland: An ad. ringed at Hvalrosodden was found dead in the Grampian Region, Scotland (2240 km SSE), in Feb three years later, while a bird (age unknown) ringed near Daneborg was found in Kent, England (2720 km SSE), in Mar nine years later.



Map 2. Red-throated Divers recovered abroad (n = 5). Filled circles denote birds ringed in E Greenland, filled squares birds ringed in W Greenland. A recovery in Iceland is excluded.

Kort 2. Genfund af Rødstrubet Lom i udlandet (n = 5). Fyldte cirkler viser fund af fugle ringmærket i Østgrønland, fyldte firkanter af fugle mærket i Vestgrønland. Et genfund i Island er udeladt.

MOVEMENTS

The Red-throated Diver is a widespread and common breeder in most parts of Greenland, arriving at the breeding grounds in May – early Jun and departing in Aug-Sep. A few may linger on into Nov (Boertmann 1994) and may even winter (L. Witting in litt.). The recoveries abroad suggest that a large part of the entire Greenlandic population winters in W European waters (from the North Sea south to the Bay of Biscay). Apparently some birds stage off northwestern Iceland in spring before

Table 5. Ringing details of recovered Red-throated Divers, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Rødstrubet Lom, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	1		3	4	1
UMA	1			1	
QEQ			1	1	
ILU		1	3	4	1
ASI	1			1	1
AMM			1	1	
NEA		1	1	2	2
Total	3	2	9	14	2

moving on to (E) Greenland. It cannot be excluded that some birds, e.g. from the Qaanaaq/Thule-area, winter along the E coast of North America. Most of the western Palearctic population seems to winter in the North Sea and in the Baltic (Danielsen et al. 1993, Durinck et al. 1994, Okill 1994, Skov et al. 1995), while the Nearctic population mainly winters off the coast of the USA (Palmer 1962).

Northern Fulmar

Fulmarus glacialis

RECOVERIES

713 GRC (Table 6) of birds ringed May-Sep 1946-1986, 28 FRC of birds ringed Mar-Nov 1942-1983 (Table 7, Map 3). Age at ringing was not reported for a total of 230 Greenland birds; of these 134 were ringed in Sep, mostly in UMA among series of several hundred unaged birds ringed in a few days. As the vast majority of these were in all probability newly fledged chicks, they have been assigned to this age-class.

Upernavik: Four birds (1 ad., 3 unaged) were recovered locally 6 days – 8 years later (latest recovery 7 Nov) and 3 birds (2 ads, 1 unaged) were recovered within the district 170-350 km away from the ringing site 17 days – 18 years later. A chick ringed 14 Sep 1960 was shot in UMA (195 km SSE) 17 days later and a chick ringed in 1963 was shot in UMA five years later 240 km SE. Two birds ringed in early Jul 1956 were recovered in ILU (450 km SSE) and ASI (465 km SSE) 9 and 6 years later, respectively.

Uummannaq: Large numbers of Northern Fulmars have been ringed in UMA, especially during 1950-75. Of the resulting 688 recoveries, 618 were from UMA, 340 (302 chicks, 4 ads, 34 unaged) of these less than 85 days after ringing. Among the latter, only 24 birds ringed as chicks were recovered after Sep, the latest dated 1 Nov, which also is the latest date of any recovery in UMA. The northernmost recovery within Greenland was of a bird ringed as a chick and shot in AVA 29 Aug 12 years later, the southernmost of two birds ringed as chicks recovered in QAT in early Sep – mid Oct, 13 and 40 days after ringing.

In spring, the earliest bird in UMA (an ad.) was recovered 12 Apr, the next on the 24th, but most birds were recovered from the end of Apr onwards (Table 8 and 9). Among birds ringed as chicks and recovered in UMA one or more years later (Fig. 3), older birds (6C+; Table 9, Fig. 4) were recovered significantly earlier in the breeding season than imm. birds (2-5C; $\chi_6^2 = 64.3$, $P < 0.0001$). Young birds (2-5C) were primarily recovered in Jul-Sep (Table 9), i.e. late in the season, while 6-7C birds and older birds (8C+) were mostly recovered in May-Jul. A British study (Dunnet et al.1979, Dunnet 1992) showed that some Northern Fulmars started breeding when five years old but the mean age of first breeding was eight years for males and 12 years for females.

Sixty-two of 72 (86%) birds ringed as chicks and recovered in Greenland as older than seven years during May-Aug were reported in UMA; the corresponding figures for birds ringed as ads were 29 of 34 (85%). The 15 birds recovered elsewhere were found 115-885 (median 192) km from the ringing site and mostly (11) in the Disko Bay area which may be an important feeding area for UMA-birds. Depending on the stage of the breeding cycle, Northern Fulmars may feed some 50-600 km from the colony; the longest foraging trips usually occur during the pre-laying exodus and after the brooding period (Dunnet & Ollason 1982, Hatch & Nettleship 1998, Weimerskirch et al. 2001). As it is not possible to assign most of the

Table 6. Ringing details for recovered Northern Fulmars, broken down according to age and ringing district. A total of 134 unaged birds ringed in Sep have been assigned as chicks (see text).
Ringmærkningsdata for genfund af Mallemuk, opdelt efter mærkningsalder og -distrikt. 134 ikke-aldersbestemte fugle ringmærket i sep er regnet som unger (se tekst).

	Ringed as				
Ringed	Chick*	Older	Unknown	Total	Recovered abroad
UPV	2	3	6	11	
UMA	557	40	91	688	23
QEQ	6			6	
ILU	2	1	1	4	1
ASI		2	1	3	
PAA			1	1	
Total	567	46	100	713	24

* Incl. newly fledged birds *Omfatter nyligt udfløjne unger.*

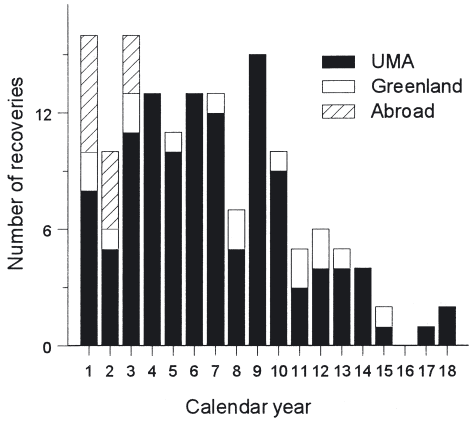
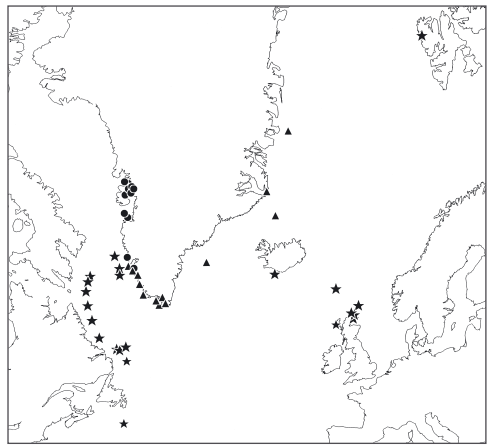


Fig. 3. Age (year of life) distribution of Northern Fulmars ringed as chicks in UMA and subsequently recovered as 2C+ in UMA (n = 190), in other parts of Greenland (n = 16) and abroad (n = 13).
Aldersfordeling (leveår) hos Mallemukker ringmærket som unger i UMA og senere genmeldt som 2C+ i hhv. UMA, i andre dele af Grønland og i udlandet.



Map 3. Ringing and recovery sites for foreign-ringed Northern Fulmars. Stars denote ringing sites. Recoveries of birds ringed west of Greenland are shown by filled circles, while recoveries of birds ringed east of Greenland are shown by filled triangles.
Kort 3. Ringmærknings- og genfundssteder for Mallemukker mærket af udenlandske centraler. Stjerner viser mærkningssted. Genfund af fugle mærket vest for Grønland er angivet med fyldte cirkler, mens genfund af fugle mærket øst for Grønland er vist med fyldte trekanter.

birds recovered in UMA to a specific colony, short distance emigration, i.e. less than a few hundred km, cannot be quantified. The summer recoveries of older birds do, however, suggest that long distance emigration may be exceptional. In a British study, 89-94% of the birds surviving to breeding age were estimated to emigrate and one was found breeding 220 km from its natal colony (Dunnet et al. 1979).

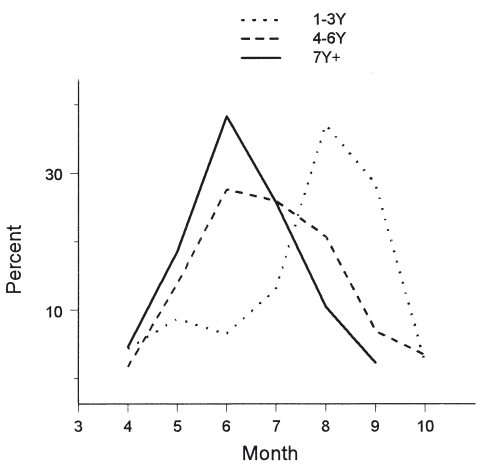


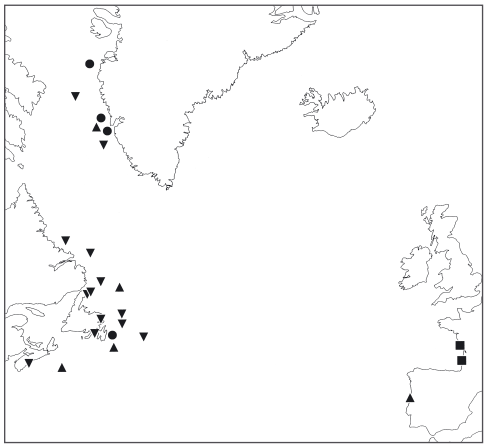
Fig. 4. Monthly distribution of different age-classes of Northern Fulmars ringed as chicks in UMA and subsequently recovered in UMA (1-3Y, n = 46; 4-6Y, n = 58; 7Y+, n = 86).
Månedsvis fordeling af Mallemukker ringmærket som unger i UMA og senere genmeldt i UMA.

Twenty-three birds (21 ringed as chicks, 2 unaged) were recovered abroad: Six birds were recovered in the Davis Strait (Apr-Nov) 2-4 years later, 2 in the Labrador Sea 16-23 days later (Sep-Oct; 114 and 78 km/day), ten in Newfoundland (Mar-Apr 2, Sep-Nov 8) 32-748 days later, 2 in Nova Scotia (Oct 26 days later, 116 km/day and Apr 227 days later), 2 in France (Jan 10 years later, bird unaged; Feb 514 days later) and 1 in Portugal (Mar, 514 days later). In autumn the earliest recovery in the Newfoundland area was dated 7 Sep (a one year old bird found dead). First-year birds have reached Labrador 25 Sep and 5 Oct (16-23 days after ringing, c.1815 km S), Newfoundland 12 Oct (32 days after ringing, 2070 km S) and Nova Scotia 5 Oct (26 days after ringing, 3020 km SSW). The latest autumn recoveries are dated 29 Oct (Newfoundland) and 20 Nov (Davis Strait). In spring only 3 birds have been recovered in these areas (late Mar – late Apr; note, however, that 4 birds ringed here in early Mar – mid Apr subsequently were recovered in Greenland).

Qeqertarsuaq: Four birds ringed as chicks were recovered locally on the day of ringing. A bird was recovered somewhere in W Greenland four years later while another, ringed 10 Sep 1955, was shot in UMA in Jul 1961 (150 km N).

Table 8. Temporal and spatial distribution of Northern Fulmars ringed in UMA and recovered in Greenland. Only birds found more than 15 days after ringing are included in recoveries from UMA.
Tidsmæssig og geografisk fordeling af Mallemukker ringmærket i UMA og genmeldt i Grønland. Kun fugle genmeldt mere end 15 dage efter ringmærkningen er inkluderet i genfundene fra UMA.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
AVA					1				1
UPV					2	1			3
UMA	8	35	70	52	46	83	15	3	312
QEQ	1	1	1	2	1				6
ILU			2	7	2				11
ASI			2	1	2				5
KAN				1	3				4
SIS					1	1			2
NUU				1	1				2
QAT						1	1		2
Total	9	36	75	64	59	86	16	3	348



Map 4. Recoveries abroad of Northern Fulmars ringed in Greenland (n = 24). Triangles pointing downwards denote recoveries from Sep-Nov, squares recoveries from Dec-Feb, triangles pointing upwards recoveries from Mar-Apr, circles May-Aug.
Kort 4. Genfund i udlandet af Mallemukker ringmærket i Grønland. Nedadvendte trekanter angiver genfund i sep-okt, firkanter fra dec-feb, opadvendte trekanter fra mar-apr, cirkler fra maj-aug

Ilulissat: A chick-ringed bird was shot three years later 60 km S and 2 birds ringed as ads were recovered 8-20 years later 110-130 km from the ringing site. A chick ringed 12 Sep 1961 was caught in fishing-gear 3 May 1963 off St. John's, Newfoundland (2505 km S).
Aasiaat: A bird ringed in Aug was recovered locally five days later. Two birds ringed as ads 20 Jul 1946 were shot in Jul 1951 in QEQ (63 km N) and ILU (160 km NNW).
Paamiut: A bird ringed in summer 1953 was shot in UMA 19 Aug 1965, 1080 km N.

Table 7. Country of origin and age of ringing for Northern Fulmars ringed abroad and recovered in Greenland.
Mærkningsland og -alder for Mallemukker ringmærket i udlandet og genfundet i Grønland.

	Ringed as			
Ringed	Chick	Older	Unknown	Total
At sea		15		15
Britain	7			7
Faeroe Isl.	1			1
Iceland		4		4
Svalbard	1			1
Total	9	19		28

Foreign recoveries: Fifteen individuals ringed as full-grown birds in the Davis Strait south to the Grand Banks off Newfoundland (Mar-May 6, Jul-Nov 9) were recovered in Greenland: Ten were shot in UMA Apr-Sep 1-6 years later, 1 in ILU in Jul two years later and 2 in ASI in summer 47 days – 8 years later; a bird ringed on Fyllas Banke in Sep was shot in MAN 20 days later, and a bird ringed on the Grand Banks in Mar 1953 was shot on Fyllas Banke in Oct 1959.

Nine birds ringed as chicks in Svalbard (1), the Faeroes (1) and Scotland (7) were recovered in Greenland: Seven were recovered from QAT northwards to NUU in Jul-Oct 1-3 years later, 2 at sea off the coast of E Greenland (a two-year old bird ringed in Orkney off Ittoqqortoormiit/Scoresbysund in Oct and a 17 year old bird from Svalbard at 74ºN in May, 900 km from the ringing site).

Four birds ringed as full-grown in southern Iceland in Apr-Jun were recovered in SW Greenland (2 in Aug-Oct 4-5 years later) and in E Greenland (2; 1 near Ittoqqortoormiit/Scoresbysund in Aug 133 days later and 1 at sea at 64ºN in late May 5 years later).

Table 9. Temporal distribution of recoveries of Northern Fulmars ringed as chicks in UMA and subsequently reported in UMA.
Tidsmæssig fordeling af Mallemukker ringmærket som unger i UMA og senere genmeldt i UMA.

Age	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
2C		2	2	4	2	5		15
3C		1	1		5	4	1	12
4C	2	1		2	10	4		19
5C			3	3	8	4	1	19
6C	1	5	5	5	4		1	21
7C		3	8	7				18
8C+	4	16	33	22	9	2		86

MOVEMENTS

The Northern Fulmar is a numerous but localised breeder in Greenland. On the W coast, the vast majority breeds in QEQ, UMA and southern UPV; there are a few small colonies south of Disko Bay and one large in AVA. On the E coast, some 20 small colonies are found from Kangertittivaq/Scoresby Sund north to Amdrup Land at about 81ºN (Boertmann 1994, Falk & Møller 1995a). The W Greenland breeding population numbers at least 80 000 pairs, but is probably much larger; the E coast population totals about 4000 pairs (Boertmann et al. 1996).

Little is known about the movements of the E coast population. Even in high-arctic NE Greenland, the breeding population arrives in late Apr – early May and departs in early Sep (Boertmann 1994, Falk & Møller 1997). Falk & Møller (1995b) tagged some birds with satellite transmitters at Mallemukfjeld, Holm Land (80º11'N). After abandoning the nest, one bird, tracked for 2043 km (average 143 km/day), moved southeastward to fishing grounds between Bear Island and northern Norway. Based on biometrics of dark morph Northern Fulmars caught off southeast Labrador during the first half of May, Brown (1973) argued that numbers of birds from the European Arctic populations (i.e. E Greenland to Franz Josef Land) reached Labrador and Newfoundland. The time of catching suggests that these birds were mainly non-breeders.

Largely based on results from the ringing in UMA, more information is available on the movements of W Greenland Northern Fulmars. The breeding population generally arrives at the colonies in late Apr – early May. Most Northern Fulmars appear to have left W Greenland coastal waters by late Oct (Table 8), including ads, imms and birds from foreign populations; the latest recoveries in W Greenland are from 1 Nov (1C birds) and 7 Nov (ad.). After fledging, the young birds move southwards, some following the Greenland coast as far south as QAT, others crossing the Baffin Bay/Davis Strait en route to Labrador and farther south to the banks off Newfoundland and Nova Scotia. At least some young birds undertake these journeys rapidly, as suggested by recoveries in QAT 28 Sep (94 km/day), Labrador 25 Sep (114 km/day) and Nova Scotia 5 Oct (116 km/day). During autumn (25 Sep – 18 Nov), seven 1C birds have been recovered along the Canadian E coast from Labrador south to Nova Scotia, compared to three recoveries in W Greenland outside the breeding areas. A total of eight 2-3C birds (but none older) has been recovered in Newfoundland/Nova Scotia, all during Mar-May and Sep-Oct. There are no reports of any age-class of W Greenland Northern Fulmars along and off the Canadian coast during Dec-Feb. Major year-round concentrations of Northern Fulmars occur along the Canadian coast, especially on the Grand Banks off Newfoundland (Tuck 1971, Brown 1986, Hatch & Nettleship 1998). Numbers of imm. British Northern Fulmars also reach Canadian waters (Tuck 1971, Macdonald 1977) and though mostly recovered during Mar-Nov, two have been recovered in Dec-Jan. It is tempting to speculate that many W Greenland imms leave Canadian waters by Nov-Dec, moving eastwards into the Atlantic; though probably storm-driven, some imms reach the European coast in late winter (Map 4). However, due to the small sample size and the high spatial and temporal variation in recovery probabilities at sea, it is, as stated by Macdonald (1997), "impossible to regard an absence of recoveries as an absence of fulmars". Even so, the absence of recoveries from Newfoundland/Nova Scotia during Jun-Aug could indicate that most of the imm. Greenland birds leave these areas during late spring, moving north to Labrador, the Davis Strait and Greenland waters. At least, some imm. birds have been recovered in their natal area, especially during Aug – early Sep (Table 9 and above).

Almost nothing is known about the movements

of older (4C+) W Greenland Northern Fulmars. There is only one recovery outside Greenland and the Davis Strait, an at least 10 year old bird found dead in Jan in western France. This recovery shows that some ads may move considerable distances into the Atlantic, but it seems reasonable to assume that most remain closer to the breeding areas (i.e. in open water areas in the Davis Strait and off SW Greenland), as do other Northern Fulmar populations (cf. Macdonald 1977). Northern Fulmars are common during winter in open water areas off southern Greenland (Boertmann 1994, Durinck & Falk 1996, see also Mosbech & Johnson 1999 and Merkel et al. 2002).

Numbers of mainly imm. Northern Fulmars from other populations occur in SW and E Greenland waters during summer and autumn, where birds ringed in Britain, the Faeroes, Iceland and Svalbard have been recovered. Additionally, many dark morph birds occur off W Greenland during summer (Boertmann 1994), suggesting that some Northern Fulmars – probably mostly imms – from the large colonies on Baffin Island feed in Greenland waters (D. Boertmann in litt.).

Great Shearwater *Puffinus gravis*

4 FRC: Three birds ringed as ads on Nightingale Island, Tristan da Cunha, in Feb 1938 (2) and Sep 1951 (1) were recovered 16 Aug 1956 off Maniitsoq town (MAN; 11 990 km NNW), 4 Aug 1938 on Lille Hellefiskebanke off MAN (11 970 km NNW) and in Aug somewhere in W Greenland 1939, respectively. Another bird, ringed at sea off Newfoundland (47°50'N 44°30'W) in Jun 1965 was shot off Atammik (MAN; 1945 km NNW) on 20 Aug 1966. These recoveries illustrate a part of the impressive annual travel of the Great Shearwater. From the breeding grounds in the S Atlantic the birds perform a transequatorial migration, reaching the Atlantic coast of North America in May-Jun. They continue to the Labrador Sea/Davis Strait where the greatest numbers are present in early Aug; the Great Shearwater is usually numerous along the Greenland W coast north to Sisimiut/Holsteinsborg and occasionally Disko Bay, but actual numbers vary from year to year (Boertmann 1994). Many also occur in the southern part of the Irminger Basin off SE Greenland (Skov et al. 1994), and rather large numbers have been recorded as far north as off Tasiilaq/Ammassalik (Boertmann 1994). After completing primary moult, the Great Shearwaters start a rapid return passage along a more easterly route, and by mid Sep most ad. birds have reached their breeding grounds (Cramp 1998). For a detailed review of the migration, see Huettmann & Diamond (2000).

Northern Fulmars, Uummannaq, W Greenland. Photo: P. Lyngs.

Manx Shearwater
Puffinus puffinus

1 FRC: A bird ringed as a chick at the Isle of Rhum, Scotland, 7 Sep 1974 was shot near Saarloq (QAT; 2320 km W) 2 Aug 1985. This recovery constitutes the second record in Greenland (Boertmann 1994).

Northern Gannet *Sula bassana*

1 FRC: A bird ringed as a chick at Sulnasker, Vestmanna, Iceland in mid Aug 1974 was shot near Killiit/Fortunebay (QEQ; 1625 km WNW) 6 Jul three years later. Small numbers of Northern Gannets visit southern Greenland annually during summer and autumn (Boertmann 1994).

Great Cormorant
Phalacrocorax carbo

RECOVERIES

289 GRC (Table 10) of birds ringed in Jul-Sep 1946-1980; ringing has been carried out in many of the Greenland colonies (cf. Map 5 and Boertmann & Mosbech 1997). The 28 unaged birds were most likely all ringed as chicks, and are treated as such here. Excluding 17 birds with uncertain finding dates, 82% were recovered when in their first or second calendar year (1-2C 222, 3-4C 31, 5C+ 19).

Upernavik: Sixteen birds were recovered locally (< 70 km) in Apr-Nov 14-74 days (10) or 1-4 years (6) later. Forty-four birds were recovered elsewhere in W Greenland, mostly during Oct-Mar in the northern parts of the Open Water Region (Table 11, Map 6) 56 days – 9 years later. In autumn the earliest birds on migration were recovered in KAN 13 Sep, in SIS 28 Sep and in NUU 20 Oct; the last birds in UPV are dated 22 Oct and 2 Nov. During mid winter (Dec-Feb) almost all birds were recovered in KAN-NUU. Few birds have been recovered during spring; the latest birds reported in SW Greenland were from 6 Mar (NUU, MAN) and 20 Mar (QAT).

Qeqertarsuaq: Ten birds were recovered within the district in May-Dec 29 days – 3 years later. The remaining 32 birds were recovered in the Open Water Region, mostly during Oct-Apr (Table 12, Map 6) 28 days – 2 years later. In autumn the earliest birds on migration were recovered in KAN 29 Sep, in MAN 27 Sep and in NUU 11 Oct. During mid winter (Dec-Feb), the recoveries are distributed from QEQ south to QAT. Apparently many birds remain in QEQ until late Dec, returning in Apr-May.

Ilulissat: Forty-three birds were recovered within the district in May-Feb 6 days – 5 years later. Outside ILU, 77 birds were recovered in the Open Water Region, primarily in Sep-Mar (Table 13, Map 6) 21 days – 10 years later. Only 2 birds were recovered north of ILU; a rather dubius recovery in UMA (Dec 490 days later) and a bird ringed in Jul 1951 shot near Tussaaq (UPV; 368 km NNW) 15 Sep 53 days later. In autumn, the earliest birds on migration were recovered in ASI 7 Sep, KAN 5 Sep, SIS 6 Oct, MAN 7 Oct and in NUU 17 Oct. During mid winter (Dec-Feb) the recoveries were distributed from QEQ south to QAT, with 55% in MAN-PAA.

Aasiaat: Four birds ringed in the outer parts of Nassuttooq/Nordre Strømfjord in Aug 1954 were shot in Sep 46 days later at Innartalik 90 km SSW.

Kangaatsiaq: The majority (54 of 61) of all recovered birds were ringed in the central parts of Nassuttooq/Nordre Strømfjord by Salomonsen in 1954. Twenty-five cormorants were recovered within the district; 17 undated birds at Iginniarfik in autumn or winter 1954, eight elsewhere in May-Nov 56-481 days later. Outside KAN, the recoveries were primarily from the Open Water Region in Nov-Apr (Table 14, Map 6) 56 days – 10 years later. Only 2 birds were recovered north of KAN; 1 in ASI in summer three years later and 1 in UPV in Mar one year later (but probably wrongly dated). In autumn the earliest birds on migration were recovered in MAN 28 Sep and in NUU 14 Sep; a 2C bird

Table 10. Ringing details of recovered Great Cormorants, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Skarv, opdelt efter alder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	59		1	60	
QEQ	39		3	42	
ILU	107		15	122	
ASI			4	4	
KAN	56		5	61	
Total	261		28	289	

Table 11. Temporal and spatial distribution of Great Cormorants ringed in UPV and recovered in Greenland.
Tidsmæssig og geografisk fordeling af Skarver ringmærket i UPV og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV				1		1		5	4	2	2		15
UMA													
QEQ										1			1
ILU													
ASI	1									1	1		3
KAN		1							1	3		2	7
SIS	1	1							1				3
MAN	3	1	1								1	1	7
NUU	1	2	1							2			6
PAA													
QAT			2										2
Total	6	5	4	1		1		5	6	9	4	3	44

Table 12. Temporal and spatial distribution of Great Cormorants ringed in QEQ and recovered in Greenland. An additional 4 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Skarver ringmærket i QEQ og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV													
UMA													
QEQ					1	1	2			2	1	3	10
ILU				1							1		2
ASI		1								3	2		6
KAN		1							1	2	2		6
SIS											1		1
MAN	1			1					1	2	1	1	7
NUU			1							1			2
PAA		1		1									2
QAT		1		1									2
Total	1	4	1	4	1	1	2		2	10	8	4	38

Table 13. Temporal and spatial distribution of Great Cormorants ringed in ILU and recovered in Greenland. An additional 15 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Skarver ringmærket i ILU og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV									1				1
UMA												1	1
QEQ					1			2	1		1		5
ILU		2			4	2	3	8	10	2	3	1	35
ASI	1	1	1						1				4
KAN	1	1	2						3	5	1		13
SIS										1			1
MAN	2	1	2	1						6	4	2	18
NUU	5	2	2	1						1	1		12
PAA	2	2	1								2		7
QAT	2	3	3										8
Total	13	12	11	2	5	2	3	10	16	15	12	4	105

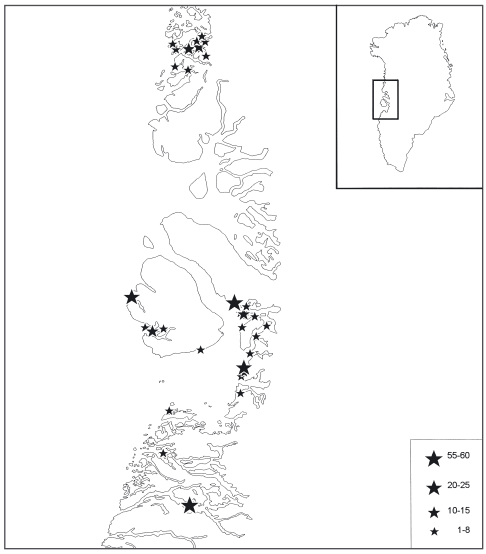
recovered in NUU 10 Aug was probably a non-breeder. During mid winter (Dec-Feb) the recoveries were distributed from KAN south to QAT, with 65% in SIS-NUU.

MOVEMENTS

All recoveries refer to the subspecies *carbo* whose Nearctic breeding range is restricted to Greenland, eastern Canada and Maine in the USA; the nearest

Table 14. Temporal and spatial distribution of Great Cormorants ringed in KAN and recovered in Greenland. An additional 18 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Skarver ringmærket i KAN og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV			1										1
UMA													
QEQ													
ILU													
ASI							1						1
KAN					1	2			1	1	3	1	9
SIS	2	1											3
MAN	2	2	1						2	1	3	2	13
NUU	1		3	1	1			1	1		1	1	10
PAA	1			1									2
QAT	1	2										1	4
Total	7	5	5	2	2	2	1	1	4	2	7	5	43



Map 5. Ringing sites of Great Cormorants in Greenland (n = 289).
Kort 5. Mærkningssteder for grønlandske Skarver.

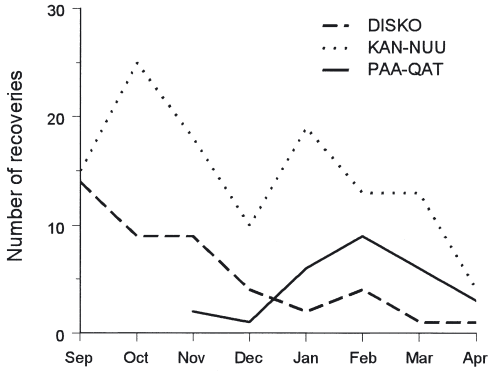
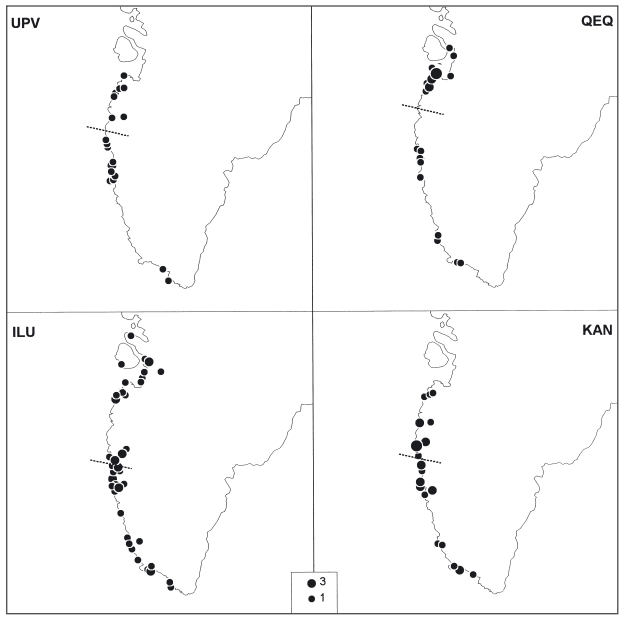


Fig. 5. Monthly distribution (Sep-Apr) of Great Cormorants recovered in Disko Bay (n = 44), KAN-NUU (n = 117) and PAA-QAT (n = 27).
Månedsvis fordeling (sep-apr) af Skarver genmeldt i Disko Bugt, KAN-NUU og PAA-QAT.

Palearctic breeding grounds are in Iceland (Boertmann & Mosbech 1997). Apparently the Greenland population has little contact with neighbouring populations. Boertmann & Mosbech (1997) estimated the breeding population at 2000-3000 pairs, occurring from northern UPV south to MAN, i.e. roughly between 65º30'N and 74ºN; several new colonies have recently been established in NUU (P. Nielsen pers. comm.).

The entire Greenland population winters in coastal waters in the Open Water Region. Autumn migration commences in late Aug-Sep and continues through Oct; movements also occur during winter. When comparing the median recovery distances of 1W (n = 85) versus older birds (2W+; n = 36) in Nov-Mar no difference could be found (U = 1506, P = 0.89, Mann-Whitney U-test), suggesting that there is no segregation between age classes during winter. During Nov to Mar birds from UPV and QEQ were on average recovered farther north than birds from ILU and KAN (see Map 6). No significant difference in the N-S distribution of UPV recoveries versus QEQ recoveries nor in the distribution of ILU recoveries versus KAN recoveries could be found (Mann-Whitney U-test; U = 735.5, P = 0.86 and U = 127.5, P = 0.06, respectively), whereas birds from UPV and QEQ combined generally were recovered more northerly than birds from ILU and KAN combined (Mann-Whitney U-test, U = 1183.0, P = 0.02). However, when comparing the proportion of UPV birds recovered in Disko Bay to that of birds from QEQ and ILU combined, no difference was found (Fish-



Map 6. Recoveries in Nov-Apr of Great Cormorants ringed in UPV (n = 23), QEQ (n = 22), ILU (n = 54) and KAN (n = 31). The dotted line on each separate map denotes the mean latitude for all recoveries pooled (UPV 66º07'N, QEQ 67º04'N, ILU 65º01'N, KAN 65º12'N).
Kort 6. Genfund i nov-apr af Skarver ringmærket i UPV, QEQ, ILU og KAN. Den stiplede linie på hvert kort viser den gennemsnitlige breddegrad for alle genfund.

er's exact test, P = 0.235), suggesting that birds from any of these populations may winter as far north as ice conditions allow. No birds from KAN have been recovered in Disko Bay during winter. During autumn and early winter a general southward movement of birds from all four districts occurs (Fig. 5). Many birds leave Disko Bay during Nov and Dec, while others remain during the whole winter if ice conditions allow. At the same time birds start to arrive in PAA-QAT in SW Greenland. During mid winter (Dec-Feb) the birds occur in all parts of the Open Water Region, but almost half the recoveries (43%) were from MANNUU. Spring migration starts in Mar, the birds arriving at the breeding grounds in Apr-May.

Pink-footed Goose

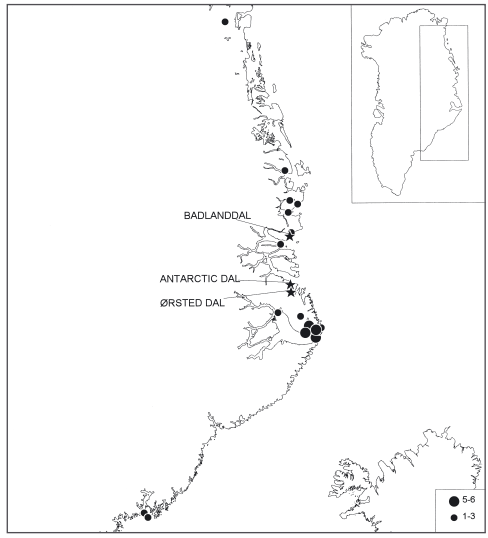
Anser brachyrhynchus

RECOVERIES

15 GRC of full-grown birds ringed in Jul-Aug 1955-88 (NEA 8, ITT 5), 39 FRC.

Northeast Greenland and Ittoqqortoormiit: Five birds ringed in Ørsted Dal, 2 ringed in Antarctic Dal and 7 ringed in Badlanddal (Map 7) have been shot in Great Britain (Map 8, Table 15) 5 Oct – 1 Apr 68-3020 days later. Additionally, a bird ringed in Badlanddal was shot in Iceland 1 Sep 3324 days later.

Foreign recoveries: Thirty-two full-grown birds ringed in Great Britain (Map 8) 6 Oct – 22 Mar 1950-59 (29) and 1988-90 (3) have been recovered in eastern Greenland 9 May – 30 Aug 158-4600 days later. About half of these were ringed in east central Scotland (Fife and Tayside; 15), 5 in NE England (Northhumberland), 6 in SW Scotland (Solway Firth in Dumfries & Galloway), 1 in NW England (Lancashire) and 3 in E England (Lin-



Map 7. Recoveries of Pink-footed Geese ringed abroad (filled circles; n = 39) and ringing sites of birds ringed in Greenland (stars).
Kort 7. Kortnæbbet Gås. Genfund af fugle ringmærket i udlandet (fyldte cirkler) og mærkningssteder for fugle ringmærket i Grønland (stjerner).

Table 15. Temporal and spatial distribution of Pink-footed Geese ringed in northeastern Greenland and recovered abroad. An additional bird with incomplete recovery data is excluded.
Tidsmæssig og geografisk fordeling af Kortnæbbede Gæs ringmærket i det nordøstlige Grønland og genmeldt i udlandet.

Recovered	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Tayside, Scotland		4	2						6
Fife, Scotland		2		1					3
Grampian, Scotland					1			1	2
Lancashire, England		1							1
Norfolk, England		1							1
Iceland	1								1
Total	1	8	2	1	1			1	14

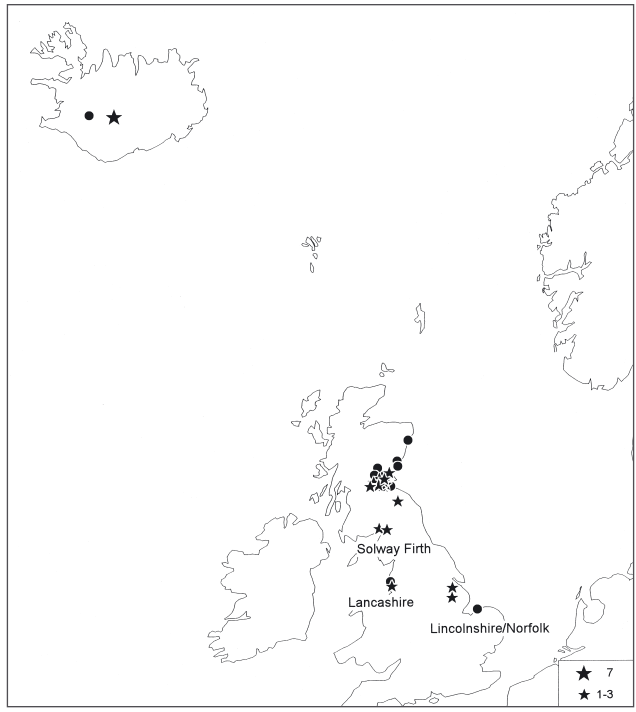
colnshire). The birds were recovered from Tasiilaq/Ammassalik (AMM; 1 9 May) in the south to Centrumsø (Kronprins Christian Land, NOR) in the north (Map 7), with two thirds (24) of the recoveries in ITT. Here birds were recovered between 5 May – 31 Aug; 8 in mid Jun – early Jul and 11 in late Jul – early Aug.

Seven birds (4 chicks, 2 full-grown, 1 ad.) ringed in central Iceland in summer 1953 have subsequently been recovered in eastern Greenland: A bird ringed as full-grown was shot near Tasiilaq/Ammassalik (AMM) 5 May 1959, 2 birds ringed as chicks were shot at Kap Borlasse Warren near Daneborg (NEA) 17 Jul 1954 and 4 birds were shot in the Kangertittivaq/Scoresby Sund area (ITT) in late Jun (2) and early Aug (2) 1-16 years later; the 2 birds ringed as chicks were one and two years old when shot.

MOVEMENTS

Two discrete populations of Pink-footed Geese occur in the Atlantic. One breeding in Svalbard winters in Denmark and the Netherlands, the other breeding in eastern Greenland and Iceland winters in Britain (Fox et al. 1997). The Greenland-Iceland winter population increased from about 30 000 birds in 1950 to 200 000 – 250 000 by the mid 1990s (Fox et al. 1994a, Fox et al. 1997). Most of the breeding population nests in the interior of Iceland (Mitchell et al. 1999). In Greenland, the breeding population probably numbers about 5000 pairs, primarily nesting from Sulussuutikajik/Steward Ø north to Hochstetter Forland (i.e. be-

Pink-footed Geese on moult migration passing Hall Bredning, NE Greenland. Photo: C. E. Mortensen.

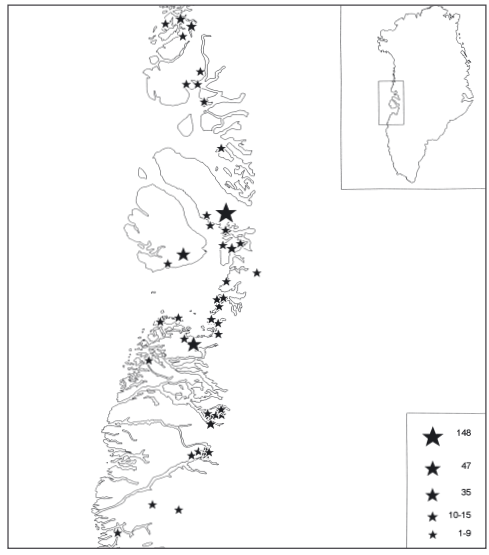


Map 8. Recoveries of Pink-footed Geese ringed in northeastern Greenland (filled circles; n = 15) and ringing sites of birds recovered in Greenland (stars; n = 39).
Kort 8. Kortnæbbet Gås. Genfund af fugle ringmærket i det nordøstlige Grønland (fyldte cirkler) og mærkningssteder for udenlandske fugle genfundet i Grønland (stjerner).

tween 72º and 75º30'N) with scattered pairs breeding as far north as northern Germania Land at 78ºN and possibly as far south as Akerninnarmiit/ Skjoldungen at 63ºN (Boertmann 1994, Boertmann & Glahder 1999). More than 30 000 non-breeding birds now moult in E Greenland between 70º and 78ºN, the largest concentrations being found in Jameson Land, Hold With Hope, Wollaston Forland, Kuhn Ø, Hochstetter Forland, Daniel Brun Land and Germania Land (Madsen et al. 1984, Boertmann 1991, Mitchell et al. 1999); recently moulting Pink-footed Geese have been recorded as far north as SE Peary Land at 82ºN (Clausen & Laubek 1999).

Some 30 000 Pink-footed Geese have been ringed in Britain and Iceland since the 1950s, resulting in several thousand recoveries, including many controls of colour-ringed individuals. Thus the general movements of the Greenlandic-Icelandic population are well known (e.g. Madsen et al. 1984, Fox et al. 1992a, Fox et al. 1994a, Fox et al. 1997, Mitchell et al. 1999). In Britain, the earliest autumn birds arrive in early-mid Sep. Numbers build up during early-mid Oct in well-defined staging sites especially in NE Scotland, eastern Scotland, the Lothian/Borders area and Northumberland in NE England. During Oct-Nov many birds move south to winter mainly in Lancashire, southern Lincolnshire, north Norfolk (both E England) and the Solway Firth, while others remain in east central Scotland and Aberdeenshire (E Scotland). Lately, an increasing number of birds have begun to arrive in Lancashire and Norfolk as early as Sep (A.D. Fox pers. comm.). From Jan, birds wintering in England begin to move north, and spring maximum numbers occur in Scotland (especially in Grampian and Moray Firth) from Mar onwards, usually peaking in Apr. Return passage commences in mid – late Apr and by early May most birds have left Britain. The earliest birds arrive in Iceland around 18-20 Apr, arrivals peaking during the first days of May. At this time most of the Pink-footed Geese gather at various localities in lowland S and SW Iceland, leaving for the breeding grounds in interior Iceland and E Greenland during mid May. Little, however, is known about the spring migration of the Greenland breeding stock. Most of the population stages in Iceland before moving on, but it is not known whether some of the late staging birds in Britain fly directly to E Greenland, where arrival takes place around 20 May (range 9-29 May; Madsen et al. 1984). During the second half of Jun, large numbers of non-breeding Pink-footed Geese move

from interior Iceland to E Greenland to moult, although some remain to moult in Iceland (Taylor 1953, Christensen 1967, Boertmann 1991, Madsen et al. 1984, Mitchell et al. 1999). Madsen et al. (1984) studied moulting Pink-footed Geese in Jameson Land 1982-84. Here the birds arrived 23 Jun – 7 Jul, started moulting 5-10 Jul (range 29 Jun – 15 Jul) and regained the power of flight 1-5 Aug (range 27 Jul – 10 Aug), a timetable much in accordance with other parts of E Greenland. After completing moult, the geese remain in Greenland until late Aug – mid Sep, at which time they and the breeders depart for Iceland. Again, it is not known whether some late departing birds fly directly to Britain, but probably most of the population gathers in interior Iceland (very few Pink-footed Geese occur in the lowlands during autumn) before migrating south in mid Sep – early Oct.



Map 9. Ringing sites of White-fronted Geese in Greenland (n = 408 birds).
Kort 9. Mærkningssteder for grønlandske Blisgæs.

White-fronted Goose

Anser albifrons

RECOVERIES

416 GRC of birds ringed in Jun-Sep 1934-97 (Table 16 and 17, Map 9), 18 FRC. The majority (355; 87%) of the recoveries refers to shot birds. The percentage of ringed birds reported as shot was stable at about 23% during the 1940-70s, but dropped to about 13% from the early 1980s, mainly due to increased protection in Greenland and on the British Isles. In the 1980s and 1990s most of the shot birds were reported from Iceland (see Fig. 6).

Upernavik: Three birds were recovered locally 0-7 years later and a bird ringed as a chick was shot in UMA 23 May four years later. Of the 25 birds recovered abroad, 6 were found in western Iceland (2 May 1, 29 Sep – 29 Oct 5; Mýrasýsla 1, Kjósarsýsla 1, Snæfellsness- og Hnappadalssýsla 5) and 19 in Ireland (21 Oct – 27 Feb; Wexford 16, Mayo 2, Donegal 1).

Uummannaq: A bird ringed as a chick was shot early Aug one year later in ILU 170 km S, and another was shot 7 May four years later in ASI 340 km S. Two of the 17 birds recovered abroad were found in western Iceland (late Apr, late May, late Oct; Borgarfjarðarsýsla 1, Mýrasýsla 2), 1 in eastern Iceland (Oct), 12 in Ireland (5 Nov – 25 Feb; Wexford 10, Mayo 1, Antrim 1), 1 in southwestern Scotland in Nov and 1 in southwestern England in Jan.

Qeqertarsuaq: Ten birds were recovered locally 0-3 years later and 1 was shot 18 May in UMA one year later, 340 km N. Two of 24 birds recovered abroad were found in western Iceland (1 May in

Table 16. Ringing details of recovered White-fronted Geese, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Blisgås, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	16	2	11	29	25
UMA	18		1	19	17
QEQ	9	8	18	35	24
ILU	104	64	20	188	132
ASI	48	1	19	68	41
KAN	13	24	1	38	35
SIS	7	19		26	25
MAN	12	1		13	13
Total	227	119	70	416	312

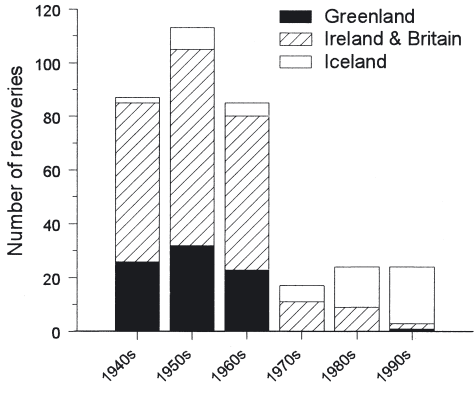


Fig. 6. Number of recoveries per decade of White-fronted Geese ringed in western Greenland (n = 350). Only birds recovered as shot in Greenland, the British Isles and Iceland are included.
Antal genfund pr ti-år af Blisgæs ringmærket i V Grønland og skudt i Grønland, på de Britiske Øer eller i Island.

Mýrasýsla, 7 Nov in Borgarfjarðarsýsla), 19 in Ireland (31 Oct – 28 Feb; Wexford 18, Cavan 1) and 3 in western Scotland (Dec; Strathclyde).

Ilulissat: Fifty-three birds were recovered locally 0-14 years later and 3 birds were recovered elsewhere in Greenland (2 birds ringed as chicks 2 years later 220 km S and a chick shot mid Sep in NUU 795 km S 46 days later). Eight of the 132 birds recovered abroad were found in western Iceland (spring 4, autumn 4; Borgarfjarðarsýsla 3, Mýrasýsla 5), 6 in southern Iceland (May 1, Oct 5; Rangárvallasýsla 4, Árnessýsla 2), 99 in Ireland (15 Oct – 12 Apr; Wexford 83, Clare 1, Donegal 3, Galway 3, Kilkenny 1, Longford 1, Louth 1, Mayo 1, Offaly 2, Roscommon 1, Westmeath 2) and 15 in Great Britain (29 Oct – 20 Mar; Strathclyde 10, Cumbria 1, Gloucester 1, Highland region 1, Orkney 1, Tayside 1). Four birds were recovered outside traditional areas: A bird ringed as ad. was found freshly dead in southern Norway 7 Nov the same year (2970 km ESE), a bird ringed as a chick was shot in eastern Denmark 15 Oct three years later (3600 km ESE), a bird ringed as a chick was shot in Quebec, Canada 1 Oct one year later (2440 km SSW) and a bird ringed as a chick was shot in New Brunswick, Canada 22 Oct the same year (2590 km SSW).

Aasiaat: Twenty-six birds were recovered locally 0-6 years later and a bird ringed as a chick was shot 16 Jun one year later in PAA 790 km S. One of the 41 birds recovered abroad was found in southern Iceland (20 May; Vestur-Skaftafellssýsla), 34 in Ireland (7 Oct – 1 May; Wexford 6, Clare 2, Donegal 1, Galway 8, Kilkenny 2, Longford 1, Leitrim 3, Mayo 1, Meath 2, Offaly 1, Roscommon 3, Tipperary 1, Westmeath 3) and 5 in Great Britain (late Sep – 5 Feb; Strathclyde 2, Dyfed 1, Grampian 1, Highland region 1). A bird ringed as a chick was shot in Quebec, Canada 12 Oct the same year (2315 km SSW).

Kangaatsiaq: Three birds were recovered locally 5 years later. Three of the 35 birds recovered abroad were found in western Iceland (Sep-Oct; Mýrasýsla, Kjósarsýsla and Snæfellsness- og Hnappadalssýsla), 12 in southern Iceland (May 1, Sep-Oct 11; Rangárvallasýsla 10, Árnessýsla 1, Vestur-Skaftafellssýsla 1), 5 in Ireland (27 Sep – 15 Jan; Wexford 1, Cork 1, Galway 1, Londonderry 1, Mayo 1) and 15 in Great Britain (18 Oct – 28 Feb; Dumfries & Galloway 3, Highland region 4, Orkney 1, Strathclyde 7).

Sisimiut: One bird was shot near the ringing site 30 Apr four years later. Twenty-five birds were recovered abroad as follows: Nineteen in southern Iceland (18 Sep – 22 Oct; Rangárvallasýsla 12, Árnessýsla 2, Vestur-Skaftafellssýsla 5), 2 in western Iceland (Oct, Mýrasýsla), 1 in Ireland (Jan; Fermanagh) and 3 in Great Britain (Dec-Mar; Strathclyde 2, Kintyre 1).

Table 17. Temporal and spatial distribution of White-fronted Geese ringed in W Greenland and recovered abroad. An additional 17 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Blisgæs genmeldt i udlandet.

Recovered	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Canada										3			3
Iceland			1	1	9			1	18	31	1	1	63
Norway											1		1
Denmark										1			1
Ireland	51	42	3	1		1				8	44	41	191
Scotland	7	3	2							3	8	9	32
England	1		1								1		3
Wales	1												1
Total	60	45	7	2	9	1		1	18	46	55	51	295

Maniitsoq: All birds (13) were recovered in Ireland (25 Oct – 24 Feb; Wexford 2, Donegal 2, Galway 1, Kilkenny 1, Longford 1, Mayo 1, Roscommon 2, Sligo 1, Westmeath 2).
Foreign recoveries: Sixteen birds ringed in Oct-Apr 1984-99 at North Slob, Wexford, Ireland were shot 4 May – 25 Sep 46-2139 days later in western Greenland (SIS 3, KAN 2, ASI 3, ILU 4, QEQ 2, UMA 1) and in eastern Greenland (AMM 1 17 Apr). A bird ringed in Iceland 23 Apr 1999 was shot in QEQ 20 Aug 2000. More unusual is the recovery of a bird ringed 13 May 1982 in western Norway and shot eight days later near Nuua/Kap Swainson (ITT; 70º25'N 21º35'W) 1515 km NW.

MOVEMENTS

The White-fronted Goose of the subspecies *flavirostris* breeds only in W Greenland. The breeding grounds range from NUU at 64ºN northward to southern UPV at 73ºN with the highest densities occurring from north of Kangerlussuaq/Søndre Strømfjord to Disko Bay, i.e. between 66ºN and 69ºN (Salomonsen 1967b, Boertmann & Glahder 1999, Fox et al. 1999b). Greenland White-fronted Geese winter exclusively in Britain and Ireland, except for a few birds occasionally straying to continental Europe or North America. During spring and autumn, the population stages for three weeks or more in Iceland, crossing the Greenland inlandice en route to and from W Greenland (Table 17, Map 10 and 11). The winter population numbered 17 500 – 23 000 birds in the 1950s, about 14 000 in the late 1970s and 33 000 in the late 1990s; the recent increase is probably mainly due to increased protection from hunting in Greenland, Britain and Ireland since the early 1980s (Fox et al. 1999b).

Due to many years of work, the general migration routes and wintering areas of the Greenland White-fronted Geese are well known (e.g. Boyd 1958, Salomonsen 1967b, Fox et al. 1983, Francis & Fox 1987, Kampp et al. 1988, Wilson et al. 1991, Fox et al. 1994b, Fox et al. 1999a, Fox et al. 1999b, Glahder et al. 1999). The non-breeders start flocking from Jun and begin moult during Jul, two weeks earlier than the breeders (Fox et al. 1983). Greenland White-fronted Geese usually moult in small flocks of 20-25 birds, though flocks of up to 450 birds have been recorded occasionally (Glahder 1999a). The highest densities of moulting birds are found at Sigguup Nunuua/Svartenhuk (UMA/UPV), Nuussuaq (UMA), Naternaq/Lersletten (KAN) and Qeqertarsuaq/Disko (QEQ) (Boertmann & Glahder 1999, Glahder 1999a). Autumn departure from W Greenland takes place in late Aug – early Oct (Fig. 7, Fox et al. 1999b), the first birds reaching Iceland in late Aug with the earliest recovery on 28 Aug; seven geese fitted with satellite transmitters in 1998 and 1999 left W Greenland during 11-23 Sep (Glahder et al. 1999, C. Glahder pers. comm.). Most birds stage in the southern lowlands (Rangárvallasýsla, Árnessýsla and Vestur-Skaftafellssýsla; 31 recoveries) and in the western part (Borgarfjarðarsýsla, Mýrasýsla, Kjósarsýsla and Snæfellsness- og Hnappadalssýsla; 13 recoveries) of Iceland (Map 10; see Fox et al. (1999a) for a detailed review of autumn and spring staging). Here the numbers of staging geese peak in late Sep – early Oct; by the end of Oct almost all birds have left the country (latest recovery 7 Nov excluding a bird found dead 20 Dec).

In the British Isles, the first White-fronted Geese arrive from late Sep to mid Oct and exceptionally early Nov, with numbers increasing rapidly during Oct. Possibly some birds arrive slightly earlier at the main sites in Ireland (late Sep – early Oct; earliest recovery 27 Sep) than in Britain (early-mid Oct, earliest recovery 18 Oct). Resightings of colour-ringed birds show that some stage within Britain and Ireland en route to the main wintering areas where numbers peak in Dec-Feb (Warren et al. 1992, Fox et al. 1999b). In the 1990s approx. one third of the population wintered in Wexford (SE Ireland), one third on Islay (Inner Herbrides, W Scotland) and the remaining third in 34 flocks

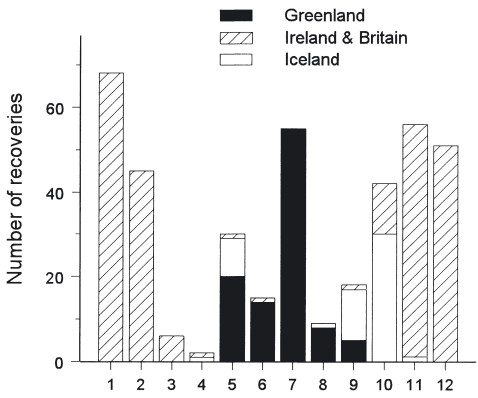
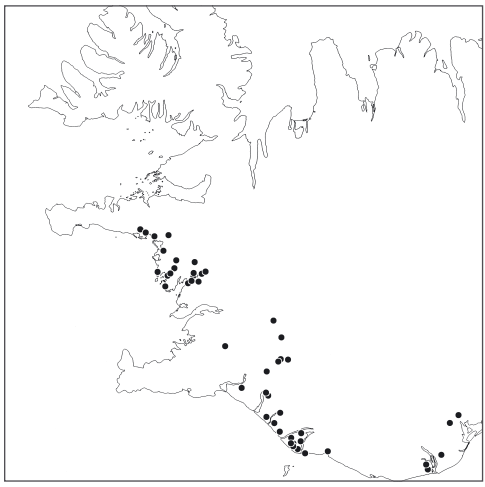
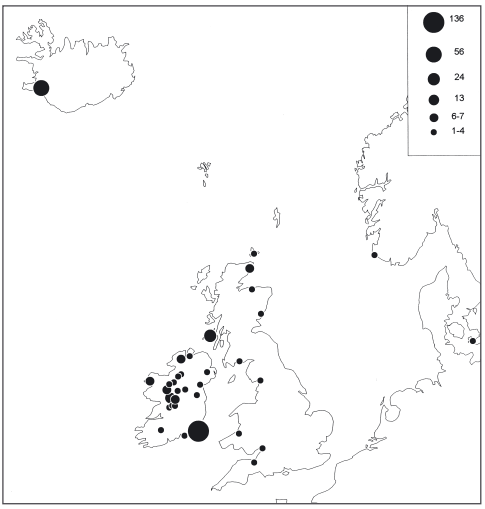


Fig. 7. Monthly distribution of recoveries of White-fronted Geese ringed in western Greenland (n = 397). Only birds recovered in Greenland, Ireland & Britain and Iceland are included.
Månedsvis fordeling af genfund af Blisgæs ringmærket i V Grønland og genmeldt i Grønland, de Britiske Øer og Island.



Map 10. Recoveries in Iceland of White-fronted Geese ringed in Greenland (n = 55).
Kort 10. Genfund i Island af Blisgæs ringmærket i Grønland.



Map 11. Recoveries abroad of White-fronted Geese ringed in W Greenland (n = 302). The recoveries are plotted using the totals and mean coordinates within administrative or county boundaries for each country; in Iceland, however, the mean coordinates for all birds recovered have been used. Three birds recovered in Canada are excluded.
Kort 11. Genfund i udlandet af Blisgæs ringmærket i Grønland. Genfundene er plottet ved at bruge det totale antal og de gennemsnitlige genfunds-koordinater for hvert amt eller administrativ enhed i hvert land; i Island er der dog kun brugt de gennemsnitlige koordinater for hele landet. Tre genfund i Canada er udeladt.

in Ireland and 32 flocks in Britain, primarily W Scotland (Fox et al. 1994b, Fox et al. 1999b, see also Map 11). Although some within-winter and between-winter movements occur, the White-fronted Goose shows a high degree of winter site fidelity (Kampp et al. 1988, Wilson et al. 1991, Warren et al. 1992); Wilson et al. 1991 found that approx. 85% of the birds return to the same site in successive winters. Likewise, a high degree of staging site fidelity has been recorded on Iceland, both in spring and autumn (Fox et al. 2002).

In spring, the majority of the White-fronted Geese depart from the British Isles during the second week of Apr and most have gone by early May. Some limited redistribution within the British Isles may also occur in spring, but apparently most birds migrate directly from their wintering grounds to Iceland (Fox et al. 1999b, Glahder et al. 1999). The White-fronted Geese start to arrive in Iceland during early-mid Apr with the first arrivals around 10 Apr. As in autumn, the majority stage in the southern lowlands (3 recoveries) and in the western part (7 recoveries) of Iceland (Map 10, Fox et al.1983, Francis & Fox 1987, Fox et al. 1999a). Numbers of staging geese peak in mid-late Apr and early May; most have departed by mid May. The first birds may arrive at spring staging sites in W Greenland as early as late Apr, but most birds arrive during the first week of May (Fox et al. 1999a, Glahder 1999b, Glahder et al. 1999; earliest spring recoveries 7 and 13 May); apparently breeders arrive earlier than non-breeders (Fox & Stroud 1981, Fox et al. 1983, Glahder 1999b). At least 28 spring staging areas have been located on the W coast, the most important situated between 66º and 69ºN; the birds spend about one or two weeks at these spring staging sites before dispersing to the breeding grounds (Glahder 1999b). The phenology and routes of the spring migration are illustrated by the data from 12 birds fitted with satellite transmitters at Wexford in Ireland, Mar 1997-99 (Glahder et al. 1999). Of these, 12 were tracked to Iceland and 10 to W Greenland. In 1997, most of the geese departed from Wexford around the 7 Apr, including one bird with a transmitter that moved to Loch Foyle in Northern Ireland where it remained until departing for Iceland on 16 Apr. In 1998 and 1999 most of the geese departed from Wexford around mid Apr. After a nonstop flight, all the tagged geese arrived in Iceland 17-22 Apr. Of the 12 birds with transmitters, eight staged in western Iceland, 4 in southern Iceland. Ten of them departed for Greenland 2-10 May, reaching the W coast 3-17 May (most around

Table 18. White-fronted Goose. Winter (Jan-Mar) recoveries in Scotland (north of 55°N), northern Ireland (north of 53°N) and southern Ireland (south of 53°N) of birda ringed in different regions of W Greenland. Most birds in region A (MAN, SIS, KAN) were ringed during 1946-49 and 1979-92, especially at Isunngua (SIS) and Eqalummiut Nunaat (KAN). The birds in region B (Disko Bay area) were mostly ringed during 1947-63; only few of them have exact information on ringing locality. Most of the birds in region C (Nuussuaq to southern UPV) were ringed during 1947-65, especially in the Saqqaq Valley on Nuussuaq and at Amitsorsuaq in the southern part of UPV. MRLL = Mean Recovery Latitude and Longitude. For comparison, the two main wintering sites on the British Isles, Islay and Wexford, are situated at about 55°50'N 6°10'W and 52°20'N 6°25'W, respectively.
Vintergenfund (jan-mar) i Skotland (nord for 55°N), det nordlige Irland (nord for 53°N) og det sydlige Irland (syd for 53°N) af Blisgæs ringmærket i forskellige regioner af V Grønland. De fleste fugle i region A (MAN, SIS, KAN) blev ringmærket i perioderne 1946-49 and 1979-92, især i Isunngua (SIS) og Eqalummiut Nunaat (KAN). Fuglene i region B (Disko Bugt området) er hovedsageligt ringmærket i perioden 1947-63; kun få af dem har nøjagtig angivelse af mærkningslokalitet. De fleste fugle i region C (Nuussuaq til det sydlige UPV) er mærket i perioden 1947-65, især i Saqqaq-dalen på Nuussuaq og i Amitsorsuaq i det sydlige UPV. MRLL = gennemsnitlig genfunds bredde- og længdegrad. Til sammenligning befinder de to vigtigste overvintringssteder på de Britiske Øer, Islay i Skotland og Wexford i Irland, sig hhv. på de omtrentlige positioner 55°50'N 6°10'W og 52°20'N 6°25'W.

Ringed	Scotland	N Ireland	S Ireland	Total	MRLL
Region A ; < 68°N	8	4	2	14	55°21'N 6°29'W
Region B; 68°N - 70°N	4	18	18	40	53°19'N 7°10'W
Region C; > 70°N	7	6	47	60	52°56'N 6°31'W
Total	19	28	67	114	

9-11 May) after crossing the inland-ice on a 300 km wide front centred along a line going from Tasiilaq/Ammassalik on the E coast to Disko Bay on the W coast (i.e. the route used by most transglacial migrants). After arrival, they staged between Kangerlussuaq/Søndre Strømfjord at 66º30'N and northern Disko Bay at 69º50'N for about 9-16 days (range 8-21) before moving to the ultimate summer areas in late May.

It has long been known that some segregation between different subpopulations of the Greenland White-fronted Goose occurs in both summer and winter (Salomonsen 1950b, 1967b, Boyd 1958, Fox et al. 1983, Kampp et al. 1988), and that the ringing recovery data shows a tendency for leap frog migration, i.e. that the northern breeding birds winter farther south than the southern breeding birds. Table 18 illustrates this tendency, showing that during winter (Jan-Mar) the recoveries are not distributed randomly (χ_4^2 = 37.7, P <0.0001). However, Table 18 also shows that birds from all regions are recovered throughout the wintering range. Likewise, sightings during winter of birds colour-ringed in Eqalummiut Nunaat (region A) have shown that their wintering sites were widely dispersed troughout the wintering range, although the majority wintered in Scotland (Wilson et al. 1991). Some segregation apparently also occurs at the staging sites in Iceland (Table 19), where for example more southern breeding birds (region A) and fewer northern (region C) have been recovered in southern Iceland during autumn than expected by chance (Fisher's exact test, P = 0.003). It appears that both during spring and autumn northern breeding birds mostly stage in western Iceland and southern breeding birds in southern Iceland, but the number of recoveries, especially in spring, is too low to allow any firm conclusions. Sightings in Iceland of colour-ringed birds also suggest that birds wintering in Scotland are more likely to stage in southern Iceland, while birds wintering in Wexford in south Ireland are more likely to stage in western Iceland (Fox et al. 2002). Eight of the 10 geese attached with a satellite transmitter, which staged in western Iceland, migrated to northern breeding grounds, while the remaining two geese staging in southwestern Iceland migrated to southern breeding grounds (Glahder et al. 1999, C. Glahder pers. comm). Furthermore, records of individuals using both the western and the southern staging areas are rare (Fox et al. 1999a). More information is clearly needed to assess the conserva-

Table 19. Number of recoveries in southern and western Iceland of White-fronted Geese ringed in different regions of W Greenland (see Tab. 18 for details). The number of autumn and spring recoveries are shown in brackets (a/s).
Antal genfund i hhv. det sydlige og vestlige Island af Blisgæs ringmærket i forskellige regioner af V Grønland (se Tab. 18). Antallet af genfund fra efteråret (a) og foråret (s) er vist i parantes.

Ringed	S Iceland	W Iceland	Total
Region A ; < 68°N	25 (25/0)	4 (4/0)	29 (29/0)
Region B; 68°N - 70°N	1 (0/1)	3 (1/2)	4 (1/3)
Region C; > 70°N	6 (5/1)	14 (8/6)	20 (13/7)
Total	32 (30/2)	21(13/8)	53 (43/10)

tion significance of this segregation, its evolutionary consequences and the potential effects of differential management of elements of the population.

Canada Goose *Branta canadensis*

RECOVERIES:

76 GRC of 54 birds practically all ringed in 1992-97, 2 FRC (Map 12.)

Ilulissat: A hybrid White-fronted × Canada Goose ringed 26 Jul 1947 in the Saqqaq valley was shot locally one year later.

Sisimiut: Three ad. birds ringed at Isunngua in Jul 1992 were shot 25 Sep 1992 on Sandy Island, Labrador, Canada (1290 km SSW). Fifty birds colour-ringed at Isunngua in Jul 1997 were recovered or resighted in Canada and the USA 1997-2000 (Map 12; see also Kristiansen et al. 1999). Eleven of these were shot in Canada (New Brunswick, Newfoundland and Quebec) 2 Oct – 3 Nov, while 39 were shot (7) or resighted in the USA (61 sightings of 32 birds) 7 Oct – 13 Mar. In the USA, 2 birds were sighted in Massachusetts 25 Oct (probably still on migration), 10 in Connecticut 15 Oct – 13 Mar, 10 in New York (Long Island) during Feb and 11 in Pennsylvania during Feb; 1 was seen both in New York (Feb 1998) and Connecticut (Oct-Nov 1998).

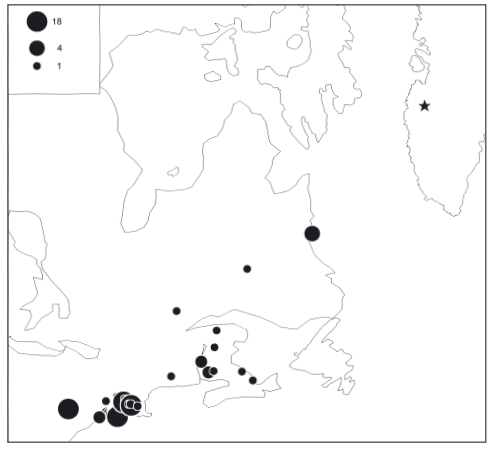
Foreign recoveries: A bird ringed near Kingsville, Ontario, Canada 4 Nov 1963 was shot in UMA 11 Jul 1964 (3610 km NNE). Another bird ringed near Doylestown, Pennsylvania, 7 Jan 1986 was found in SIS 29 May 1993 (3200 km NNE).

MOVEMENTS

Before the 1970s, the Canada Goose was a scarce vagrant and occasional breeder in W Greenland (Salomonsen 1950b, 1967b). Since then a rapid colonisation of W Greenland has taken place, especially during the late 1980s and the 1990s (Fox et al. 1996a, Glahder et al. 1996, Boertmann & Glahder 1999), apparently resulting in increasing inter-specific competition with the White-fronted Goose (Kristiansen & Jarrett 2002, Malecki et al. 2000). Most Canada Geese have been recorded in Isunngua (SIS), Eqalummiut Nunaat (KAN), Naternaq/Lersletten (KAN), Qeqertarsuaq/Disko (QEQ), the Nuussuaq Peninsula (ILU/ UMA) and Sigguup Nunuua/Svartenhuk (UMA/ UPV). Furthermore, a few breeding pairs and several summer visitors have been reported from NUU and MAN, and autumn as well as spring migrants are recorded annually in PAA (Boertmann 1994); low numbers of moulting birds as well as a breeding pair have also been recorded in AVA (Boertmann & Glahder 1999). In 1999, the Greenland breeding population was estimated at 2600 pairs based on the results of arial surveys (Malecki et al. 2000). At least three different subspecies of Canada Geese have been recorded in Greenland. The small *hutchinsii* has been recorded breeding north of 69ºN and there is one breeding record of *parvipes* from Disko Island (Salomonsen 1967b, Boertmann 1994). Most of the Canada Geese breeding south of 69ºN apparently belong to the large *interior* (Fox et al. 1996a), including the birds ringed at Isunngua. However, the question of subspecies is complicated and still far from being resolved.

The recent recoveries show that the Canada Geese ringed in SIS cross the Davis Strait in late Sep, passing Labrador, New Brunswick and Massachusetts en route to the wintering grounds in northeastern USA, primarily Connecticut, New York and Pennsylvania, though there may be some winter movements between these states. Three birds caught in the inner parts of Kangerlussuaq/Søndre Strømfjord in 1999 and fitted with satellite transmitters, left Greenland in the latter half of Sep and all were present on Long Island (New York) by mid Nov. At the start of Feb the three birds continued to southern New Jersey and Delaware (A.D. Fox pers. comm.).

Apparently the Canada Geese leave Greenland during the last half of Sep, reaching their general wintering areas in late Oct – early Nov and departing from these by mid Mar. However, little is known about spring migration; the Canada Geese arrive in W Greenland in mid May with 6 May as the earliest observation (Boertmann 1994, Boertmann & Glahder 1999).



Map 12. Recoveries of Canada Geese abroad. The position of Isunngua (SIS) is shown by a star.
Kort 12. Genfund af Canadagæs i udlandet.

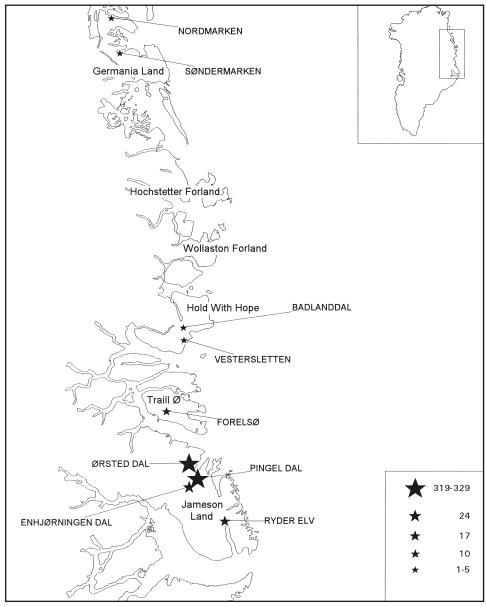
Barnacle Goose *Branta leucopsis*

RECOVERIES:

722 GRC (Table 20) of birds ringed 1955-88, 23 FRC of birds ringed 1969-94. In Greenland, all birds were ringed by British and Irish expeditions, especially those by R. Marris in 1955, 1961 and 1963 (see Cabot & West 1973). Almost half (49%) of the recoveries refers to controlled birds, 33% to shot birds.

Northeast Greenland and Ittoqqortoormiit: The majority (91%) of all Barnacle Geese was ringed in Ørsted Dal and Pingel Dal in ITT (Map 13), and for practical purposes the two districts are combined here. A total of 286 birds (305 controls) was controlled in NE Greenland 2-8 years later (Table 21). Of these controls, 267 (88%) were local, 35 involved birds moving between Ørsted and Pingel Dal (or vice versa; a distance of approx. 25 km) and 3 were controlled more than 50 km away from the ringing site. The latter includes a bird ringed 4 Aug 1956 at Vestersletten and controlled 26 Jul 1963 in Pingel Dal (207 km S), and a bird ringed 15 Jul 1963 in Ørsted Dal and controlled with goslings on Hvalrodsodden 4 Jul 1969 (582 km N). Twenty-seven birds were reported as shot or found dead in Greenland (all NEA/ITT) 1-20 years later. Eight of these were shot on migration in spring and in early Aug, mostly in the Ittoqqortoormiit/Scoresbysund-area. The earliest was reported shot on Mestersvig airstrip 22 Apr, the other 7 from 19 May and onwards. The remaining 19 were found locally (5; Jul-Aug), 25-52 km from the ringing site (7; Jul-Aug), 62-77 km away (4; Jul-Aug) and 120-230 km away (3; Aug). The latest newly dead bird reported from Greenland was from 14 Aug.

Including controls, a total of 390 birds was recovered abroad (Table 22, Map 14), primarily in Iceland, Great Britain and Ireland. Only 4 birds have been recovered outside these areas: Two birds ringed as ads in Ørsted Dal 1955 and 1961 were shot 31 Oct 1965 in southern Norway, a bird ringed as ad. in Pingel Dal 1963 was shot in the German Wadden Sea in Jan 1966, and, remarkably, a bird ringed as a chick in Ørsted Dal 1955 was found newly dead in a garden south of Valencia in eastern Spain 4 Jan 1957.



Map 13. Ringing sites of Barnacle Geese in Greenland (n = 722 birds).
Kort 13. Mærkningssteder for grønlandske Bramgæs.

A total of 144 birds has been recovered in Iceland, the majority (108) shot. About half (67) were found in spring. The earliest recovery is dated 28 Mar (bird found dead), but the bulk (57) is from the period 23 Apr – 21 May. Eight birds were reported in Jun-Aug, all either with dubious finding dates or found dead. In autumn the earliest recoveries of newly dead birds were from 4 Sep (2 birds shot), but most (57) were from the period 8 Sep – 15 Oct; the latest recoveries are from 7 Nov (2 birds shot). The Barnacle Geese were primarily re-

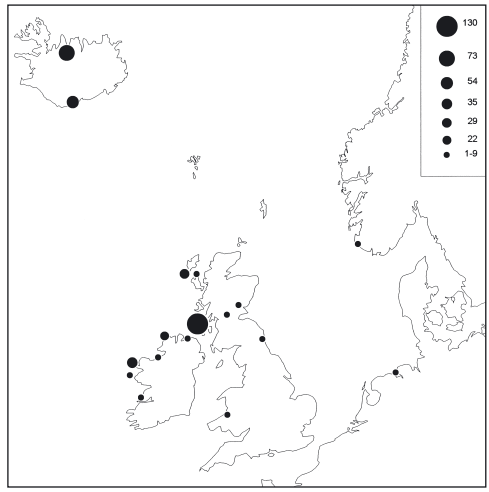
Table 20. Ringing details of recovered Barnacle Geese, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Bramgås, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
ITT	117	564	15	696	367
NEA	2	24		26	23
Total	119	588	15	722a	390b

[a] incl. 45 controls
[b] incl. 24 controls

Table 21. Controls of Barnacle Geese in NE Greenland. P = Pingel Dal, Ø = Ørsted Dal, M = Mestersvig, H = Hvalrosodden.
Kontroller af ringmærkede Bramgæs i det nordøstlige Grønland.

	Controlled				
Ringed in	P	Ø	M	H	Total
Enhjørningen Dal	13	2			15
Pingel Dal	146	21			167
Ørsted Dal	12	108	1	1	122
Vestersletten	1				1
Total	172	131	1	1	305



Map 14. Recoveries abroad of Barnacle Geese ringed in northeastern Greenland (n = 389). The recoveries are plotted using the totals and mean coordinates within administrative or county boundaries for each country; in Iceland, however, the mean coordinates for birds recovered in the northern and southern parts of the country have been used. A bird recovered in Spain is omitted.
Kort 14. Genfund i udlandet af Bramgæs ringmærket i det nordøstlige Grønland. Genfundene er plottet ved at bruge det totale antal og de gennemsnitlige genfunds-koordinater for hvert amt eller administrativ enhed i hvert land; i Island er der dog kun brugt de gennemsnitlige koordinater for hhv. den nordlige og sydlige del af landet. Et genfund i Spanien er udeladt.

covered in northern Iceland in spring and in southeastern Iceland in autumn (Map 15, see below). Of 58 spring recoveries with reliable finding dates 56 (97%) are from the north, while 54 (79%) out of 68 autumn recoveries are from the south; the remaining 14 are all reported in the first half of Sep.

Most of the 242 recoveries in Great Britain and Ireland are from Nov-Apr (Table 22). The earliest autumn recovery is dated 15 Oct (shot), and only 19 birds have been recovered after 27 Apr (May 10, Jun 5, Jul 4); most of the latter have dubious finding dates or refer to birds found long dead. Almost all birds have been recovered in western Scotland and western Ireland (Map 16), especially on the Outer Hebrides (29), the Inner Hebrides (130), Co. Mayo (35) and Co. Donegal (22). Two localities, the island of Islay in Scotland and the Inishkea Islands in western Ireland, account for 55% of all recoveries (Islay 106, Inishkea 26). The remaining recoveries are scattered between some 70 localities from Kilkee (Co. Clare, western Ireland) to Dounrey in northeastern Scotland (Map 16).

Table 22. Temporal and spatial distribution of Barnacle Geese ringed in NE Greenland and recovered abroad. An additional 53 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Bramgæs ringmærket i det nordøstlige Grønland og genfundet i udlandet.

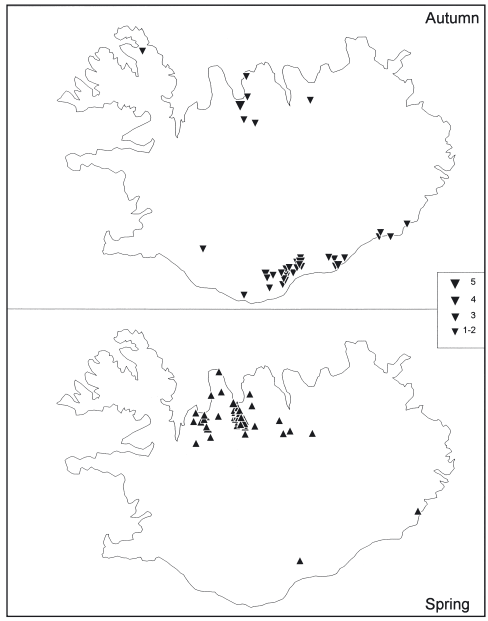
Recovered	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Iceland			1	4	50	4	1		39	24	4		127
Norway										2			2
Donegal, Ireland	3	5	1	1						1	7	2	20
Sligo, Ireland	3	1	1										5
Mayo, Ireland	3	2	7	15							3	1	31
Galway, Ireland		1											1
Clare, Ireland	4		1										5
Antrim, N. Ireland											1		1
Strathclyde, Scotland	37	10	16	6	6	4	1			1	9	18	108
Northhumberl., England										1			1
Western Isles, Scotland	6	5	2	1	2	1			1	3	6	6	27
Highland, Scotland	2			1	1						1		5
Central, Scotland	1												1
Dyfed, Wales											1		1
Germany	1												1
Spain	1												1
Total	61	24	29	28	59	9	2		39	30	29	27	337

Apparently the birds are not distributed randomly in their wintering areas. Although birds ringed in Ørsted and Pingel Dal are found in the same areas (Table 23), their distribution within these areas differs significantly (χ_2^2 = 10.5, P = 0.005). For example, fewer Ørsted Dal-birds are recovered on the Inner and Outer Hebrides than expected by chance. Judging from the few controls in this material, the birds show a high degree of site fidelity. There is, however, some redistribution between different localities on a year-to-year basis and seemingly also within the season: Eleven birds were controlled in 28 winters and of these 4 were seen at other localities in later winters; 2 were seen on different localities within the same winter (see also below).

Foreign recoveries: An ad. male ringed in Svalbard 23 Jul 1973 was shot in Scoresbysund Fjord (ITT) 10 Sep 1981 (1990 km SW). Twenty-two birds ringed in Ireland (Inishkea 14, Sheshkinmore in Co. Donegal 4) and Scotland (Islay 3, Strathclyde 1) in the period 9 Nov – 21 Apr were subsequently recovered/controlled in northeastern Greenland 10 May – 18 Sep 44 days – 18 years later. Twelve of these were shot (most in late May) in the Ittoqqortoormiit/Scoresbysund-area, 2 were found dead (Mestersvig and Kong Oscar Fjord) and 8 were controlled alive. The latter include 4 birds ringed Inishkea and controlled Ørsted Dal, 3 birds (Islay 1, Sheskinmore 2) controlled in Klægbugten, Skærfjorden (77º40'N 20º53'W) and a bird from Sheskinmore controlled at Mestersvig.

MOVEMENTS:

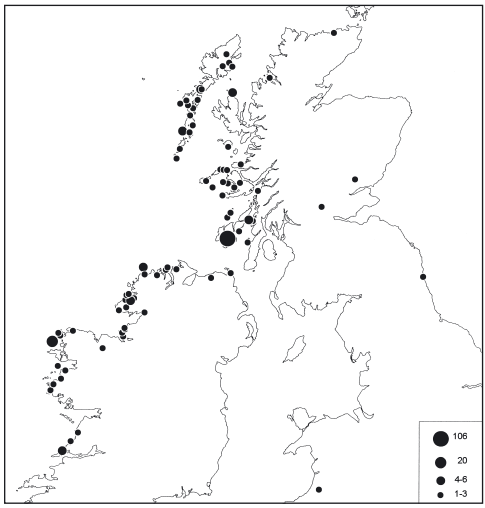
In Greenland, the Barnacle Goose breeds and moults in the high-arctic northeastern part of the country from Kangertittivaq/Scoresby Sund north to Hertugen af Orléans Land, i.e. between 70-79ºN. Scattered individuals and flocks have been recorded as far north as Peary Land and as far south as Tuttilik in AMM, while stragglers have been noted in northern and western Greenland (Boertmann 1994, Boertmann & Glahder 1999, Ogilvie et al. 1999). The Greenland population winters in western Scotland and western Ireland, staging in Iceland spring and autumn. In 1959 the population numbered about 8000 birds, by 1994 it had increased to at least 38 000; in 1997 the population was estimated at 40 000 – 45 000 birds (Ogilvie et al. 1999). The main reason for this increase appears to be a higher over-winter survival, partly due to reduced hunting in Scotland and Ireland since 1982, partly because the geese in many wintering areas changed their feeding habits.



Map 15. Recoveries in Iceland of Barnacle Geese ringed in northeastern Greenland. Triangles pointing downwards denote recoveries from Mar-Jun (n = 58), triangles pointing upwards recoveries from Sep-Nov (n = 63).
Kort 15. Genfund i Island af Bramgæs ringmærket i det nordøstlige Grønland. Nedadvendte trekanter angiver genfund i mar-jun, opadvendte trekanter genfund i sep-nov.

Table 23. Barnacle Geese ringed in Pingel and Ørsted Dal and recovered in selected areas of Scotland and Ireland. Only birds reported as dead are included.
Bramgæs ringmærket i Pingel and Ørsted Dal i det nordøstlige Grønland og genfundet i udvalgte områder af Skotland og Irland. Kun fugle genmeldt som døde er inkluderet.

	Recovered			
Ringed	Outer Hebrides	Inner Hebrides	western Ireland	Total
Pingel Dal	21	48	32	101
Ørsted Dal	7	50	12	69
Total	28	98	44	170



Map 16. Recoveries in Ireland and Great Britain of Barnacle Geese ringed in northeastern Greenland (n = 240). *Kort 16. Genfund i Irland og Storbritannien af Bramgæs ringmærket i det nordøstlige Grønland.*

Formerly they mostly fed on coastal pastures, but now they feed on managed grassland which provides a richer food resource.

Some moult migration takes place at the end of Jun, but few details are known (Madsen et al. 1984, Ogilvie et al. 1999). Important moult areas include Heden in Jameson Land, Ørsted Dal and Kjovedal in Scoresby Land and the lowlands on Hold With Hope and Gauss Halvø (Boertmann & Glahder 1999). In Jameson Land 1984 most of the geese commenced moulting around 3-7 Jul and regained flight 26 Jul – 1 Aug (Madsen et al. 1984). Birds from the northernmost areas start to move south by early – mid Aug and autumn migration commences by late Aug – early Sep (Meltofte et al. 1981). The Barnacle Geese reach Iceland in the last days of Aug and in early Sep, moving on to the British Isles by the end of Sep – early Oct. In autumn, most – if not all – of the birds stage in Vestur-Skaftafellssýsla and Austur-Skaftafellssýsla in the southeastern part of Iceland (Map 15, Ogilvie et al. 1999); most of the birds recovered in the northern part of the country were reported during the first part of Sep and were probably still en route to the south. The first birds arrive in the British Isles during late Sep – early Oct; the peak arrival period on Islay is 5-10 Oct. Adverse wind conditions in Iceland may, however, postpone arrivals until the end of Oct (Ogilvie et al. 1999). Greenland Barnacle Geese winter at approx. 100 sites scattered along the western fringes of Scotland and Ireland from Orkney south to Kilkee in Ireland; these sites can be grouped into roughly 20 major haunts in Ireland and 32 in Scotland (Ogilvie et al. 1999; see also Map 16). In the 1990s, the most important wintering sites were Islay in Scotland, holding 25 000 – 31 000 birds (or 67-77% of the total population), and Inishkeas Islands in Ireland, holding 2500-3000 birds. Flocks of 1000-2000 birds have been recorded in the Sound of Harris in the Outer Hebrides, Orkney, Tiree on the Inner Hebrides and Lissadell in Ireland (Ogilvie et al. 1999). Although some redistribution among the major wintering sites does occur, the geese generally show a high degree of site fidelity: about 66% of the birds remain at the same site during winter and about 70% of the surviving birds return to the same site the following winter (Percival 1991, Ogilvie et al. 1999). Even on a local scale the birds are highly site faithful. For example, Percival (1991) found that 85% of the females returning to Islay used the same site between winters. Interestingly, birds from three different ringing areas in Greenland (Ørsted Dal, Traill Ø and Germania Land) were not distributed randomly on Islay (Percival 1991). From mid Apr the birds start to depart from the British Isles with the majority departing in late Apr (Fox & Gitay 1991). During spring migration, practically all of the population stages in the counties of Austur-Húnavatnssýsla, Vestur-Húnavatnssýsla and Skagafjarðarsýsla in northern Iceland (Map 15, Ogilvie et al. 1999). The birds arrive there in mid-late Apr, and depart around 20 May; most are gone by the end of May (cf. the recoveries and Ogilvie et al. 1999). Consistently, the first birds arrive in NE Greenland around 19-22 May (cf. the recoveries and Boertmann & Glahder 1999), but a few may arrive earlier, cf. the recovery in Mestersvig 22 Apr.

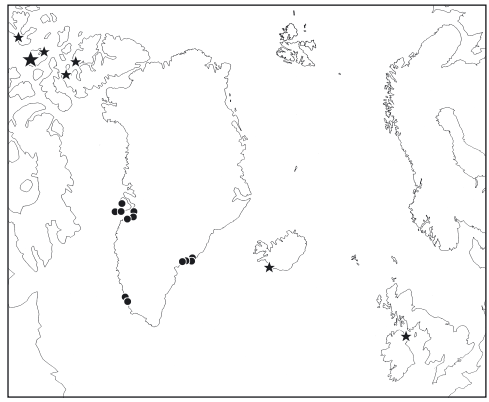
Although a few birds from the Svalbard population occasionally reach NE Greenland, as shown by the recovery of a bird ringed in Svalbard, the two populations are discrete, with only 0.1% emigration and no immigration being recorded (Owen & Black 1999). The Svalbard population winters on the Solway Firth in SW Scotland, migrating via mainland Norway in spring and Bear Island in autumn (Owen & Black 1999). Apparently a few birds from the Greenland population occasionally reach the wintering areas of the Russian-Baltic population (cf. the recovery in the German Wadden Sea), but generally almost no interchange occurs between these populations (Ganter et al. 1999).

Brent Goose *Branta bernicla*

RECOVERIES

12 FRC of birds ringed 1971-1992 (Map 17).

Foreign recoveries: A bird ringed in southwestern Iceland 25 May was shot near Kuummiut (AMM) 26 Aug the same year, while a bird ringed in Northern Ireland 5 Feb was shot in QEQ in Sep 10 years later. Ten birds (8 ads, 2 chicks) ringed in Jul-Aug in high-arctic Canada (Bathurst Island 6, Axel Heiberg Island 1, Seymour Island 1, Melville Island 1, Ellesmere Island 1) were recovered 30 May – 4 Jun (4 birds; AMM 30 May, ILU 31 May, QEQ 4 Jun and 1 in "spring"), 3-18 Sep (5 birds; ILU ad. 3 Sep, ASI 1C 16 Sep, PAA 2 1C 9 Sep and AMM ad. 11 Sep) and 10 Oct (1 ad. AMM).



Map 17. Ringing sites (filled stars) of Brent Geese recovered in Greenland (filled circles; n = 12, large star = 5).
Kort 17. Mærkningssteder (stjerner) for Knortegæs genmeldt i Grønland (cirkler).

MOVEMENTS

Two populations of Light-bellied Brent Geese (subspecies *hrota*) occur in Greenland, the "Eastern Canadian high-arctic Light-bellied Brent" (ECHALB) and the "Svalbard Light-bellied Brent" (SLB). The two populations are considered discrete and only negligible exchange occurs during winter (Clausen et al. 1999). Both populations moult on or near the breeding grounds (Merne et al. 1999, Clausen et al. 1999).

The ECHALB population, to which all the recoveries refer, breeds from eastern Melville Island at about 108ºW east to northern Ellesmere Island. The vast majority of the population passes Greenland and Iceland on migration to and from the wintering areas situated primarily in Ireland; a few hundred reach the Channel Isles and W France. In 1985 the population numbered about 25 000 birds, declining to about 20 000 in the 1990s (Merne et al. 1999). Most birds leave the Canadian breeding grounds in late Aug – early Sep, passing northwestern and western Greenland during late Aug – mid Sep, first arrivals around 20 Aug (Boertmann et al. 1997, Merne et al. 1999). Compared with the total flyway population, only small numbers of staging Brent Geese have been recorded in northwestern and western Greenland, primarily at Sigguup Nunuua/Svartenhuk (UMA/UPV) and on Disko Island (QEQ). During the autumns of 1991-95 Boertmann et al. (1997) recorded a maximum of 730 staging birds, suggesting either that some staging sites went undetected or a large part of the population migrate nonstop from Canada to Iceland. Apparently, most birds arrive in the Disko Bay area and Svartenhuk directly from Canada after crossing Baffin Bay, while others arrive via AVA in NW Greenland, crossing Melville Bay. The main migration route to the E coast of Greenland and Iceland is probably from Disko Bay to AMM and onwards to Iceland (Boertmann et al. 1997), but some birds may cross the inland-ice farther north or farther south. Whether some birds fly directly from W Greenland to Ireland as suggested by Merne et al. (1999) is unknown. However, only few Brent Geese have been reported from SW Greenland (Boertmann et al. 1997). In Iceland, the first birds arrive in late Aug – early Sep. Arrivals peak mid Sep and ceases around 20 Sep; most have left Iceland by the end of Oct. All birds stage in the western part of the country, with major concentrations in the southern parts of Breiðafjörður and in Faxaflói (Boertmann et al. 1997, Gardarsson & Gudmundsson 1997, Merne et al. 1999). Small numbers arrive in Ireland as early as late Aug in some years, but the main arrival takes place in late Sep – early Oct (Merne et al. 1999). During Oct and Nov most of the population stages at Strangford Lough and Lough Foyle in the northern part of Ireland, before redistributing to suitable wintering areas situated along the Irish coast (O'Briain & Healy 1991, Merne et al. 1999). The geese generally remain at their wintering sites until spring migration commences in mid Apr; most have left Ireland by early May (Merne et al. 1999). In spring, the first birds arrive in Iceland in late Apr with most arrivals taking place during the first week of May. Up to 17 400 Brent Geese have been recorded in Iceland in the 1990s, suggesting that a very large part, if not all, of the population stages here during spring (Gardarsson & Gudmundsson 1997, Merne et al. 1999). As in autumn the birds stage in the western part of the country. Most geese depart from Iceland during the last week of May and the first week of Jun; no departures have been

observed before 23 May (Gudmundsson et al. 1995). Ten birds fitted with satellite transmitters in 1992-93 departed between 29 May and 7 Jun (Gudmundsson et al. 1995). Eight were tracked to E Greenland and five to W Greenland. The eight birds took a northwesterly course until reaching the edge of the pack ice, where they reorientated to a more southerly course until reaching the Greenland E coast south of Tasiilaq/Ammassalik. Apparently they spent some days at the E coast before crossing the inland-ice on their way to W Greenland. The five birds tracked to W Greenland arrived there three to four days (4 birds) and ten days (1 bird) after departing from Iceland, i.e. 1-11 Jun; four birds reached W Greenland at Disko Bay or just south of it, the fifth as far south as Nuuk (NUU). Most Brent Geese pass Disko Bay during the last days of May and the first part of Jun (Boertmann & Glahder 1999, K. Kampp pers. comm.) in accordance with the earliest arrivals at the Canadian breeding grounds during the first days of Jun (Merne et al. 1999). The migration from W Greenland to the breeding grounds appears to be undertaken very rapidly and directly, but few details are known.

The SLB population breeds in Svalbard, Franz Josef Land and on Kronprins Christian Land in NE Greenland (Hjort et al. 1987, Hjort 1995, Clausen & Bustnes 1998, Clausen et al. 1999). This small population, numbering 4000-5800 birds in the 1990s, winters at 6-9 localities in Jutland in the western part of Denmark and at Lindisfarne in Northumberland, England. During cold spells some birds disperse southwards to winter in the Netherlands (Clausen et al. 1998, Cottaar et al. 1999). The SLB population is thought to have been ten times larger in the late 19th century, but declined dramatically during the first part of the 20th century due to intensive hunting (especially in Denmark), egging in Svalbard, and a disease in western European *Zostera* stands, removing the main food source of the geese (Clausen et al. 1999). Formerly, the Brent Goose was a rather common breeding bird in N and NE Greenland, but it disappeared sometime after the start of the 20th century (Meltofte 1975, 1976a, Hjort et al. 1987, Boertmann & Glahder 1999). It is not known to which population these birds belonged. In 1985 a small population of 850 birds was found at Kilen on Kronprins Christian Land, including breeders, young birds and non-breeders (Hjort et al. 1987). In 1993, the total number in NE Greenland was estimated at 1000 birds, including a few breeding pairs on Amdrup Land south of Kilen and a few birds on Holm Land and Henrik Krøyer Holme (Hjort 1995). Clausen et al. (1999) estimated that about 100 pairs bred at Kilen in 1985; around 20% of the total SLB population migrates to NE Greenland (Clausen & Bustnes 1997). After finishing the moult in mid Aug (Hjort et al. 1987) they depart from NE Greenland in late Aug, and unknown numbers of the Greenland breeding birds stage in Svalbard en route to the wintering grounds (Clausen et al. 1999). The first SLB birds arrive in Denmark in late Aug – early Sep and by the end of this month the autumn migration has normally ceased. At Blåvandshuk in SW Denmark the earliest migrating birds have been recorded 24 Aug, with 5 Sep as the median date of arrival; the migration peaks in mid Sep (Clausen & Fischer 1994). At Lindisfarne the first birds also arrive roughly in late Aug – early Sep, but formerly most of these birds staged in the Danish part of the Wadden Sea during Sep and Oct. In Nov they moved to Mariager and Randers Fjord in eastern Jutland and remained there in mild winters. In cold winters, however, most of the birds moved to Lindisfarne, some to the Netherlands. From there, they then moved to fjords in NW Jutland in Feb, staging there until the departure to the breeding grounds. In the 1990s this pattern changed. Now many birds arrive directly to Lindisfarne as well as to Mariager and Randers Fjord, and they depart earlier for the spring staging sites such as Agerø, Venø and Nissum Fjord (Clausen et al. 1998, Clausen et al. 1999). The geese leave the spring staging sites in late May – early Jun, arriving in Svalbard and NE Greenland during the first half of Jun. The following case-story illustrates the migration patterns of the Greenland breeding birds: In mid May 1997 five birds caught on Agerø in Jutland were fitted with satellite transmitters (Clausen & Bustnes 1997, Clausen & Bustnes 1998). One transmitter stopped working before the birds left Denmark. Of the remaining four birds, two migrated along the Norwegian coast and then headed northwest, reaching Svalbard on 1-2 Jun, apparently to remain there all summer. Two other birds, a male and a female, migrated to NE Greenland. They departed from Agerø in the morning of 30 May, and passed Lista in SW Norway about three hours later, reaching Vega, Helgeland, at the W coast of Norway 31 May. Here they stayed for ten hours before migrating northwest, passing south of Svalbard to reach Peary Land in N Greenland just after midnight on 3 Jun. They had then migrated about 3500 km in 83 hours of flight, i.e. 42 km/hour. After two days in Peary Land they moved south to

Kilen, where they remained all summer. The transmitter of the female kept functioning until 29 Sep. She left NE Greenland on 22 Aug, arriving at NW Svalbard 23 Aug and S Svalbard on 25 Aug, remaining there at least until 8 Sep. On the 22-27 Sep she was staging in the northern part of the Danish Wadden Sea and then moving on to winter at Lindisfarne, where she arrived on 30 Sep. Controls of colour-ringed birds showed that the male arrived with her. Both the male and the female were subsequently controlled at Kilen in the summer of 1998 (Clausen & Laubek 1999). At least some birds also stage in Svalbard in spring before moving on to NE Greenland. Among 51 colour-ringed birds controlled in NE Greenland in 1998, one was seen in Svalbard 7-10 Jun 1998, while two others had been seen there in early Jun in previous springs (Clausen & Laubek 1999).

Teal *Anas crecca*

3 FRC: Two birds ringed as chicks at Mývatn, Iceland in Jul 1933 and 1954 were shot near Narsaq Kujalleq/Frederiksdal (QAT; 1550 km SW) in early May 1934 and mid Nov 1954, respectively. A bird ringed as 2C male in Maryland, USA, in Mar 1976 was shot near Nanortalik (QAT; 3250 km NE) in mid Jun 1976. The Palearctic subspecies *crecca* is an annual vagrant and occasional breeder in most of Greenland (except the extreme north and northwest), while the Nearctic *carolinensis* is a rare visitor (Boertmann 1994).

Mallard *Anas platyrhynchos*

RECOVERIES

60 GRC of birds ringed in 1946-1979 (Table 24). Of 29 birds known to be ringed as chicks 1 was recovered as 1C (3%) and 20 (69%) as 2 or 3C.

Uummannaq: One bird was recovered in southern UPV in May seven years later. Five birds were recovered in KAN-MAN in spring (May 1), early autumn (Jul-Sep 3) or winter (Jan 1).

Qeqertarsuaq: A bird ringed as a chick was shot near the ringing site one year later. Another was recovered in NUU in Feb 11 years later.

Ilulissat: Five birds with imprecise finding dates (date of letter) were recovered in MAN, NUU (2) and QAT (2). The temporal and spatial distribution of the remaining 26 recoveries is shown in Table 25. See also Map 18 and 19.

Aasiaat: An ad. female was shot less than 30 km from the ringing site in May one year later, while an unaged bird was recovered in QEQ some three years later (undated).

Kangaatsiaq: Two ad. males and a chick ringed at Eqalummiut Nunaat were recovered in Apr-May in SIS-PAA 1-9 years later.

Sisimiut: A bird was shot near the ringing site three months later.

Maniitsoq: An ad. female ringed in Sep was recovered in QAT in Mar, while a male ringed as chick was recovered in PAA in Nov. Five birds were recovered locally (Feb 1, May 1, Jul 2, Aug 1) after 1-9 years.

Nuuk: Two birds were recovered in MAN in Apr and Jul two years later 60-210 km from the ringing site; both reported as males. Four birds were recovered locally (Jun 2, Jan 2) after 2-8 years.

Qaqortoq: Two birds ringed as chicks were shot near the ringing site after three days and two years, respectively.

MOVEMENTS

The Greenland breeding population belongs to the subspecies *conboschas*, which, as suggested by the recoveries, is endemic to Greenland. Mallards are widespread and common breeders in W Greenland north to S UPV; on the E coast it probably breeds in all suitable habitats south of Kangersittuaq (AMM) at 68ºN (Boertmann 1994). Birds from the

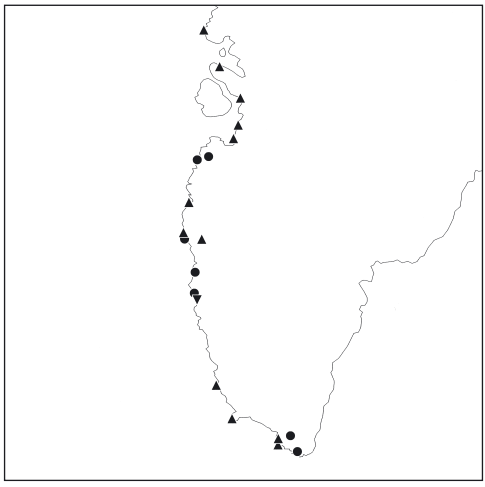
Table 24. Ringing details of recovered Mallards, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Gråand, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA	1	3	2	6	
QEQ	2			2	
ILU	20	8	3	31	
ASI		1	1	2	
KAN	1	2		3	
SIS			1	1	
MAN	3	3	1	7	
NUU	3		3	6	
QAT	2			2	
Total	32	17	11	60	

Table 25. Temporal and spatial distribution of Mallards ringed in ILU and subsequently recovered. An additional 5 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Gråænder ringmærket i ILU.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UMA					1								1
QEQ						1							1
ILU					2		4	1	1				8
ASI					1				1				2
KAN		1		1									2
SIS					2			1					3
MAN				1	1								2
NUU										1			1
PAA					1								1
QAT				1	3						1		5
Total		1		3	11	1	4	2	2	1	1		26

Map 18. Mallards ringed in UMA-QEQ and recovered in Jun-Sep (n = 12). Recoveries from Aug-Sep are shown by triangles pointing downwards.
Kort 18. Gråænder ringmærket i UMA-QEQ og genfundet i jun-sep. Genfund i aug-sep er angivet med opadvendte trekanter.



Map 19. Mallards ringed in UMA-QEQ and recovered in Oct-May (n = 21). Recoveries from May are shown by triangles pointing upwards, while recoveries from Oct are shown by triangles pointing downwards.
Kort 19. Gråænder ringmærket i UMA-QEQ og genfundet i okt-maj. Genfund i maj er angivet med opadvendte trekanter, genfund i okt med nedadvendte trekanter.

northern part of the breeding range in W Greenland move south in Aug-Oct to winter along the coast in the Open Water Region from KAN to QAT. The northward migration commences in Apr and peaks in May. In the KAN-MAN region, part of the population is sedentary, while another part winters farther south. Birds from NUU and southwards are mainly sedentary. Nothing is known about the movements of the population breeding in SE Greenland. Alerstam et al. (1986) found it highly probable that Mallards perform transglacial migrations from wintering grounds in western Greenland to SE Greenland, and Salomonsen (1979b) mentions a small flock passing the DYE2 station (66ºN 46ºW) on the inland-ice in spring. Wintering birds are, however, reported from the Ammassalik-area (Boertmann 1994).

Pintail *Anas acuta*

2 FRC: A female ringed in western Iceland 15 Dec 1962 was shot at Narsaq Kujalleq/Frederiksdal (QAT; 1260 km SW) 17 Apr 1963. A full-grown male ringed northeast of Mills Lake, Mackenzie, Canada 27 Aug 1970 was shot near Issormiut (QAT; 3880 km E) 14 May 1971, 3700 km to the east. As illustrated by these recoveries both Palearctic and Nearctic birds occur in Greenland as annual vagrants (Boertmann 1994).

Ring-necked Duck

Aythya collaris

1 FRC: An adult male ringed 1 Mar 1977 Slimbridge, England was shot near Isertoq (AMM; 2590 km NW) around 19-23 May 1977. Although the possibility of an escape cannot be excluded, the bird was believed to be wild when ringed. The recovery constitutes the only Greenlandic record of this Nearctic species (Boertmann 1994).

Common Eider

Somateria mollissima

RECOVERIES

2134 GRC (Table 26), 48 FRC. All birds from NEA were ringed after 1963 as ads attending colonies in Jun-Jul. In western Greenland, practically all birds were ringed between 1933-1972, the majority as moulting full-grown birds in Aug-Sep (Table 27). The monthly distribution of recoveries of birds from W Greenland is shown in Fig. 8.

Avanersuaq: Seventeen birds ringed in 1928 (12 chicks) and 1948 (5 ad. females) were subsequently recovered. Two were local summer recoveries after 0-11 years, 2 ads on spring migration were shot at Pamiua/Søndre Næs (UPV) in May 2-7 years later, and 13 were recovered after 0-4 years from Disko Bay southwards to Kangaamiut/Gl. Sukkertoppen (MAN) in Nov-May (Map 20).

Upernavik: Large-scale ringing of moulting, flightless eiders was carried out in the fjords southeast of Upernavik town during 1948-1972 (see Map 21). Under this scheme, mainly conducted by A. Lund Drosvad, some 1500 Common Eiders and 6400 King Eiders were caught. Almost 95% of the 742 recoveries of Common Eiders ringed in UPV originate from these operations. However, only 4 controls of 3 birds (retrapped at the same locality 2-11 years later) were filed at ZMUC. These birds were reringed, and controls were probably not reported. Of all Common Eiders ringed and recovered in UPV, approximately half were from within the district (Table 28). Most of these may be considered local recoveries, as 85% (311) were recovered less than 50 km away from the ringing site, 14% (48) 50-100 km away and 4 birds 140-230 km to the north. The recoveries in UPV were primarily from Apr-Oct (Table 29 and 30), and the majority of these within 10 years after ringing (Fig. 9).

Most of the recoveries south of UPV were from the winter time (Nov-Apr; Table 29 and 30, see also Map 22 and 23) and from the northern parts of the Open Water Region (ASI-MAN). A few birds were recovered as far south as Alluitsup Paa/Sydprøven (QAT), 1400 km from the ringing site. The

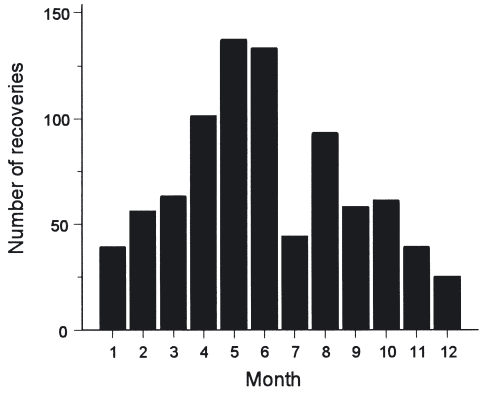


Fig. 8. Monthly distribution of recoveries of Common Eiders ringed in western Greenland (excluding AVA). N = 849.
Månedsvis fordeling af genfund af Ederfugle ringmærket i V Grønland (AVA udeladt).

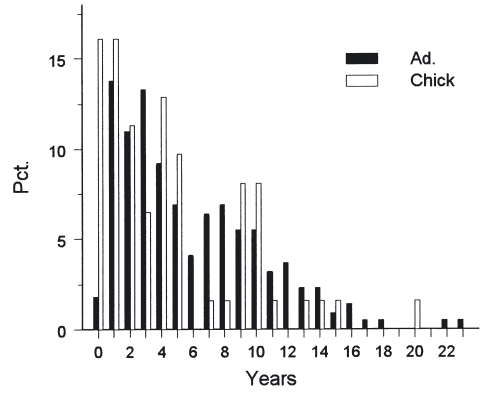


Fig. 9. Elapsed time (years) between ringing and recovery of UPV Common Eiders ringed as adults (n = 218) or chicks (n = 62).
Forløben tid i år mellem ringmærkning og genfund af Ederfugle fra UPV mærket som gamle eller som ællinger.

Table 28. Sex distribution and recovery areas for Common Eiders ringed in UPV.
Kønsfordeling og genfundssteder for Ederfugle ringmærket i UPV.

	Male	Female	Unknown	Total
AVA	2		1	3
UPV	127	93	145	365
Canada	1			1
SW Greenland	143	84	146	373
Total	273	177	292	742

Table 26. Ringing details of recovered Common Eiders, broken down according to age and ringing district. Two birds ringed in 'western Greenland' are omitted.
Ringmærkningsdata for genfund af Ederfugl, opdelt efter mærkningsalder og -distrikt.

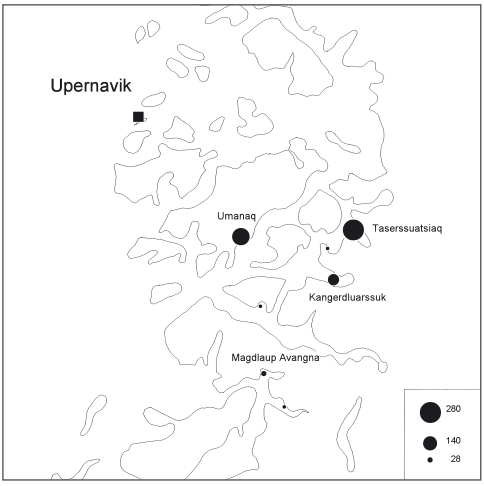
	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	12	5		17	
UPV	168	492	82	742	1
UMA	17	21	30	68	
QEQ	4	2		6	
ILU	8	4	7	19	
MAN	20	34	66	120	
NUU	1	10	1	12	
NEA*		1144	4	1148	18
Total	230	1712	190	2132	19

* Incl. 1079 local controls and recoveries

Table 27. Month and district of ringing of all recoveries of Common Eiders ringed in Greenland. An additional 47 birds with incomplete ringing data are excluded.
Månedsvis ringmærkningsfordeling og mærkningssted for alle genfund af Ederfugle mærket i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA							17						17
UPV							21	646	75				742
UMA							5	46	14		1	2	68
QEQ								5	1				6
ILU								17	2				19
MAN	4	1					3	80	13		15	4	120
NUU						1	1	1					3
NEA						377	725	10					1112
Total	4	1				378	772	805	105		16	6	2087

Map 20. Common Eiders ringed in AVA and recovered elsewhere (n = 15). Monthly distribution: Nov-Dec 6, Mar-May 9.
Kort 20. Ederfugle ringmærket i AVA og genfundet andetsteds.



Map 21. Localities in UPV where more than 10 Common Eiders have been ringed and subsequently recovered. The filled square shows the position of Upernavik town.
Kort 21. Lokaliteter i UPV hvor mere end 10 Ederfugle er blevet ringmærket og senere genfundet. Den fyldte firkant angiver positionen af Upernavik by.

mean monthly centre of gravity for the recoveries gradually shifts southwards until Apr, where spring migration commences (Map 22). A total of 40 birds was recovered south of UPV during Jun-Sep, the majority presumably reflecting abmigration of males (24 out of 27 sexed birds were males). Only very few birds have been recovered north and west of UPV: Three birds (2 males, 1 unsexed) were recovered in AVA during summer 7-9 years after ringing. An ad. male ringed in Aug 1972 was shot at Broughton Island, Northwest Territories, Canada in Aug or Sep 1973.

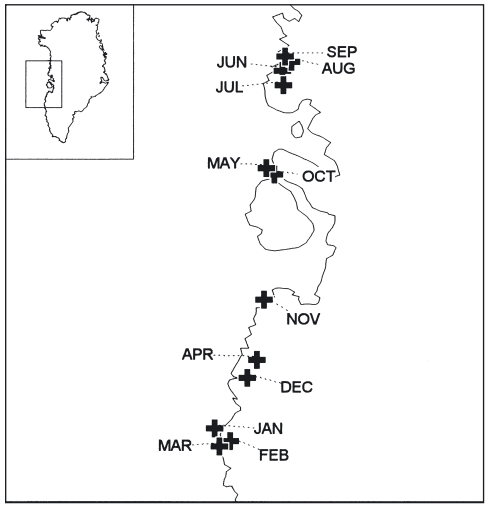
Uummannaq: A total of 68 birds ringed in UMA 1946-63 was recovered. None of these birds were sexed, 17 were ringed as chicks, 21 as ads and 30 were of unknown age. Half (32) of the recoveries can be considered as local: They were primarily from Aug-Oct (27; Table 31) 0-133 (mean 34) km from the ringing site after 0-10 (mean 2.3) years. Only 3 birds were recovered north of UMA, all shot in the southern parts of UPV in May-Jul 1-2 years after ringing. South of the district there were 33 recoveries (8 with uncertain finding data) concentrated in the southern parts of Disko Bay and in MAN. The recoveries from May-Sep are generally situated farther north than the wintertime recoveries, and the centre of gravity for the former falls 150 km north of the latter. The birds were recovered 0-11 (mean 3.3) years after ringing.

Qeqertarsuaq and Ilulissat: The combined total includes 25 recoveries of birds ringed either as chicks (12), ads (6) or unaged (7) in 1946-60. About half (12) of the recoveries are local, from Sep-Nov 0-121 (mean 49) km from the ringing site after 0-9 (mean 1.5) years. One bird was recovered in UPV some 13 years later (finding data uncertain). The remaining 12 birds were recovered from Disko Bay south to NUU (Table 32), mostly during winter.

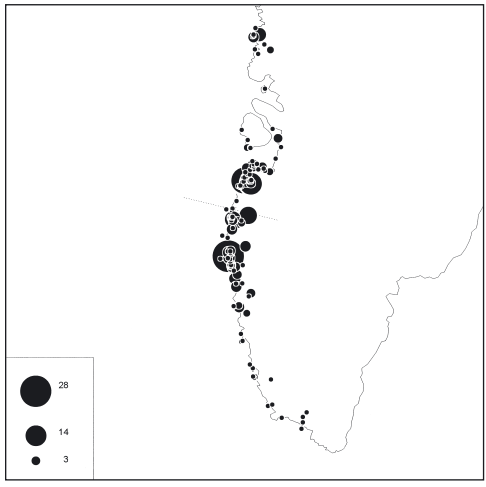
Maniitsoq: Of the 120 birds ringed 1933-1960 only 1 was sexed (a female), 34 were ringed as ads, 20 as chicks and 66 were unaged. Most of the recoveries were from MAN in Oct-May (Table 33) after 0-13 (mean 1.5) years. Nineteen of the 24 (79%) birds ringed during winter (Table 33, see also Map 24) were recovered in MAN in Dec-May, as were a similar proportion (77%) of the birds ringed in summer. Most of the birds recovered north of MAN were found during summer.

Nuuk: Three local recoveries in Apr-Jul after 0-7 years. Nine full-grown birds ringed in Feb-Mar 2000-01 were shot 2-17 km from the ringing site after 6-431 days.

Northeast Greenland: Seven breeding females ringed at Danmarkshavn produced 9 local controls 1-2 years later and a single recovery: a bird shot at Nuua/Kap Swainson (ITT) in May. Since 1964, the Sirius military sledge patrol have carried out ring-



Map 22. Mean monthly recovery coordinates of Common Eiders ringed in UPV and recovered in W Greenland (n = 655). Each point represents 17-117 recoveries.
Kort 22. Månedlige gennemsnitskoordinater for genfundne Ederfugle ringmærket i UPV og genfundet i V Grønland. Hvert punkt repræsenterer 17-117 genfund.



Map 23. Winter (Nov-Apr) recoveries of Common Eiders ringed in UPV-ILU (n = 280). The dotted line denotes the mean latitude for all recoveries pooled.
Kort 23. Vintergenfund (nov-apr) af Ederfugle ringmærket i UPV-ILU.

Table 29. Temporal and spatial distribution of recoveries of Common Eiders ringed as adults in UPV. An additional 52 birds with incomplete recovery data and one recovered in Canada are excluded.
Tidsmæssig og geografisk fordeling af genfund af Ederfugle mærket som adulte i UPV.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA					1								1
UPV				11	47	60	22	45	19	12	1	1	218
UMA						1		4		1			6
QEQ					3	5	2	3		1	2		16
ILU				2			2	2			2		8
ASI		1	1	8	6	3	2		1			1	23
KAN	7	8	4	9	8	2		1	1	1	1	3	45
SIS	3	5	6	12	8	1	1					2	38
MAN	5	6	15	17	6	2			1	2	2	1	57
NUU	2	2	4	3							3	1	15
PAA	1	2		1								1	5
QAT	1	3	1		1					1			7
Total	19	27	31	63	80	74	29	55	22	18	11	10	439

Table 30. Temporal and spatial distribution of recoveries of Common Eiders ringed as chicks in UPV. An additional 26 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Ederfugle mærket som ællinger i UPV.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA													
UPV	1				10	10	2	19	11	5	3	1	62
UMA													
QEQ		1			4		1		1	1	1	1	10
ILU						1	1						2
ASI		2		3		1	1			1			8
KAN	4	2	2	4	2			2			1	1	18
SIS	1	3	1	4	3	1				1	1	2	17
MAN		4	7	3		1						2	17
NUU			1		1								2
PAA	2				1					1	2		6
QAT													
Total	8	12	11	14	21	14	5	21	12	9	8	7	142

Table 31. Temporal and spatial distribution of recoveries of Common Eiders ringed in UMA. An additional 11 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Ederfugle mærket i UMA.

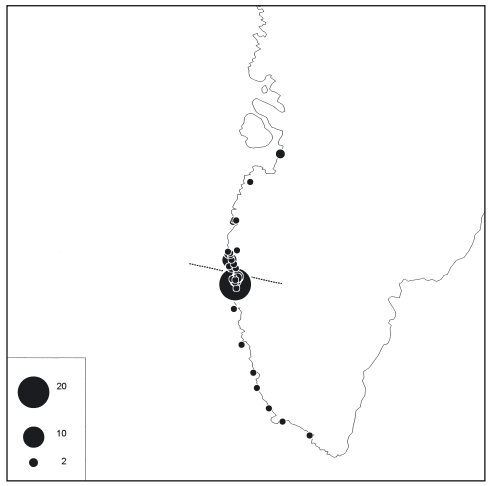
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA													
UPV					1	1	1						3
UMA					1		1	8	10	9	1		30
QEQ								1					1
ILU						1			1		1		3
ASI		1		1	2	1						1	6
KAN					1	3							4
SIS													
MAN	2	1		4							1		8
NUU						1							1
PAA					1								1
QAT													
Total	2	2		5	6	7	2	9	11	9	3	1	57

ing of ad. birds breeding near the tethered huskies at Daneborg (see Meltofte 1978), resulting in 1077 local controls (including birds taken by huskies) one or more years later and 61 recoveries away from the colony (Map 25). The local controls include 8 of 5 males (1-7 years later) and 1069 of 658 females caught 1-8 times 1-18 years later. Forty-two Daneborg birds (34 females, 7 males, 1 unsexed) have been recovered in the Ittoqqortoormiit/Scoresbysund area (NEA; from Ukaleqarteq/ Kap Høegh to Kangikajiip Apalia/ Kap Brewster) in Apr-Sep (29 in May-Jun). The stated dates of recovery of the Jul-Sep birds are unreliable (date of letter), and most of these were probably shot during spring migration. Two presumably abmigrating males were shot in late May – early Jun 850-1200 km to the south (AMM) 7-11 years after ringing.

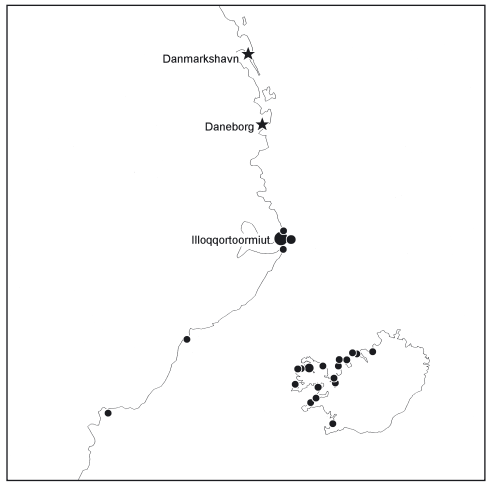
Fifteen females and 3 males were recovered in northwest Iceland. The earliest recorded female was caught in a fishing net on 1 Sep, 67 days after ringing. All others were recovered in spring or summer (Apr 4, May 9, Jun 3, Jul 1), the latest 12 Jul (a male). Fifteen of the birds were reported as taken in fishing net, and the temporal distribution of the recoveries mainly reflects the season for coastal lumpsucker-fishing – the Eider is fully protected in Iceland (I. K. Petersen pers. comm.). Two birds were controlled breeding at Æðey, Ísafjörður: a male and a female, 4 and 12 years, respectively, after being ringed. It is not known wether the female was actually breeding when ringed at Daneborg, or just prospecting. Inter-colony movements of females are unusual, but do occur (Swennen 1990, Bustnes & Erikstad 1993).

Foreign recoveries: An ad. male ringed in a colony at Æðey, Ísafjörður, Iceland in May was shot near Kulusuk (AMM; 660 km W) in Aug six years later. Two chicks ringed 1995-96 in NW Iceland were shot 5-8 Jun 2001 in AMM (65º36'N) and NEA (70º25'N).

A total of 45 Canadian Common Eiders has been recovered in W Greenland (Map 26): A full-grown bird ringed at Devon Island (75º40'N 84º30'W) in Jul 1967 was shot in early Apr 1970 near Kangaatsiaq town (KAN). Forty birds ringed on Southampton Island, Foxe Basin (64º02'N 81º48'W), in late Jun – early Aug 1996-2000 (3 chicks, 11 ad. males, 26 ad. females) were recovered in SW Greenland (36 shot, 4 caught in nets) from QAT north to MAN. The majority (38) was recovered during Oct-May, 1 in Jun and 1 in Jul. Three ad. females ringed in Hudson Strait (c. 64ºN 74ºW) in Jul 1997-98 were shot in NUU (2, Apr and Nov) and QAT ("spring"). Additionally, an ad. bird ringed in the outer Hudson Strait (Quebec; 59º25'N 65º35'W) in Jul 1987 was shot in PAA in Feb 1997.



Map 24. Winter (Nov-Apr) recoveries of Common Eiders ringed in MAN-NUU (n = 64). The dotted line denotes the mean latitude for all recoveries pooled.
Kort 24. Vintergenfund (nov-apr) af Ederfugle ringmærket i MAN-NUU.



Map 25. Common Eiders ringed at Daneborg and Danmarkshavn in Northeast Greenland (filled stars) and recovered elsewhere (n = 60; filled circles).
Kort 25. Genfund af Ederfugle ringmærket ved Daneborg eller Danmarkshavn i Nordøstgrønland (fyldte stjerner) og genfundet andetsteds (fyldte cirkler).

Table 32. Temporal and spatial distribution of recoveries of Common Eiders ringed in QEQ and ILU combined. An additional 4 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Ederfugle mærket i QEQ og ILU.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA													
UPV													
UMA													
QEQ									1	2			3
ILU									1	4	1		6
ASI		1			2								3
KAN		1	1	2									4
SIS						1							1
MAN	1	1										1	3
NUU					1								1
PAA													
QAT													
Total	1	3	1	2	3	1			2	6	1	1	21

Table 33. Temporal and spatial distribution of recoveries of Common Eiders ringed in MAN. An additional 6 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Ederfugle mærket i MAN.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA													
UPV					1	2							3
UMA										1			1
QEQ						1							1
ILU	1						1				1		3
ASI								1					1
KAN				1				1					2
SIS			2										2
MAN	8	13	8	9	12	4	1		8	14	8	5	90
NUU		1			1					1	1		4
PAA			2	1									3
QAT			1				1		1			1	4
Total	9	14	13	11	14	7	3	2	9	16	10	6	114

MOVEMENTS

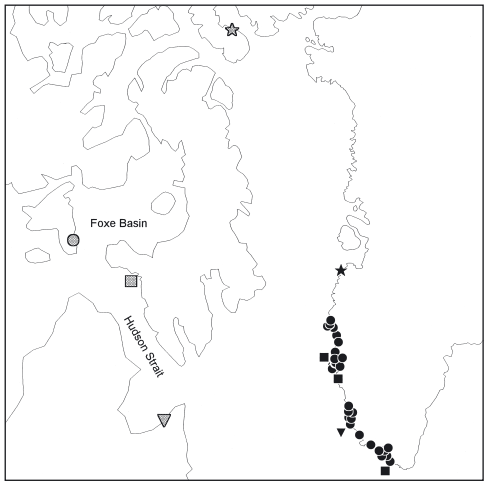
On the W coast, Common Eiders breed northward to western Avannarliit/Inglefield Land and have been recorded breeding as far east as Hall Land in NW Greenland (Boertmann 1994). The breeding population in western Greenland has declined from probably more than 100 000 pairs in the 1820s (Salomonsen 1967b, Vibe 1967) to an estimated 12 000 – 15 000 pairs in the late 1990s (Merkel 2002); the largest breeding populations are now found in AVA and UPV. In SE Greenland, the Common Eider is probably a widespread breeder but little is known about its status (Boertmann 1994). On the coast of NE Greenland, Common Eiders are widespread and fairly common (Meltofte 1978, Boertmann 1994), after a recent range expansion they are now breeding as far north as southern Kronprins Christian Land at about 81ºN (Falk et al. 1997a). No estimates exist for the size of the E Greenland population. The entire breeding population of Common Eiders in Greenland is usually referred to as belonging to the subspecies *borealis* (e.g. Salomonsen 1967b, Cramp 1998, Boertmann 1994). Other authors have, however, split the Greenland birds into a western population belonging to the subspecies *borealis* and an eastern belonging to the subspecies *islandica* (e.g. Schiøler 1926). At any rate, as discussed below the populations fall into two discrete groups: A Baffin Bay population breeding in western Greenland and the eastern Canadian Arctic, and an Icelandic population breeding in Iceland and (north)eastern Greenland.

Western Greenland: Judging from the recover-

ies, Common Eiders from AVA mainly winter from Disko Bay south to about Maniitsoq town (MAN). The populations from UPV, UMM, QEQ and ILU winter in practically the same area (compare Map 20 and 23), though some birds may move further south. A gradual shift southwards during winter occurs amongst UPV birds (Map 22), but birds from all these populations may winter as far north as ice conditions allow (Salomonsen 1967b, Boertmann 1994); small numbers may even winter in AVA (Vibe 1950). Spring migration commences in Apr and peaks in May, while autumn migration starts in Sep and peaks in Oct. Moult migration generally takes place in Aug but is predominantly a local phenomenon. In summer, abmigrating males may be found far from where they were ringed, even in Canada. The Common Eiders from MAN are mainly sedentary, on the average wintering some 200 km south of the abovementioned populations (compare Map 23 and 24). There is very little information on the movements of the population breeding from NUU and southwards, but this, too, is probably sedentary.

During the last fifty years some 80 000 – 150 000 Common Eiders have been bagged annually in western Greenland (Salomonsen 1967b, Kapel & Petersen 1982, Frich 1998). In Mar 1999, the wintering population in SW Greenland was estimated at 462 000 (341 000 – 627 000) birds (Merkel et al. 2002). Approximately 45% of the shot birds are taken in NUU, PAA and QAT combined, an area where only some 10% of the birds from the western and northwestern populations (MAN and UPV-ILU; see Table 34) were recovered. The distribution of the recoveries from these populations suggests that the majority winter north of NUU, and this also seems to be the case for birds from AVA. Where, then, do the bulk of Common Eiders wintering in southwestern Greenland originate? The local breeding population does contribute, but it is small, numbering 2000-5000 pairs (Merkel 2002). The Common Eiders in NE Greenland and Iceland do not winter in western Greenland (see below). Almost nothing is known of the population breeding in SE Greenland, but it is thought to be small and unlikely to contribute significantly to the winter population in SW Greenland. Common Eiders of the subspecies *v-nigrum* from northwestern North America occur in western Greenland, but only as scarce vagrants. The subspecies *dresseri* also occurs in W Greenland as a scarce vagrant (Boertmann 1994); it breeds on the Atlantic coast of North America from Labrador south to Maine and winters from Newfoundland southwards to Massachusetts (Reed 1975, G. Gilchrist in litt.). The subspecies *sedentaria* breeds and winters in Hudson Bay (Abraham & Finney 1986). This leaves only birds breeding in the eastern Canadian Arctic, belonging to the subspecies *borealis* (as the W Greenland breeding birds do).

Migrating Common Eiders, Qaqortoq bay, SW Greenland. Photo: K. Falk.



Map 26. Common Eiders ringed in Canada and recovered in Greenland (n = 44). Shaded symbols denote ringing sites, filled symbols recovery sites.
Kort 26. Genfund af Ederfugle ringmærket i Canada og genfundet i Grønland. Gråtonede symboler angiver mærkningssteder, fyldte symboler genfundssteder.

The Canadian population is roughly estimated to number at least 184 000 breeding birds, which are thought to winter partly in eastern North America (Newfoundland and the Gulf of St. Lawrence), partly in western Greenland (Abraham & Finney 1986). However, more than 800 birds have been ringed in Foxe Basin (almost all in the 1990s) providing 40 recoveries in W Greenland and a few in Hudson Strait and in Newfoundland (G. Gilchrist in litt.). About 240 birds have been ringed in Hudson Strait resulting in two local recoveries, eight in Newfoundland and three in W Greenland. In the remaining parts of the eastern Canadian Arctic only 52 birds have been ringed resulting in two local recoveries and one in W Greenland (KAN). These recoveries strongly suggest that although some birds winter in eastern North America (Newfoundland), a large majority of the Canadian arctic population winter in W Greenland. Common Eiders from the northern Canadian breeding range probably winter farther north in Greenland than birds from the southern part, as is the case of the W Greenland population. Considering the decline of the W Greenland breeding population during the 20th century and its present population size, a large proportion of the Common Eiders currently wintering not only in SW Greenland, but throughout much of W Greenland, must originate in Canada. Whether some Canadian birds also moult in W Greenland as suggested by Abraham & Finney (1986) and Frimer (1993) still remains to be proved.

Eastern Greenland: The NE Greenland population is well separated from the population in western Greenland. Tens of thousands eiders are shot annually in southwestern Greenland, and yet there are no recoveries of NEA-birds from this area. In fact there are only three recoveries (including a bird from Iceland) on the E coast south of the Ittoqqortoormiit/Scoresbysund area, all males shot in the northern parts of AMM. On the other hand, there are almost twenty recoveries from Iceland (Map 25), a country with rugged coasts and no hunting of eiders. Hence, it can be concluded that the Common Eiders breeding in NE Greenland winter in Iceland. A few may, however, winter in leads and polynyas on the NE coast of Greenland (Meltofte 1978). Spring migration starts in Apr and peaks in May, where many birds have been recovered in the Ittoqqortoormiit/Scoresbysund area. After having spent a month at the outer coast, the first breeders usually arrive at their colonies in early-mid Jun (Meltofte 1978, Falk et al. 1997a). Apparently the males moult in Iceland – only very few males are observed in NE Greenland after mid Aug, whereas large flocks gather at suitable sites in Jul (Meltofte 1978). On autumn migration the females and yearlings seem to head straight for Iceland, where they start to arrive in early Sep. Non-breeding imms probably summer off Iceland, as few are seen in NE Greenland (Meltofte 1978). Nothing is known about the movements of the small population in southeastern Greenland, though some apparently winter in the Ammassalik area during favourable ice conditions (Boertmann 1994).

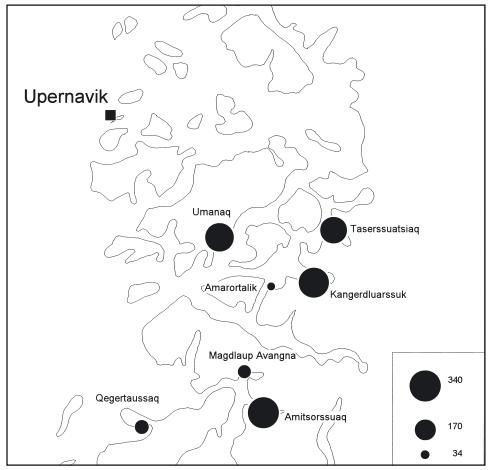
Ringing Eiders in Foxe Basin, Canada. Photo: A. Mosbech.

King Eider *Somateria spectabilis*

RECOVERIES

1475 GRC (Table 35), 8 FRC. Practically all birds in Greenland were ringed before 1973, 99% in Aug-Sep. The majority were ringed as full-grown (1275) or ad. (128). Only birds ringed in UPV were sexed; here 1112 were ringed as males, 141 as females and 197 as unsexed.

Upernavik: During 1946-1972 about 6400 moulting, flightless King Eiders were ringed in the fjords southeast of Upernavik town (Map 27), mostly between 19 Aug and 3 Sep. Of the resulting 1450 recoveries, 74% (1073) were recovered in UPV 0-25 (mean 6.6) years later (Fig. 10). Most were recovered in Jul-Oct (Table 36, Fig. 11). Judging from the recoveries, spring migration mostly took place between 10 May and mid Jun. Arrival of ad. postbreeding males started around 10-15 Jul and peaked in late Aug (Fig. 11). Older females (2S+) seem to have arrived late Jul – early Aug (probably failed breeders) and again in late Aug (successful breeders). Sixty-seven birds were recovered in UPV within the same season after 0-30 days (22), 31-45 days (25) and 46-75 days (20), suggesting that the turnover rate of the moulting birds were low. Unfortunately controls were not reported, but 59 birds included in the above total were reringed 1-16 (mean 4.4) years later; 30 at the same locality, 29 6-63 (mean 24) km away. The recoveries indicate a similar high degree of site fidelity among birds returning to moult in UPV: 82% (769) were recovered less than 50 km away from the ringing site, 17% (155) 50-100 km and 2% (18) 100-182 km away. A number of birds (75 plus 48 in "summer") were recovered south of UPV during May-Oct in later years, especially in UMA and Disko Bay (Table 36, Map 28). Some of these were undoubtedly on migration (May-Jun and Oct), but others were obviously summering. Twenty-seven birds (3 not sexed, 20 males, 4



Map 27. Localities in UPV where more than 30 King Eiders have been ringed and subsequently recovered. The position of Upernavik town is shown by a filled square.
Kort 27. Lokaliteter i UPV hvor mere end 30 Kongeederfugle er blevet ringmærket og senere genfundet. Den fyldte firkant angiver positionen af Upernavik by.

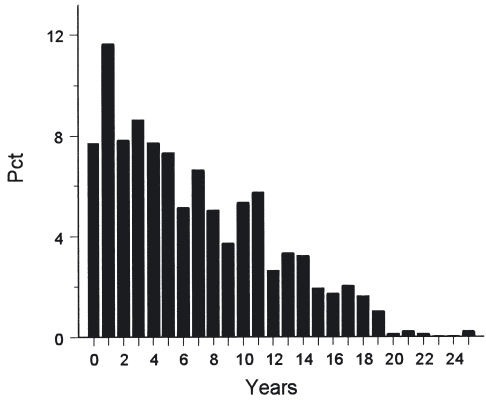


Fig. 10. Elapsed time (years) between ringing and recovery of UPV King Eiders (n = 945).
Forløben tid i år mellem ringmærkning og genfund af Kongeederfugle fra UPV.

Table 35. Ringing details of recovered King Eiders, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Kongeederfugl, opdelt efter mærkningsalder og -distrikt.

	Ringed as				Recovered
Ringed	Chick	Older	Unknown	Total	abroad
UPV		1392	58	1450	27
UMA		2	4	6	1
QEQ		4	1	5	
ILU		8		8	
MAN		3		3	2
NUU		2		2	
ITT	1		1		1
Total	1	1411	63	1475	31

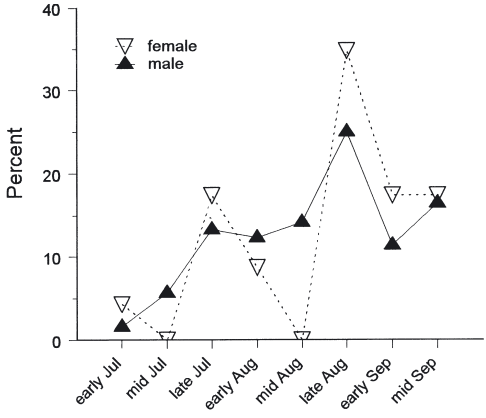


Fig. 11. Temporal distribution of ad. male (n = 316) and ad. female (n = 23) King Eiders recovered in UPV during Jul – mid Sep. Only birds ringed in UPV and shot here one or more years after ringing are included.
Tidsmæssig fordeling af adulte han og hun Kongeederfugle genmeldt i UPV i perioden jul – midt sep. Kun fugle ringmærket i UPV og skudt her et eller flere år senere er medtaget.

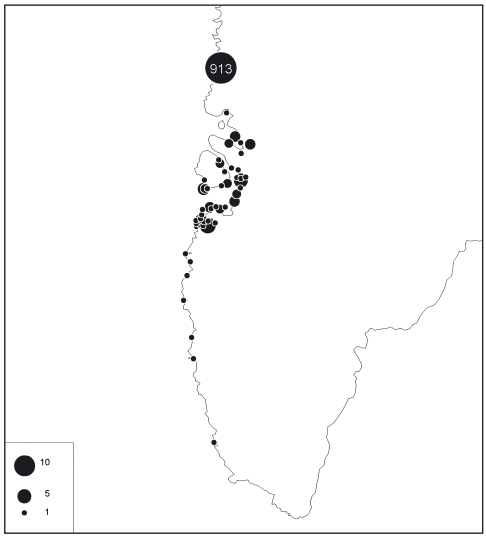
females; the latter recovered 19 Aug – 15 Sep) were recovered between 15 Jul and 15 Sep one or more years after ringing, suggesting that they were moulting in the area, so apparently some birds did not return to the same general moulting area every year. As only 7 birds were recovered outside UPV the autumn they were ringed (QEQ Oct 2, Dec; KAN Nov 2; NUU early Nov and QAT early Nov), little information can be extracted about the timing of the postmoult migration. Apparently many birds stayed in UPV until early-mid Oct, and some probably only left when forced away by the ice in Nov. During winter (Nov-Apr) most of the birds were recovered in the Open Water Region (Table 36, Map 29). The mean monthly centre of gravity for the recoveries gradually shifts southwards until Jan (Map 30). Most of the birds ringed in UPV originated from the eastern Canadian Arctic, where 4 females, 20 males and 3 unsexed birds were subsequently recovered (Map 31); the majority in May-Jun. However, two males were recovered in AVA during "summer", suggesting that some birds from this population also moulted in UPV. All birds (12) recovered in Canada before 15 Jun were found south of 70ºN, while 11 birds recovered during 15 Jun – 10 Jul were found between 64º and 83ºN (see also Map 32).

In early Aug 1999 satellite transmitters were implanted in 10 King Eiders caught in southern UPV (Mosbech et al. 2001). Two birds were shot locally, while signals from the remaining birds were received up to six months later. The birds moulted and remained in southern UPV until Oct. Six birds were tracked past early Oct: One of these remained in southern UPV until at least Feb, while 5 birds migrated south during Oct. These birds arrived at Store Hellefiskebanke off KAN some 450 km to the south in late Oct (median arrival date 30 Oct; typical travel duration 5-8 days) and remained here at least until the transmitters ran out of battery in Jan. At Store Hellefiskebanke, the birds were mainly located in areas about 50 km off the coast and at depths of 20-35 metres.

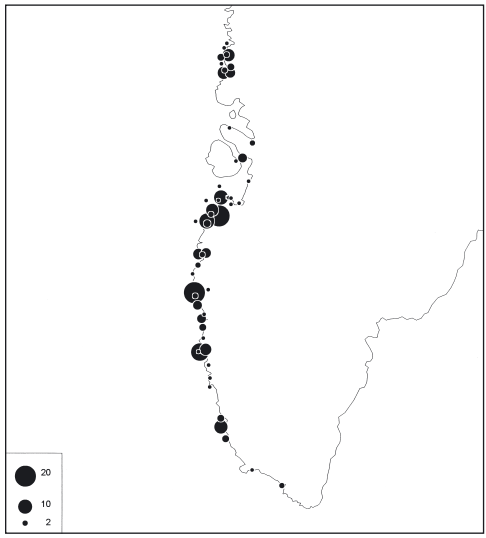
Uummannaq: Six birds ringed Jul-Aug 1946-1959 were recovered: One in UPV in Sep one year later, 1 in UMA 4 years later, 1 in ILU seven years

Table 36. Temporal and spatial distribution of recoveries of King Eiders ringed in UPV. NWT = Northwest Territories, Canada, QU = Quebec province, Canada. An additional 252 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af genfund af Kongeederfugle mærket i UPV.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
NWT				1	5	13	1	1			1		22
QU							1						1
UPV			3	2	15	17	100	342	253	176	26	2	936
UMA	1							3	1	2	2		9
QEQ					3	5	4	2	1	7	1	1	24
ILU	1				1		2	4	4	2	4		18
ASI	1	5	2	6	6	1		1	5	1			28
KAN	4	14	13	7	3	2	1	3	3	1	4	5	60
SIS	3	2	3	3	2							1	14
MAN	9	8	12	4	1		2			1		3	40
NUU	8	8	5	3	1						2	1	28
PAA	2	5	2	4							1	1	15
QAT	1	1									1		3
Total	30	43	40	30	37	38	111	356	267	190	42	14	1198



Map 28. Summer (May-Oct) recoveries in W Greenland of King Eiders ringed in UPV (n = 996).
Kort 28. Sommergenfund (maj-okt) i V Grønland af Kongeederfugle ringmærket i UPV.



Map 29. Winter (Nov-Apr) recoveries in W Greenland of King Eiders ringed in UPV (n = 202). Note that 26 (79%) of the 33 recoveries from UPV are from Nov.
Kort 29. Vintergenfund (nov-apr) i V Grønland af Kongeederfugle ringmærket i UPV.

later (Aug), 2 in ASI in May 1-4 years later, and 1 at King William Island, Canada (Map 31; 1650 km WSW) in summer one year later.

Qeqertarsuaq: Five birds ringed in Aug-Sep 1946-1961 were recovered: 3 in QEQ in Aug-Oct 0-20 years later, 1 in UMA in Jun one year later and 1 in KAN in Mar three years later.

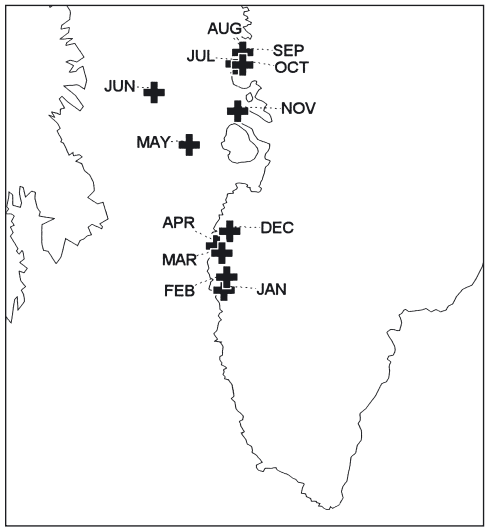
Ilulissat: Eight birds ringed in Sep 1946-1958 were recovered, all in ILU in Aug-Oct 0-11 years later.

Maniitsoq: Three birds ringed in Nov-Jan 1934-1948 were recovered: One in MAN 73 days later, 1 at Baffin Island, Canada in Jun (1150 km W) six years later and 1 in the Gulf of St. Lawrence, Canada (1730 km SSW) in Jul fifteen years later; the latter may, however, be wrongly dated.

Nuuk: Two birds ringed 5 Mar 2001 were shot <4 km from the ringing site after three and 36 days.

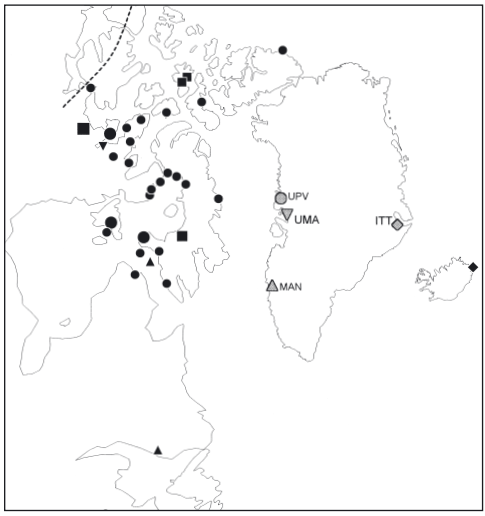
Ittoqqortoormiit: A bird ringed as a chick in Jameson Land in Aug was recovered in Seyðisfjörður, northeast Iceland in Dec the same year (Map 31; 730 km SE).

Foreign recoveries: Two birds ringed as older chicks at Bathurst Island, Canada (c. 75º48'N 98ºW; Map 31), in early Aug 1973 and 1976 were shot in Jan 180 days later in MAN (1925 km SE) and in Oct 62 days later in UPV (1300 km ESE), respectively. Three birds (1 ad. female, 2 chicks) ringed near Karrak Lake, Canada (c. 67º10'N 100ºW) in 1996-99 were subsequently recovered

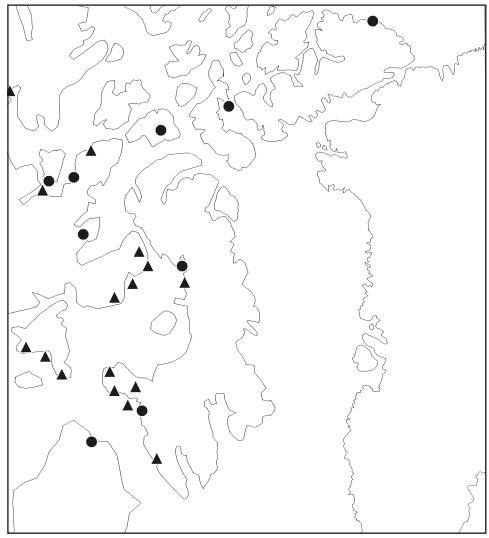


Map 30. Mean monthly recovery coordinates of King Eiders ringed in UPV (n = 1196). Each point represents 14-354 recoveries.
Kort 30. Månedlige gennemsnitskoordinater for Kongeederfugle ringmærket i UPV og genfundet i V Grønland. Hvert punkt repræsenterer 14-354 genfund.

in northern UPV (10 Oct the same year), in QEQ (2 Oct the same year) and in KAN (15 Sep two years later). Two chicks ringed near Nikku Island,



Map 31. Recoveries/ringing sites abroad of King Eiders ringed/recovered in W Greenland. The ringing sites of seven birds ringed in Canada and later recovered in Greenland are shown by filled squares. Filled circles denote birds ringed in UPV (n = 27), filled triangles pointing downwards birds ringed in UMA (n = 1), filled triangles pointing upwards birds ringed in MAN (n = 2), and diamonds birds ringed in ITT (n = 1). The dotted line shows the migratory divide between eastern and western Canadian populations proposed by Salomonsen (1968).
Kort 31. Genfund/mærkningssteder i udlandet af Kongeederfugle ringmærket/genfundet i V Grønland. Mærkningsstedet for syv fugle ringmærket i Canada og senere genfundet i Grønland er angivet med fyldte firkanter. Fyldte cirkler angiver fugle ringmærket i UPV, nedadvendte trekanter fugle ringmærket i UMA, opadvendte trekanter fugle ringmærket i KAN og rhomber fugle ringmærket i ITT. Den stiplede linie viser trækdeleren mellem østlige og vestlige canadiske bestande som foreslået af Salomonsen (1968).



Map 32. King Eiders ringed in W Greenland and recovered in Canada during late Apr – 10 Jul. Filled circles denote birds recovered 16 Jun – 10 Jul (n = 9), filled triangles birds recovered 27 Apr – 15 Jun (n = 16).
Kort 32. Kongeederfugle ringmærket i V Grønland og genfundet i Canada i perioden ultimo apr – 10 jul. Fyldte cirkler angiver fund af fugle i perioden 16 jun – 10 jul, trekanter perioden 27 apr – 15 jun.

Canada (c. 66º36'N 71º33'W), in 2000 were recovered in NUU (29 Mar 2001) and in PAA (15 Jan 2001). Additionally, a bird ringed as a chick (apparently a female) in Prudhoe Bay, Alaska (c.70º20'N 150º20'W), in Aug 1994 was shot in MAN 27 Jan 1998 (4100 km E).

MOVEMENTS

In Greenland, the King Eider only breeds in AVA westwards to Washington Land and in NE Greenland from Peary Land south to Kangertittivaq/Scoresby Sund (Salomonsen 1967b, Boertmann 1994). Though probably not large, the size of the NW Greenland breeding population is unknown; the population in NE Greenland numbers a few thousand pairs at the most (H. Meltofte and D. Boertmann pers. comm.). Little is known about the movements of the Greenland breeding populations. Moulting birds occur in AVA (Mosbech & Boertmann 1999), but it is not known whether these birds belong to the local or the Canadian populations. Some birds from AVA may move south to moult in W Greenland, as suggested by the two recoveries of males ringed when moulting in UPV. The wintering area of the AVA population is unknown, but supposedly most winter in the Open Water Region of W Greenland. King Eiders breeding in NE Greenland generally arrive at open water areas near the coast in mid May and arrive at the breeding grounds in early-mid Jun (Meltofte 1976a, 1976b, Falk et al. 1997a); at least some birds moult locally, e.g. in Jørgen Brønlund Fjord (Meltofte 1976b). A few may winter in open water areas as far north as Wollaston Forland (Boertmann 1994). Salomonsen (1967b) proposed that the population partly wintered in SW Greenland and partly in Iceland (c.f. the recovery in NE Iceland). The King Eider is, however, rare in coastal Iceland, where only 50-100 birds are observed annually (Petersen 1998), and there is no evidence for a movement to SW Greenland. Thus, the main wintering areas of the NE Greenland population remains unknown.

Large numbers of King Eiders breeding in the

eastern Canadian Arctic moult and winter in W Greenland. These birds originate from a vast area from Ellesmere Island in the north and Hudson Strait in the south to Victoria Island in the west (see Map 31). King Eiders breeding in the western Canadian Arctic move west to winter in the Bering Sea (del Hoyo et al. 1996, Suydam et al. 1997), while birds from the eastern Canadian Arctic move east and south to winter along the Open Water Region of W Greenland and the NE American coast from Newfoundland south to Maine (Salomonsen 1967b, Abraham & Finney 1986, this study). Apparently the migratory divide runs through or just east of Banks and Victoria Island at approx. 98-124ºW (Salomonsen 1968, Abraham & Finney 1986). However, a few birds from the western Canadian Arctic may also winter in Greenland, as shown by the recovery of a bird hatched in Alaska (150ºW) and shot in MAN during winter. The main moult migration routes take birds through Lancaster Sound, over central Baffin Island and through Hudson Strait (Salomonsen 1968, Abraham & Finney 1986); at least some King Eiders are known to moult in Canada (Abraham & Finney 1986). From early-mid Jul postbreeding ad. males arrive to moult in an area extending from southern UPV to Disko Bay (Salomonsen 1967b, Frimer 1993, Mosbech & Boertmann 1999). Arrival of ad. males peaks in the first half of Aug on Qeqertarsuaq/Disko (Frimer 1994a), and perhaps a little later in UPV. Shortly after arrival the ad. males initiate moult, most moulting between mid Aug and late Sep (Frimer 1994a); during wing moult the birds are flightless for a period of three weeks (Schiøler 1926). Many imm. birds remain south of the breeding areas, and some of them summer in W Greenland (Salomonsen 1968). The imm. males initiate their wing moult up to two weeks earlier than the ad. males, and imm. females perhaps even earlier again (Frimer 1994a). Salomonsen (1968) stated that ad. females do not take part in the moult migration to W Greenland. However, observations from Qeqertarsuaq/Disko (Frimer 1994a) and the recoveries from UPV show that many ad. females arrive at the moulting areas from late Aug onwards. The timing of their arrival fits well with observations of females migrating eastwards in the eastern Canadian Arctic (Abraham & Finney 1986 and references therein). Young birds (1C), which do not moult remiges, arrive in W Greenland from mid Sep (Frimer 1994a).

King Eiders generally return to the same moult-

King Eiders, Danmarkshavn, NE Greenland. Photo: J. Gravgaard.

ing area from year to year, but as they are extremely shy during wing moult (Frimer 1994b, Mosbech & Boertmann 1999), disturbance may cause them to abandon an area. For example, the largest known moulting concentration was formerly found at Aqajarua/Mudderbugten at Qeqertarsuaq/Disko, where Salomonsen (1967b) in 1946 estimated 30 000 moulting birds. In the early 1990s only 300-500 King Eiders moulted here, most likely due to increased human activity in the area (Frimer 1993). Salomonsen (1967b, 1968) gave the number of moulting birds in W Greenland in the 1950s as "at least 200 000" and "some hundred thousand", and even if these figures may represent rough guesses, the numbers of moulting King Eiders seem to have declined since then (Frimer 1993, Mosbech & Boertmann 1999). Based on aerial surveys Mosbech & Boertmann (1999) estimated that 30 000 – 40 000 King Eiders moulted in W Greenland (mostly in UPV and Qeqertarsuaq/Disko) in the early-mid 1990s. Some 270 000 birds (range 140 000 – 440 000) were estimated to winter in W Greenland in the 1980s and early 1990s (Mosbech & Johnson 1999, see also Durinck & Falk 1996 and Merkel et al. 2002). Even allowing for a high turnover rate of moulting birds (although the recoveries from UPV suggest the opposite), the comparatively low number of moulting birds in later years suggests that many birds now moult in areas outside those surveyed. However, at present the available data from Canada and Greenland are not conclusive and it is a matter of speculation whether a shift of moulting areas has actually occurred or not.

After moulting, King Eiders leave UPV in Oct-Nov and Qeqertarsuaq/Disko in Nov-Dec (Frimer 1993), apparently more or less forced southward by the ice. The birds moulting in UPV primarily winter from ASI south to PAA (Table 36), and the birds moulting in Disko Bay most likely in the same area. At least in some years, large numbers of King Eiders also winter in QAT (Salomonsen 1967b, Pihl 1976). The King Eider ringed in MAN during winter and subsequently recovered in the NE American wintering area suggests that some birds occasionally alternate between these two areas. King Eiders usually winter in areas with deeper water than the Common Eider (Bustnes & Lønne 1997, Mosbech & Johnson 1999, Mosbech et al. 2001). In W Greenland, large concentrations have been found on the offshore banks at depths of less than 50 m, including areas with dense ice cover (Durinck & Falk 1996, Mosbech & Johnson 1999), illustrated by the observation of 20 000 – 30 000 birds in a single small lead 60 km off the coast at Store Hellefiskebanke (Boertmann 1994). The most important wintering areas are Fyllas Banke off NUU and Store Hellefiskebanke off KAN, but many King Eiders also occur in more shallow coastal areas and fjords (Durinck & Falk 1996, Mosbech & Johnson 1999). Spring migration commences in Apr. At Qeqertarsuaq/Disko, the first birds arrive when the ice breaks, usually in mid Apr (Frimer 1993); large numbers stage in Disko Bay during May and the first part of Jun. In UPV the main spring passage occurs between 10 May and mid Jun. At the same time, many King Eiders also migrate northwards via Hudson Strait and Foxe Basin in Canada, as shown by the recoveries here (Map 32).

Harlequin Duck

Histrionicus histrionicus

RECOVERIES

2 GRC, 1 FRC.

Uummannaq: A chick ringed in Aug 1955 was shot somewhere in W Greenland around 1969.

Maniitsoq: A chick ringed in Aug 1947 was shot nearby 12 days later.

Foreign recoveries: An ad. male ringed in Jun 1999 at Fig River, Labrador, Canada, was controlled while moulting in NUU 26 Aug the same year.

MOVEMENTS

The Harlequin Duck is an uncommon breeder in W Greenland north to S UPV and scarce in SE Greenland. Supposedly, the W Greenland population winters in the Open Water Region; the movements of the small population in SE Greenland are unknown (Boertmann 1994). Satellite telemetry studies and ringing conducted in Canada 1997-99 showed that some Canadian birds moult and possibly winter in SW Greenland (Robert et al. 1997, Canadian Wildlife Service homepage). Three males tagged in Hudson Bay in Jun 1997 reached SW Greenland in late Jul – early Aug and were still there by mid Sep. An additional 11 birds tagged 1998 in eastern Hudson Bay, Ungava Bay and northern Labrador reached the SW Greenland coast between Nuuk and Qaqortoq town during mid Jul – early Aug; at least one of them was still there in late Nov. Salomonsen (1974) had previously suspected that Canadian and perhaps Icelandic males moulted in SW Greenland. It is estimated that 5000 – 10 000 males moult in V Greenland (Boertmann & Mosbech 2002).

Long-tailed Duck

Clangula hyemalis

RECOVERIES

32 GRC (Table 37), 10 FRC.

Upernavik: Two birds ringed in summer 1973-1975 were shot two years later less than 70 km from the ringing site.

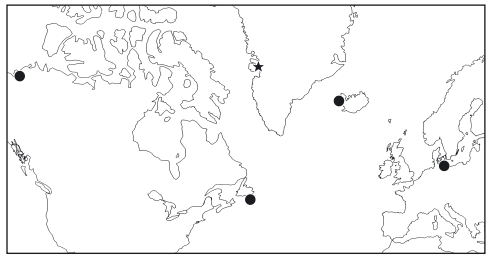
Qeqertarsuaq: Twenty-five birds ringed in mid Jul – early Sep 1947-1964 (8 as chicks, 17 unaged) somewhere near Aamaruutissat/Skansen were subsequently recovered. Three birds were found abroad (Map 33): A bird ringed as a chick was shot in Jan, 4 years later, near Gedser in southeastern Denmark (3690 km ESE). Another was shot near Point Verde, Newfoundland (2450 km S) in Nov 123 days later, and 1 was recovered in Nov near Sveinseyri, northwestern Iceland (1290 km ESE) 112 days later; both of unknown sex and age. The remaining 22 birds were recovered in western Greenland; 3, however, had very imprecise finding data and could not be used. Eleven birds were recovered south of QEQ in Dec-Jul 1-11 years later, while 8 birds in QEQ were shot during summer 1-6 years later and 0-60 km from the ringing site (Table 38, Map 34).

Ilulissat: A bird ringed as a chick in Aug 1947 in Saqqaq valley was shot in Jun 1950 near Tuktoyaktuk in Nunavut, Canada (3180 km W; Map 33). Another bird ringed on the same day was shot two months later 30 km from the ringing site.

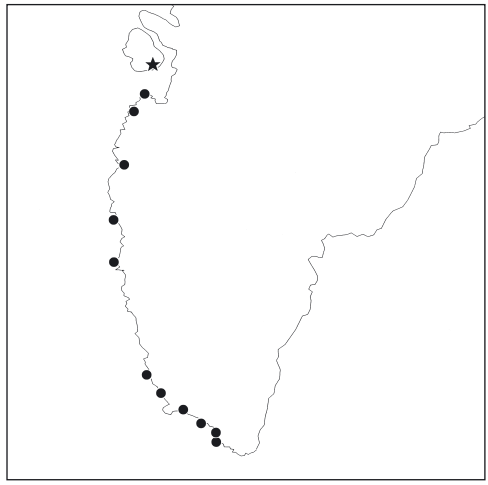
Aasiaat: A bird ringed as ad. in Jul 1946 was shot 13 years later 37 km to the north.

Northeast Greenland: Two birds ringed as chicks in Kong Oscar Fjord in Aug 1955 were shot three weeks later 50 km to the west.

Foreign recoveries: Ten birds ringed in northeastern Iceland in summer 1928-1986 (2 as ad. males, 1 as ad. female, 2 as chicks, 5 unknown) were recovered in Nov (2), Dec (1), Feb (1), Mar (2) and May (4) in southwestern and western Greenland 0-8 years later. Those recovered north of QAT (Map 35) were all from May, as was 1 bird from the northernmost part of this district. The recoveries from Disko Bay were dated 10 and 27 May.



Map 33. Long-tailed Ducks ringed in Greenland and recovered abroad (n = 4). The star denotes approximate site of ringing.
Kort 33. Havlitter ringmærket i Grønland og genfundet i udlandet. Stjernen angiver omtrentligt mærkningssted.



Map 34. Long-tailed Ducks ringed in QEQ and recovered elsewhere in Greenland (n = 11). The star denotes site of ringing.
Kort 34. Havlitter ringmærket i QEQ og genfundet i Grønland. Stjernen angiver mærkningssted.

Table 37. Ringing details of recovered Long-tailed Ducks, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Havlit, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV			2	2	
QEQ	9		16	25	3
ILU	2			2	1
ASI		1		1	
NEA	2			2	
Total	13	1	18	32	4

Table 38. Temporal and spatial distribution of Long-tailed Ducks ringed in QEQ and recovered in Greenland. An additional 3 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Havlitter mærket i QEQ og genfundet i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
QEQ						5	2		1				8
ASI				1									1
KAN						1							1
SIS	1												1
MAN				1									1
NUU		1											1
PAA				1								1	2
QAT	1		1	1		1							4
Total	2	1	1	4		7	2		1			1	19

Map 35. Long-tailed Ducks ringed in Iceland and recovered in Greenland (n = 10). The star denotes approximate site of ringing.
Kort 35. Havlitter ringmærket i Island og genfundet i Grønland. Stjernen angiver mærkningssted.

MOVEMENTS

The Long-tailed Duck is a widespread and fairly common breeder in most of Greenland, though little is known about its occurrence in SE Greenland (Boertmann 1994). Judging from the recoveries, parts of the W Greenland breeding population winter in the Open Water Region from KAN and southwards, especially south of MAN. Others apparently winter around Iceland and Newfoundland, and maybe even farther afield. Around 20 000 Long-tailed Ducks winter in northern British waters, and though some of these are known to come from Russia and Fennoscandinavia (Scott & Rose 1996), the possibility of Greenland birds wintering in this area cannot be excluded. Although both were potentially cases of abmigration, the recoveries in Denmark and western Canada do illustrate that some Greenland birds move very long distances. Even if it is impossible to determine the proportion of the W Greenland population wintering in SW Greenland, the recoveries suggest that it could be the majority. In Mar 1999, the wintering population in SW Greenland was estimated at 94 000 (67 000 – 133 000) birds (Merkel et al. 2002). Nothing is known about the movement of the populations breeding in eastern and northern Greenland. Under favourable ice conditions some birds winter in the Ammassalik-area and a few in the mouth of Kangertiitivaq/Scoresby Sund (Boertmann 1994), but the majority probably winters in Icelandic waters or along the coast of SW Greenland. An unknown part of the Icelandic breeding population also winters in SW Greenland, especially in QAT. In spring these birds gradually move north along the W coast, reaching Disko Bay in May. From there they may migrate across the inland-ice to Iceland. Long-tailed Ducks are well known to undertake migrations over land, and Alerstam et al. (1986) found evidence that birds from eastern and southeastern Greenland used a transglacial migration route as well. Whether parts of the arctic Canadian population also winter in SW Greenland remains an open question.

Red-breasted Merganser

Mergus serrator

RECOVERIES

5 GRC, 1 FRC.

Upernavik: Four birds ringed as full-grown in Aug-Sep 1950-1958 were recovered as follows: One in UPV one year later 60 km from the ringing site, 2 in PAA in Jan 6 years later and in Jul (date of letter) 10 years later, and 1 in NUU in Jan 15 years later.

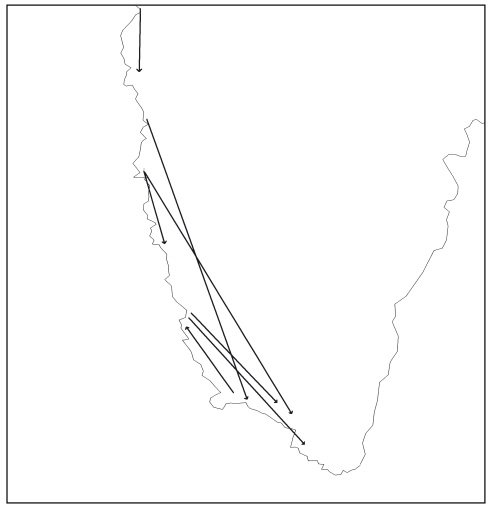
Nuuk: A bird ringed as ad. in Jul 1954 was recovered in MAN in Mar 1963.

Foreign recoveries: A bird ringed as a chick in Jul

1935 in northeastern Iceland was shot in Nov 1954 near Kuummiut (AMM).

MOVEMENTS

The Red-breasted Merganser is a fairly common breeder in W Greenland north to UPV and rare in NE Greenland; in SE Greenland it breeds north to Tasiilaq/Ammassalik (Boertmann 1994). The recoveries show that birds from the northern part of the W Greenland breeding range winter in the Open Water Region, according to Salomonsen (1967b) always south of Kangaatsiaq town (KAN). Birds from the remaining parts of W Greenland are most likely sedentary. Nothing is known about the movements of the population breeding in SE Greenland. Salomonsen (1967b) speculated that this population winters in Iceland and Great Britain, while Alerstam et al. (1986) suggested that some birds winter in southwestern Greenland, returning across the inland-ice in spring. The recovery of an Icelandic bird does, however, show that there is a link between the Icelandic and the E Greenland populations. Some Icelandic birds winter in Great Britain and one has been recovered in the Netherlands (Petersen 1998).



Map 36. Movements of 1Y White-tailed Eagles recovered more than 100 km from the site of ringing.
Kort 36. Trækbevægelser af unge Havørne genfundet mere end 100 km fra mærkningsstedet.

White-tailed Eagle

Haliaeetus albicilla

RECOVERIES

41 GRC (Table 39, Map 36). The 7 unaged birds were most likely all ringed as chicks and are treated as such here. All birds were ringed in Jun-Sep 1946-1982, and recovered as shot (24), caught in fox-traps (8) or found dead (9). Twenty-nine were recovered as 1Y, 6 as 2Y, 2 as 3Y and 4 as 4Y+; the latter either found in various states of decay or recovered locally.

Sisimiut: A bird was recovered in MAN (120 km S) in Nov 80 days after ringing.

Maniitsoq: Three birds were recovered less than 30 km from the nest and less than four months after ringing. One recovered in the nesting-area 13 months later may be wrongly dated. Two birds were recovered in QAT (c. 540 km SSE) after 120 days (Nov) and 2.5 years (Feb), respectively.

Nuuk: Five birds were recovered in NUU in Nov-Feb 0-130 km from the ringing site after three months – 4 years. One was shot in QAT (470 km SE) in May one year later, and 2 were recovered in MAN (c. 150 km NW) in Oct-Nov 1-5 years later.

Paamiut: Two birds were recovered in PAA in Sep-Jan 20 and 140 days later, while 2 other birds were recovered in QAT (c. 280 km SE) in Nov-Jan 113 and 194 days later.

Qaqortoq: Of the 22 recoveries, 2 were found north of the district: the remains of a bird were found in NUU some 15 years after ringing, while another was found dead in PAA (180 km NW) in Nov 180 days after ringing. The remaining birds

Table 39. Ringing details of recovered White-tailed Eagles, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Havørn, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
SIS			1	1	
MAN	2		4	6	
NUU	7		1	8	
PAA	3		1	4	
QAT	22			22	
Total	34		7	41	

were recovered as 1Y (14), 2Y (4) or 3Y (1) 4-99 (mean 40) km from the ringing site, the majority (12) in Nov-Feb; a ring was found locally 12 years after ringing.

MOVEMENTS

The White-tailed Eagle breeds from ILU southwards to Uummannarsuaq/Kap Farvel; the population numbered 150-170 pairs in the 1980s (Kampp & Wille 1990). Stragglers have been recorded in UMA and in the southernmost parts of SE Greenland (Salomonsen 1967b). Young birds (1Y) from most of the breeding range are migratory or partially so. In early autumn they may wander in any direction, but from late autumn there is a general tendency for a southward movement towards QAT (6 of 8 birds ringed north of QAT and recovered as 1Y in Nov-May more than 100 km from the nesting area were found to the south; Map 36). This southward movement may be less pronounced in older imms (1 of 3 recovered in Nov-May more than 100 km from the nesting-area was found to the south), but the number of recoveries is too small to be conclusive. The material does not give any information on the movements of ad. birds, but presumably they are largely sedentary like their boreal conspecifics (Glutz et al. 1971), at least in areas with sufficient food supplies.

Merlin *Falco columbarius*

1 FRC: A bird ringed as a chick in northeastern Iceland 10 Jul 1983 was found on board a fishing vessel in the Denmark Strait May 1986. The Merlin is a rare vagrant in Greenland (Boertmann 1994).

Gyrfalcon *Falco rusticolus*

RECOVERIES

14 GRC. One recovery has no ringing data and 2 concern wounded birds; 1 from ILU released at Nuuk town and found dead two months later, and 1 released in Nuuk town and found dead in PAA five years later. The remaining 11 birds were ringed as ad. (1), chick (3) or unknown (7) in 1948-1992 and recovered less than one year later (10) or five years later (1), as shot (7) or found dead (4).

Avanersuaq: A bird tagged with a satellite transmitter in the summer of 2001 moved westward, arriving on Ellesmere Island in late Sep (Burnham 2001).

Uummannaq: A bird ringed in Jun was shot 13 days later 39 km south of the ringing site.

Qeqertarsuaq: A bird ringed in Sep was found dead in SIS (310 km S) 27 days later. Another was shot near the ringing site 30 days later.

White-tailed Eagle at the nest, Qaqortoq, SW Greenland. Photo: K. Kampp.

Aasiaat: A bird ringed in Sep was shot 10 days later near the ringing site.

Kangaatsiaq: A bird ringed in summer was reported shot near the ringing site in Jan some six months later.

Sisimiut: A bird ringed in Jun was shot two months later in ASI (215 km N), while the ring from a chick ringed in Jun 1992 was found 60 km from the ringing site five years later.

Maniitsoq: A chick ringed in Jul was found dead (decayed) near the ringing site one year later, while a chick ringed in Aug was found dead near the ringing site 44 days later. Two ad. females were caught in mid Sep – mid Oct 2000 near Maniitsoq and tagged with satellite transmitters (Burnham 2001). One of these birds remained through most of the winter in an approx. 8000 km^2 large area near Maniitsoq, the other moved 600 km south to QAT, where it wintered in an approx. 2400 km^2 large area. It arrived to the wintering area in late Oct and left in mid Mar, arriving in late Mar to the breeding area situated about 100 km north of the trapping site.

Nuuk: An ad. ringed in Sep was shot in ASI (469 km N) 47 days later, while a 1C bird ringed Sep 1995 was found dead in PAA five years later.

Paamiut: A bird ringed in Aug was shot near the ringing site one year later.

MOVEMENTS

The Gyrfalcon is a widespread, but sparse breeder in practically all Greenland; no estimate of population size exists (Boertmann 1994). Very little information on the movements of the Greenland Gyrfalcon can be extracted from the recoveries.

Only four birds were recovered in winter or more than 50 km away from the ringing site: One moved south, two moved north and one remained in the same area. As indicated by the recoveries and the recent satellite transmitter trackings, birds from the low-arctic are sedentary, partially migratory or dispersive. In Ptarmigan peak years irruptions may occur (Boertmann 1994). The high-arctic birds are known to be migratory, leaving the breeding grounds in Sep and returning in May. Birds from W Greenland are thought to winter from Disko Bay southwards, while E Greenland birds winter in the Ammassalik area and Iceland (Salomonsen 1967b); vagrants are known from northwestern Europe. Apparently, some birds from AVA winter in Canada.

Peregrine Falcon

Falco peregrinus

RECOVERIES

393 GRC of 239 birds, 22 FRC (Table 40 and 41, Map 37 and 38). Most of the Greenland birds were ringed in 1972-2000 by the Peregrine Falcon projects carried out in SIS/MAN since 1972 (Mattox & Seegar 1988, see also Restani & Mattox 2000) and in QAT since 1981 (Falk & Møller 1988). Among sexed GRC birds 65 were males, 159 females. Of 61 birds ringed as chicks and reported as dead or dying outside Greenland 34 (56%) were in their first year of life, 10 in their second year and 17 older.

Avanersuaq: A male chick ringed late Jul was controlled mid Oct 75 days after ringing at Assateague Island, Maryland, US (4280 km S). Two birds tagged with satellite transmitters in the summer of 2001 moved westward toward Ellesmere Island and then southwestward, passing Southampton Island in late Sep (Burnham 2001).

Uummannaq: A young bird ringed in Aug was shot mid Oct 46 days after ringing near Windigo, Quebec, Canada (2870 km SSW).

Aasiaat: A chick ringed in Jul was shot somewhere in the district one year later.

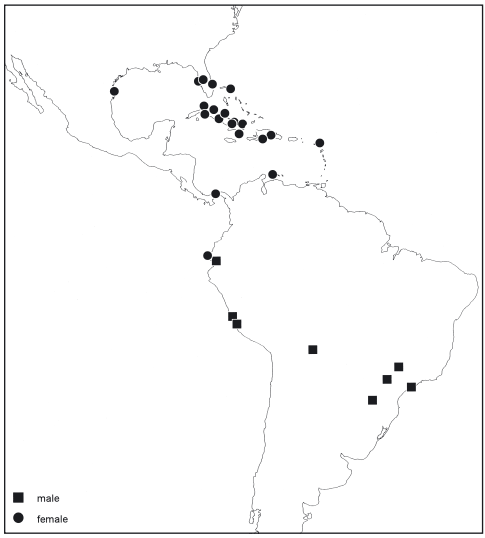
Sisimiut and Maniitsoq: As most of the birds were ringed in the southern part of SIS and in the northern part of MAN, the two districts are combined here. Sixteen birds were found dead or shot in SIS/MAN in Aug-Oct (15) and Apr (1; ring only) after 0-8 years 0-200 km from the nesting area. Two birds were recovered in Greenland outside SIS/MAN: One, ringed as female chick, was found emaciated in QAT (750 km S) in late Jun two years later, while the remains of a young male were found in ASI (150 km N) one year later – in fact the only one-year old bird recovered in Greenland apart from the dubious ASI-record.

A total of 214 controls from SIS/MAN during the breeding season one or more years later was filed at ZMUC. They comprise 87 birds controlled 1-8 times 0-67 (mean 6.9) km from the ringing site. Birds ringed as ads generally returned to the same nesting site; 50 females and 3 males were recorded locally, while 10 females were recorded 2-33 km (mean 11 km) away and 1 male 33 km away. A total of 28 young birds (2Y+), 7 females and 21 males, returned to breed in their natal area and were recorded 5-65 km from the hatch nest. Not all young birds, however, return to their natal area: Two females ringed as chicks in 1990 and 1991 were controlled breeding in QAT 7 and 8 years later (c. 700 km S).

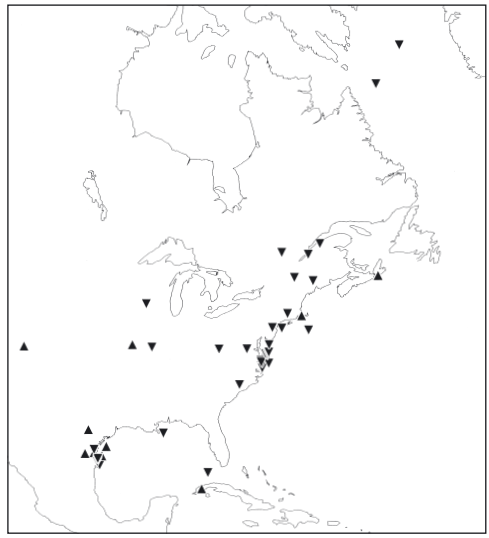
From abroad, there are 106 controls/recoveries of 101 birds ringed in SIS/MAN. Three birds were controlled on migration and subsequently reported dead in winter, while 2 were controlled twice the same autumn: One after two days (110 km to the SSW) and 1 after nine days (19 km to the N). The latter was one of a notable set of autumn controls in the USA: Three sibling chicks ringed in 1983 were controlled as 1C birds; 2 at the same locality

Table 40. Ringing details of recovered Peregrine Falcons, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Vandrefalk, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	1			1	1
UMA	1			1	1
ASI	1			1	
SIS	108	120		228	80
MAN	47	65		112	26
QAT	22	27	1	50	19
Total	180	212	1	393	127



Map 37. Sexed Peregrine Falcons ringed in Greenland and recovered abroad during Nov-Mar (n = 25; a male recovered in mid Apr in Bolivia is included).
Kort 37. Kønsbestemte Vandrefalke ringmærket i Grønland og genfundet i udlandet i nov-mar; en han genfundet i midten af apr i Bolivia er inkluderet.



Map 38. Localities where Peregrine Falcons ringed in Greenland have been recovered during spring (Apr-May; 13 birds on 12 localities) and autumn (Aug-Oct; 77 birds on 42 localities).
Kort 38. Lokaliteter hvor Vandrefalke ringmærket i Grønland er blevet genfundet hhv. om foråret (apr-maj) og om efteråret (aug-okt).

Table 41. Temporal and spatial distribution of Peregrine Falcons recovered abroad. An additonal 2 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Vandrefalke genfundet i udlandet.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
At sea				1					2	1			4
Canada				1				1		3			5
USA		1	2	6	3				9	60	3	2	86
Mexico										1			1
Cuba	1	1	3		1						2	3	11
Panama												1	1
Dominican Republic	1											1	2
Lesser Antilles	1	1									1		3
Bahama											1		1
Ecuador											1	1	2
Peru	1										1		2
Brazil	2			1						1	2		6
Bolivia				1									1
Total	7	2	5	10	4			1	11	66	11	8	125

in Virginia 11 and 15 Oct and 1 in Iowa 19 Oct, 1500 km NW of Virginia. Half (52) of all reported birds were controlled in autumn by ringers operating along the eastern coast of USA, especially on Assateague Island in Maryland/Virginia (16) and on Cape May in New Jersey (10). Forty-six birds were recovered during autumn or winter either in Canada (3 in autumn), in other parts of the eastern USA (12 in autumn), in S America and the Caribbean (25 in Nov-May including an unsexed bird found in Uruguay in "winter") or on board ships (4). Twenty-six sexed birds (19 females, 7 males) were recovered during winter (Nov-Mar). An injured female was found dying in Massachusetts, a 1C female was found in Ecuador and 17 females were reported from countries in the Gulf of Mexico and the Caribbean Sea. The 7 males were all recovered in S America, from Ecuador southwards to Brazil (see Map 37). Nine birds were controlled or recovered in USA in

spring: Five on Padre Island in Texas (late Apr – early May), 1 elsewhere in Texas, 1 in Missouri (Apr), 1 in Colorado (Apr) and 1 in Massachusetts (May).

Qaqortoq: Three birds were recovered in QAT less than 35 km from the ringing site 12 days – 9 years later. Eighteen birds were controlled during the breeding season one or more years later. Birds ringed as ads returned to the same nesting site: 14 females were all subsequently recorded breeding locally. Five young (2Y+) females returning to breed in their natal area were recorded 6-49 (mean 25) km from the hatch nest.

Seventeen birds (3 males, 12 females, 2 unsexed) were recovered/controlled abroad: Two were reported in Sep (1 in New York and 2 days later found dead in New Jersey, 1 in Delaware), 7 in Oct (1 in Mexico, 1 in Texas and 5 in Virginia), 2 in Dec (Cuba (female), Costa Rica (male)), 1 in Jan (Cuba; female), 1 in Feb (Grenada), 1 in Mar (Cuba; female) and 2 in Apr (Texas, Nova Scotia). Finally, an undated bird was reported from the Lesser Antilles.

Foreign recoveries: Twenty-one birds (19 females, 2 males) ringed in the USA 1956-92 were recovered or controlled in Greenland. The majority were ringed in Sep-Oct (19) on the E coast (Massachusetts 1, New Jersey 3, Virginia 13) and in Texas; 2 were ringed in Apr in Texas (ad. females). Four of these were recovered as dead in Greenland: Two were shot in UMA in Aug-Sep, 1 found dead in ILU in Jun and 1 shot in KAN in late autumn (Oct?). The remainder was controlled as breeders in SIS/MAN (12) and QAT (5), all in Jun-Jul. An ad. female ringed on South Padre Island, Texas in late Apr was controlled 59 days later nesting in MAN, having covered the distance at a speed of at least 95 km/day.

MOVEMENTS

The Peregrine Falcon of the subspecies *tundrius* mainly breeds in low-arctic Greenland with the highest densities occurring between Disko Bay and QAT. Small numbers also breed in AVA and in AMM on the E coast; the population is estimated at 500-1000 breeding pairs (Falk & Møller 1988, Boertmann 1994). The breeding-season controls of the Peregrine Falcon projects in SIS/MAN and QAT show that breeders generally are highly philopatric. An unknown proportion of the young birds return to breed in their natal area, while others may move considerable distances. Young males seem to exhibit a higher degree of natal fidelity than young females (Restani & Mattox 2000), a tendency also shown in other studies (Ambrose & Riddle 1988, Newton & Mearns 1988).

Apart from the fact that they are migratory, nothing is known of the migration of Peregrine Falcons breeding in eastern Greenland. Birds from western Greenland generally leave the country in Sep, crossing the Davis Strait/Labrador Sea in a southwesterly direction. During Oct they follow a migration route either through the central USA or along the eastern seaboard. Many northern Peregrine Falcons (including Greenland birds; Map 38) on autumn migration concentrate in key areas such as Assateague Island in Virginia/Maryland, Cape May in New Jersey and Padre Island in Texas. On Assateague, the migration peaks in early Oct with 90% of all birds noted between 21 Sep and 18 Oct (Ward et al. 1988). No difference in the migration pattern of imm. and ad. birds was noted here, but males generally pass through earlier than females. Twenty-four Greenland birds (15 1C, 9 older) ringed or controlled on Assateague were taken 29 Sep – 19 Oct (mean 11 Oct). On Padre Island, situated 2400 km SW of Assateague, the timing of the autumn migration is roughly similar to that on Assateague, but ads pass earlier than imm. birds (Hunt et al. 1975). Six Greenland birds (5 1C, 1 older) ringed or controlled on Padre were taken 2-24 Oct (mean 11 Oct). Apparently there is little seasonal interchange between these two areas (Yates et al. 1988), suggesting that Greenland birds using flyways through the central US migrate somewhat faster than birds moving along the E coast. Three females tagged with satellite transmitters in Greenland and following the US E coast on autumn migration covered a mean daily distance of 150-200 km (data from Mattox 1995). Probably the majority of the Greenland Peregrine Falcons follow the eastern seaboard route in autumn, but the actual proportion is not known. Siblings may follow different routes, as may the members of a breeding pair (Mattox & Seegar 1996, Mattox 1997). The recoveries from ships, as well as the results of satellite-tracking (Mattox 1995, 1997), suggest that some birds following the eastern seaboard may travel considerable distances across the sea, for example from the northeast US coast directly to eastern Cuba.

Greenland Peregrine Falcons reach their wintering area in mid Oct – Nov. During winter, all females were recovered in an area stretching from 28ºN to 2ºS, comprising the Gulf of Mexico, the Caribbean, Central America and the northernmost parts of South America (Map 37). A wintering female fitted with a satellite transmitter in the Gulf

of Mexico at about 24ºN departed from the wintering area 1 May and reached the breeding area in southern Disko Bay (ASI/KAN) 27 May. She then departed from the breeding area 5 Sep to reach the same wintering area 16 Oct (McGrady et al 2002); apparently some Peregrine Falcons are faithful to their wintering areas. Some females may, however, winter as far north as 39ºN: Three ad. females fitted with satellite transmitters in Greenland apparently wintered in the Delaware Bay/Chesapeake Bay area on the US E coast (Mattox 1995). All males (8, including a bird recovered in mid Apr in Bolivia) were recovered in South America between 2-26ºS, but some may winter even farther south as suggested by the recovery of an unsexed bird in Uruguay at 34ºS. An additional male, fitted with a satellite transmitter in Greenland 1996, reached Brazil at approx. 4ºS by 28 Oct (Mattox & Seegar 1996). Thus the wintering areas of males and females are segregated, males on average wintering 4000 km farther south than females.

Most birds arrive at the breeding area in mid May – early Jun (Salomonsen 1967b, Mattox & Seegar 1996), but information concerning spring migration is limited. Padre Island is the only known locality in the western hemisphere where northward migrating Peregrines concentrate in spring (Hunt et al. 1975, Yates et al. 1988). Seven Greenland birds (4 2C, 3 older) ringed or controlled here were taken 21 Apr – 3 May (mean 23 Apr). Apart from these, only six other birds have been recovered on spring migration: Nova Scotia 2 Apr (ad. female), Bolivia 13 Apr (male), Missouri 16 Apr (ad.), Colorado 27 Apr (ad.), Texas 1 May (ad.) and Massachusetts 14 May (2C). The recoveries suggest that most birds use a more westerly route in spring, supported by a 3C Greenland bird trapped on Assateague Island in Oct 1995 and fitted with a satellite transmitter (Mattox 1997). After wintering in Panama, this bird migrated north through the central US, passed just south of Hudson Bay and reached Greenland in Jun, having travelled at least 16 500 km that year. Some birds, e.g. males staying in the southern parts of their wintering range, may perform even more impressive travels, exceeding 25 000 km annually. Thus, the Greenland Peregrine Falcon truly earns its name.

Newly fledged Peregrine Falcon, Qaqortoq, SW Greenland. This bird was retrapped in Mexico in October the same autumn. Photo: K. Falk.

Rock Ptarmigan *Lagopus mutus*

RECOVERIES

26 GRC (Table 42, Map 39) of birds ringed in Jun-Aug 1946-53 (24; 13 in 1949) and 1992 (2).

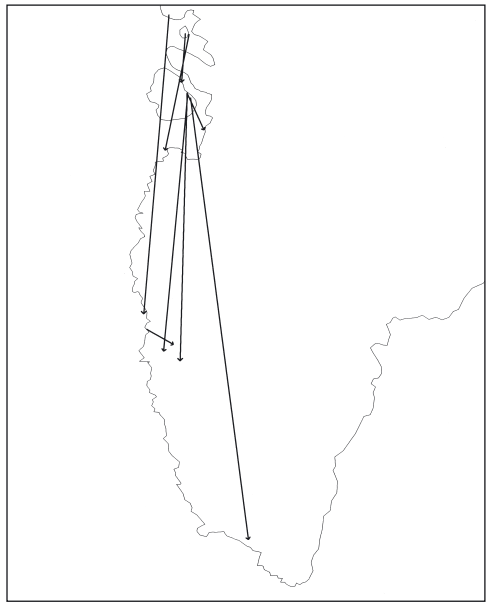
Uummannaq: Five birds were recovered locally after 9-540 days (Jul-Sep 4, Jan 1). Three birds ringed as chicks were reported outside the district: A bird ringed Aug 1950 was shot in MAN in Feb 184 days later (700 km S), another ringed Jul 1949 in ASI in May 300 days later (280 km S) and 1 ringed Jul 1949 was reported from QEQ (120 km S) the following spring.

Qeqertarsuaq: Six birds were recovered locally after 0-3 years (finding dates uncertain). Four birds ringed as chicks in Jul 1949 were reported outside the district: One was shot in ILU (88 km SE) in May two years later, 2 in NUU (600 km S) in Jan-Mar 1-2 years later and 1 in QAT (1050 km SSE) in Feb 208 days later.

Maniitsoq: Seven birds were recovered locally (0-50 km) in Jul-Nov 0-3 years later. A bird ringed as ad. Aug 1949 was shot in NUU (100 km ESE) sometime during winter one year later.

MOVEMENTS

The Rock Ptarmigan is a common breeder throughout Greenland, where three subspecies occur: *rupestris* (south), *saturatus* (northwest) and *captus* (north and northeast), the two latter being endemic (Boertmann 1994). The northernmost populations are migratory, presumably wintering in southern Greenland. They depart in late Sep – Oct and return from Feb onwards, males before females. Migration from Ellesmere Island to Greenland has been observed during late Sep – early Oct (Holder & Montgomerie 1993). In the southern parts of the high-arctic (as far north as Wollaston Forland on the E coast and AVA on the W coast) and in the low-arctic, populations are apparently resident, but may migrate southwards in peak years (Salomonsen 1967b, Boertmann 1994). An observation of a bird passing the inland-ice station DYE2 in Oct 1949 suggests that transglacial migration occur, at least in peak years (Salomonsen 1979b).



Map 39. Movements of Rock Ptarmigans recovered more than 50 km from the site of ringing.
Kort 39. Trækbevægelser af Fjeldryper genfundet mere end 50 km fra mærkningsstedet.

In peak years, which occur approximately every ten years, large scale movements take place. Half the recoveries originate from birds ringed in 1949, the only peak year when large numbers were ringed; high population levels were also recorded 1948 and 1950. According to Salomonsen (1967b), in peak years the southward migration starts mid Oct. On the W coast, high numbers winter in QAT-NUU during Nov-Jan. By late Jan, ptarmigans start leaving this area and in the south most have departed by the end of Mar. In Disko Bay, the spring migration lasts from late Mar to mid May, culminating in late Apr. As in northern populations in normal years males migrate northward before females. In the winter of 1948-49 only males were found among hundreds of birds shot

Table 42. Ringing details of recovered Rock Ptarmigans, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Fjeldrype, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA	5	1	2	8	
QEQ	7		3	10	
MAN	3	5		8	
Total	15	6	5	26	

and examined near Qeqertarsuaq town (QEQ), and among the first flocks migrating through in spring. From early May, flocks consisted exclusively of females (Salomonsen 1950b), suggesting that females wintered farther south than males. This segregation of sexes during winter and during migration is apparently a typical phenomenon in many parts of the western hemisphere (Weeden 1964 and references therein). The recoveries illustrate a tendency to extend migrations in years with high population levels, but more information is needed to understand the migration patterns of Rock Ptarmigans in Greenland.

Oystercatcher

Haematopus ostralegus

3 FRC: A 3C bird ringed Brownsea Island, England, on 14 Jan 1975 was shot in QAT (2870 km WNW) in mid Apr 1979 while another 3C bird ringed in Norfolk, England, 8 Aug 1979 was shot near Kangerlussuaq (ITT; 2430 km NW) in late Aug 1991. An ad. bird ringed 3 Oct 1990 in Devon, England, was shot 6 Apr 1998 in QAT.

The Oystercatcher is a rare Palearctic vagrant in Greenland (Boertmann 1994); the nearest breeding grounds are in Iceland, from where most of the birds move to NW Europe for the winter, while a few remain (Petersen 1998).

Ringed Plover

Charadrius hiaticula

RECOVERIES

12 GRC (Table 43) of birds ringed in 1972-1987, 12 FRC; see Map 40.

Qeqertarsuaq: A 1C bird ringed in late Jul was shot in Landes, France, 20 Sep 56 days later (4060 km SE).

Qaqortoq: A bird ringed as a chick in Jul was controlled near the ringing site 46 days later.

Ittoqqortoormiit: A bird ringed as a chick in Jul was shot in Calvados, France, 8 Sep 46 days later (2770 km SSE; Map 40).

Northeast Greenland: Six birds ringed as ads were controlled locally after one year (3) and two years (3). A bird ringed as a chick in early Aug was controlled at Southampton Water, S England, 25 Sep 56 days later (2630 km SSE), while another ringed as ad. in Jul was controlled in Dumfries & Galloway, Scotland, 13 May five years later (2120 km SSE). A chick ringed in Jul was found dead in Sogn og Fjordane, Norway, in late Aug c. 40 days later (1775 km SE). An additional 11 birds colour-ringed or dye-marked at Jørgen Brønlund Fjord in 1973 and around Kong Oscars Fjord in 1974 were subsequently seen in Britain 3 Sep 1973 and 16 Aug – 12 Sep 1974 (Meltofte 1976b, Green 1978a); these are included in Map 40.

Foreign recoveries: Twelve birds ringed abroad have been recovered in Greenland, all in Jun-Jul. Eight were recovered in eastern Greenland: A bird shot in Jul 1973 while breeding in Jørgen Brønlund Fjord (NOR) was ringed in Dee Estuary, England (3340 km NNW), 21 Aug 1971 and controlled at Morecambe Bay 23 Aug 1972. Two birds recorded as breeding at Mestersvig (NEA) in Jul were ringed in Senegal (6240 km N) 22 Oct 6 years earlier and in Dumfries & Galloway, SE Scotland (2160 km NNW), 20 May one year earlier, respectively. A bird recorded as breeding in Ørsted Dal (ITT) in Jul was ringed in Hampshire, England (2590 km NNW), 22 Aug three years earlier. Another bird recovered in ITT in Jun was ringed in Lancashire, England (2050 km NNW), 19 May one year earlier. Three birds of unknown status were recovered in the first half of Jun in AMM; 1 was ringed in Dumfries & Galloway, Scotland, 13 May 34 days earlier, 1 in Perry Oaks, SE England, 22 Aug two years earlier, and 1 in southwestern Iceland (705 km WNW) 12 Aug one year earlier, respectively. The remaining 4 were recovered in western Greenland. A bird ringed in SW Iceland 1 Jun was shot in QAT 13 Jul the same year (1255 km SW), a bird ringed in Lancashire 30 Apr was shot in early Jun in NUU (2960 km WNW) seven

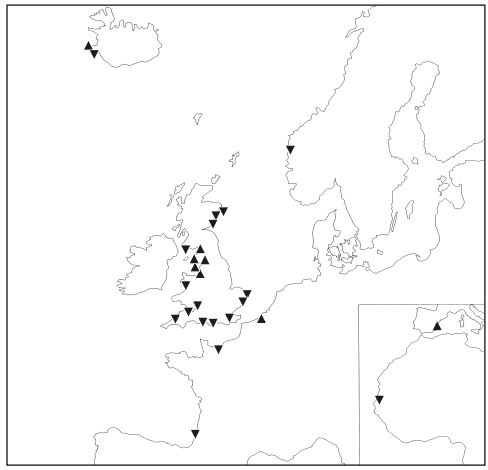
Table 43. Ringing details of recovered Ringed Plovers, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Stor Præstekrave, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
QEQ		1		1	1
QAT	1			1	
ITT	1			1	1
NEA	2	7		9	3
Total	4	8		12	5

years later, a bird ringed in Belgium 3 May was recovered in QEQ (3645 km WNW) 25 Jun the same year and a bird ringed near Valencia, Spain, 21 Apr was shot in QEQ (4630 km NW) 3 Jun the same year.

MOVEMENTS

The Greenland breeding population belongs to the nominate subspecies *hiaticula*, which also breeds NE Canada, Iceland and S Scandinavia south to France; the subspecies *tundrae* breeds N Scandinavia and N Russia (del Hoyo et al. 1996). In W and NW Greenland the Ringed Plover is a locally common breeder (e.g. in Disko Bay and western AVA) while it is absent or scarce in the extreme north from Avannarliit/Inglefield Land (AVA) eastwards to western Peary Land (NOR), abundant in NE Greenland and scarce in SE Greenland (Boertmann 1994). Meltofte (2001) estimated the mainly high-arctic breeding population at 30 000 – 60 000 pairs. The NE Greenland breeding population arrives late May – early Jun (mean date of first sightings 23 May) and departs mid Jul – late Aug; ads first (Meltofte 1985). In low-arctic W Greenland arrival takes place some weeks earlier; during spring and autumn migration small numbers are seen throughout the region with a few 1C birds staying until late Oct (Boertmann 1994).



Map 40. Recoveries of Ringed Plovers ringed/recovered in Greenland and recovered/ringed abroad (n = 27, including sightings). Triangles pointing downwards shows recoveries/ringing sites in Aug-Oct, triangles pointing upwards recoveries/ringing sites in Apr-May.
Kort 40. Genfund af Stor Præstekrave ringmærket/genfundet i Grønland og genfundet/ringmærket i udlandet (incl. aflæsninger). Nedadvendte trekanter angiver genfund/ringmærkning i perioden aug-okt, opadvendte trekanter genfund/ringmærkning i perioden apr-maj.

During autumn, Greenlandic Ringed Plovers (GRC + FRC) have been recovered in Iceland (12 Aug), Norway (late Aug; 1C), Britain (14; 16 Aug – 25 Sep, 10 21 Aug – 8 Sep), France (2; 8-20 Sep) and Senegal (22 Oct). Apparently the Ringed Plovers leave Greenland on a broad front. Part of the population pass SW Norway and W Denmark en route to the Wadden Sea and farther, while another part pass the British Isles. Some stage in Iceland, where ads are recorded from the last week of Jul through Aug, 1C birds from early Aug through late Sep (Wilson 1981). Nearctic (and Icelandic?) birds pass through W Denmark and the Wadden Sea in Aug-Sep, but numbers are believed to be low (Meltofte 1993, Meltofte et al. 1994). Large numbers of birds from the NW population (Nearctic and Iceland) move through Britain in Aug-Sep (Taylor 1980, Prater 1981). At Southampton Water in southern England the passage of birds from the NW population starts in early-mid Aug and finishes at the start of Oct (Insley & Young 1981). Here numbers peak late Aug – early Sep; the passage of 1C birds starting five days after that of ads and peaking three weeks later. In the peak period most of the birds had attained high weights, in theory enabling them to fly nonstop to Morocco or Mauritania; similar high weights were also recorded in NW England (Eades & Okill 1976, Clapham 1978). The few recoveries in France (2 1C birds in Sep) in this material suggest that many (ad.) birds may undertake a nonstop flight to the Iberian Peninsula or NW Africa. Two Icelandic birds recovered in Morocco in Aug and three (2 1C, 1 ad.) recovered in Portugal and Spain during Sep-Nov (Taylor 1980) could have performed such a long-distance migration. Whether some Nearctic birds, e.g. from Baffin Island and SW Greenland, cross the Atlantic on a direct flight to NW Africa (cf. Taylor 1980) is still unknown.

The recovery from Senegal is the only indication of the wintering areas for Greenlandic birds. Smit & Piersma (1989) estimates that approx. 48 000 Ringed Plovers winter in western Europe, western Mediterranean and Morocco, while more than 200 000 birds winter in western Africa (south to S Africa). The first group predominately consists of *hiaticula*-birds breeding around the North Sea and in S Scandinavia, the second of *hiaticula*-birds from the NW population and of N Scandinavian/N Russian *tundrae*-birds (Taylor 1980). In W Africa some 50 000 – 100 000 birds are found at Banc d'Arguin (c. 20º10'N 16º30'W) in Mauritania (Zwarts et al. 1997a, 1997b). Although both *tundrae* and *hiaticula* occur here, a large proportion of

the wintering birds is thought to be *hiaticula* (Wymenga et al. 1990), and Banc d'Arguin is probably an important site for Nearctic birds. Relatively few Ringed Plovers winter south of the Gulf of Guinea, but many winter at other sites in W Africa (e.g. Guinea-Bissau) as well as on inland habitats south of the Sahel Zone (Smit & Piersma 1989).

Birds on spring migration have been recovered on the E coast of Spain (21 Apr), in Belgium (3 May), Britain (5; 30 Apr – 20 May) and Iceland (1 Jun). The Spanish bird is puzzling, and it is tempting to speculate that it either arrived there after a trans-Saharan passage from the Gulf of Guinea or an African inland locality, or wintered at the Mediterranean coast. Spring migration through the British Isles of birds of known or suspected Nearctic/Icelandic origin occurs from mid Apr till the first week of Jun (Eades & Okill 1976, Clapham 1978, Ferns 1980a). The passage is highly concentrated on the British W coast where most birds stage in the estuaries bordering the Irish Sea (Prater 1981). Two peaks occur, one around the third week of Apr and one around the third week of May; the latter by far the largest (Ferns 1980a, Prater 1981). The first peak may consist of Icelandic lowland-breeders (and low-arctic birds?), while the second probably mainly consists of high-arctic breeders (and Icelandic highland-breeders?). Upon arrival in Britain many Ringed Plovers show rather low weights which increase rapidly during May (Eades & Okill 1976, Clapham 1978). According to Taylor (1980) birds ringed in Iceland have been recovered during spring in Morocco (1; Apr), France (3; 2 Apr, 1 May) and NW England (1; Apr).

On average Ringed Plovers depart from Mauritania in late Apr (late Mar – mid May; Piersma et al. 1990). The available data suggests that many birds from the NW population fly more or less directly to the staging areas in Britain (cf. Zwarts et al. 1990). After replenishing their fat reserves they move on. As large numbers of staging Nearctic birds do not occur in Iceland (see below), it is likely that most of the NE Greenland birds overfly Iceland on a direct flight to the breeding grounds. In Iceland, the first Ringed Plovers arrive in mid Apr; the numbers increase during the first half of May and peak in the second half of the month (Wilson 1981). At this time, the local lowland-breeding birds are nesting, but as the Icelandic population is large (50 000 pairs; Petersen 1998) the timing and number of Nearctic birds on passage are obscured. Gudmundsson & Gardarsson (1993) estimated that 5000 birds staged on the Icelandic coast in May, of which an unknown proportion were local. Even if the turnover rate may be high (cf. Gudmundsson & Lindström 1992), the figures suggest that only a small fraction of the Nearctic population uses Iceland as a spring staging site. Possibly, this fraction consists mainly of birds from NE Canada or NW Greenland preparing for a trans-glacial migration (cf. Alerstam et al. 1986); the bird ringed in western Iceland in early Jun and shot mid Jul in SW Greenland could be returning from these breeding grounds.

Red Knot *Calidris canutus*

RECOVERIES

4 GRC of birds ringed as chicks, 137 FRC (Table 44, Map 41 and 42) of birds ringed 1948-1994 (72% in 1968-1972). Twelve of the FRCs were ringed as 1-2C birds, the remaining as ads or full-grown.

Avanersuaq: Two chicks ringed near Pituffik/Thule Airbase 7 Jul 1987 were shot in France the same autumn: One 20 Sep in Loire-Atlantique 4515 km SE and 1 7 Oct in Vendée 4570 km SE.

Ittoqqortoormiit: A chick ringed 17 Jul 1979 in Liverpool Land was shot 18 Nov 1979 in Charente-Maritime, France, 3000 km SSE.

Northeast Greenland: A chick ringed 17 Jul 1997 at Zackenberg was killed by a Peregrine Falcon 5 Sep 1997 at Dornoch Point, Sutherland, Scotland.

Foreign recoveries: A total of 137 Red Knots ringed abroad has been recovered in Greenland (Table 44 and 45). The majority were ringed in Britain (Map 41), especially at the Wash (72) on the E coast and at Morecambe Bay (29) on the W coast of England. The birds were ringed in all months except Jun, though mostly during autumn and winter.

During spring migration (May) birds were ringed in Britain (1-5 May; 2), northern Norway (Balsfjord 18 May; shot UMA 6 Jun one year later) and Iceland (2-27 May; 5). One of the latter was shot in QEQ in early Jun 36 days later; all other birds were recovered more than 98 days after ringing. The earliest reliable spring recovery dates are 25 May (1 in KAN) and 28 May (8 in AVA, 1 in KAN); a majority of all recoveries in Greenland were from late May and the first two weeks of Jun (Fig. 12). The recoveries are highly concentrated in Disko Bay, UMA-UPV and AVA (Map 42), and only 4 birds were recovered south of KAN in May-Jun. One of these, a bird ringed in Britain in Feb, was caught 29 May 1972 onboard a fishing boat operating on Lille Hellefiskebanke (MAN) more

than 100 km off the coast. Large numbers of Red Knots were recovered during spells of adverse weather in spring 1972 (32) and 1974 (58). In 1972, the proportion of birds recovered in AVA during early and late spring were roughly equal (Table 46), whereas in 1974 the early birds were primarily recovered in Disko Bay and UMA-UPV and the later birds in AVA.

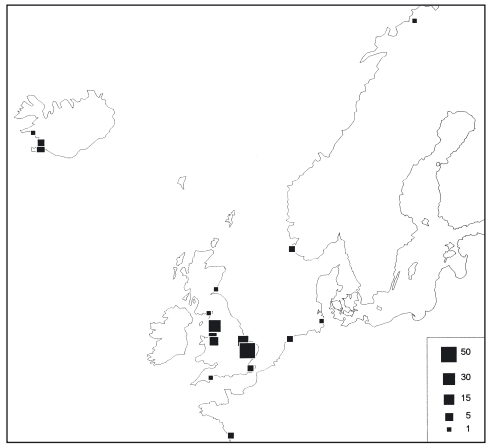
Three of 4 birds recovered in eastern Greenland were found in Jun: One ringed in Germany in Sep was controlled at Danmarkshavn (NEA) 5 Jun, 1 ringed in England in Oct was shot at Ittoqqortoormiit/Scoresbysund (ITT) 15 Jun and 1 ringed in England in May was shot while breeding in Jameson Land (ITT) 30 Jun. An undated bird recovered in AMM was ringed in England in Sep.

The earliest autumn birds ringed abroad are dated 16 Jul (full-grown bird in the Netherlands; summering) and 30 Jul (2C bird ringed in England; summering). Birds ringed in Aug in Iceland, southwestern Norway and Britain were all caught after the 10th of this month; the earliest 1C bird was ringed 17 Aug (in England). Few Red Knots have been recovered in Greenland during autumn migration. In Jul 4 birds were recovered south of AVA: One in QEQ 28 Jul, 1 in KAN 22 Jul and 2 in QAT 20-28 Jul. In Aug there are recoveries from AVA (2 birds 5 Aug 1996), UMA (12 Aug) and ASI (2; 12-15 Aug) and in Sep from QAT (5 Sep) and AVA (16 Sep). The latter is, however, probably incorrectly dated.

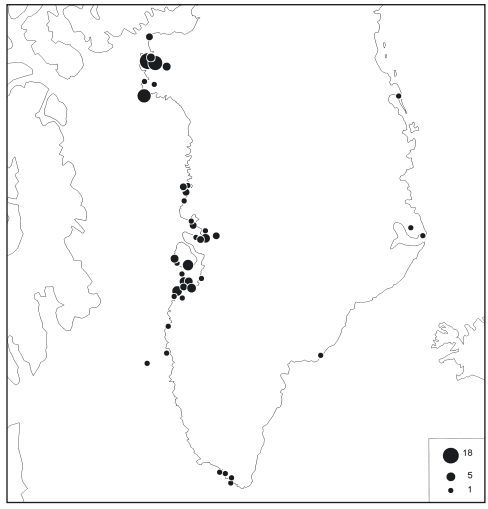
MOVEMENTS

All recoveries refer to the subspecies *islandica* breeding in high-arctic Greenland and NE Canada as far west as Prince Patrick Island; in Greenland most of the population breeds north of 72ºN (Cramp 1998, Godfrey 1992, Morrison & Harrington 1992). In western and southeastern Greenland the Red Knot is a widespread but scarce migrant during Jun and late Jul-Aug; it is most common from Disko Bay northwards (Boertmann 1994). Due to the few recoveries of breeding birds or birds ringed as chicks, it is not possible to differentiate movements and staging sites of the Canadian and Greenlandic population. Meltofte (2001) estimated the size of the Greenlandic breeding population at 15 000 – 30 000 pairs. In the 1980s the midwinter population was estimated to number 345 000 birds (Smit & Piersma 1989, but this number may be too low, cf. Meltofte et al. 1994), suggesting that at least half the population breeds in NE Canada.

The *islandica* population winters in western Europe, from western France northwards to the German Wadden Sea; the British Isles hold at least 70% of the total mid winter population (Smit & Piersma 1989, Davidson & Wilson 1992, Cayford & Waters 1996). Among the most important wintering sites are Morecambe Bay, Dee and Ribble in NW England, the Wash, Humber and Thames in E England and the Dutch Wadden Sea (Prater 1981, Davidson & Wilson 1992, Meltofte et al. 1994). The recoveries of three chicks ringed in Greenland (all in the southern part of the breeding range) and



Map 41. Ringing sites of Red Knots ringed abroad and recovered in Greenland (n = 137).
Kort 41. Ringmærkningssteder for Islandske Ryler ringmærket i udenlandet og genfundet i Grønland.



Map 42. Distribution of Red Knots ringed abroad and recovered in Greenland (n = 137).
Kort 42. Islandske Ryler ringmærket i udlandet og genfundet i Grønland.

Table 44. Temporal and spatial distribution of Red Knots ringed abroad.
Tidsmæssig og geografisk fordeling af Islandske Ryler mærket i udlandet.

Ringed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Norway					1			1	1				3
Iceland					5			3					8
Britain	9	23	17	5	2		1	15	11	10	11	16	120
Germany									1				1
The Netherlands	1						1				1		3
France		2											2
Total	10	25	17	5	8		2	19	13	10	12	16	137

Table 45. Temporal and spatial distribution of Red Knots ringed abroad and recovered in Greenland.
Tidsmæssig og geografisk fordeling af Islandske Ryler mærket i udlandet og genfundet i Grønland.

Recovered	May	Jun	Jul	Aug	Sep	Uncertain dates	Total
AVA	11	33	5	2	1	18	70
UPV	1	5				1	7
UMA		11		1		1	13
QEQ		11	1				12
ASI	2	7		2		4	15
KAN	4	4	1				9
SIS		1					1
MAN	1	1					2
QAT		1	2	1			4
AMM						1	1
ITT		2					2
NEA		1					1
Total	19	77	9	6	1	25	137

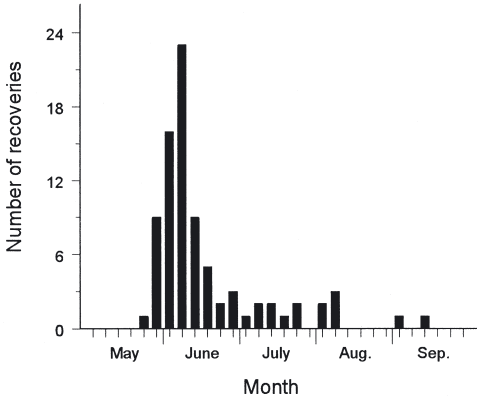


Fig. 12. Monthly distribution of Red Knots ringed abroad and recovered in Greenland (n = 77).
Månedsvis fordeling af Islandske Ryler ringmærket i udlandet og genfundet i Grønland.

Table 46. Recoveries in western Greenland in spring 1972 and spring 1974 of Red Knots ringed abroad.
Genfund af udenlanske Islandske Ryler i V Grønland i forårene 1972 og 1974.

	Disko Bay + UMA-UPV	AVA	% in AVA
30/5-6/6 1972	5	12	71
after 6/6 1972	5	10	67
30/5-6/6 1974	14	1	7
after 6/6 1974	6	37	86
Total	30	60	

shot in France during late Sep – Nov the same year suggest that some (young) Greenlandic Red Knots winter in France. Between the early 1970s and the 1980s the winter population apparently almost halved (from 609 000 birds to 345 000; Smit & Piersma 1989, but see Meltofte et al. 1994); the largest decline was recorded in France (from 110 000 to 19 000 birds). The decrease was probably due to a series of weather-related bad breeding seasons, especially in the early 1970s (e.g. Boyd 1992). The extraordinary numbers of recoveries in AVA 1972 and 1974 indicate an unusual high mortality these years; on Ellesmere Island the breeding success was very low in 1972 (Waterston & Waterston in Morrison & Wilson 1992) and numbers of emaciated, dead birds were found in 1974 (Morrison 1975).

Table 47. Spring (late May - mid Jun) recoveries in W Greenland of Red Knots ringed abroad.
Forårsgenfund (ultimo maj - medio jun) i V Grønland af Islandske Ryler ringmærket i udlandet.

	Recoveries 1972 and 1974	Recoveries in other years	Total	Percentage 1972 and 1974	Years with recoveries
AVA	31	4	35	89	5
UPV	5	1	6	83	3
UMA	6	4	10	60	6
DISKO	14	7	21	67	8
KAN-MAN	6	5	11	55	7
NUU-QAT		1	1	0	1
Total	62	22	84	70	

In late Feb to early Apr many Red Knots move to the Wadden Sea, especially the Schleswig-Holstein part in Germany. Here numbers peak in late Apr – early May and the Wadden Sea at this time holds 60-80% or more of the total *islandica* population (Davidson & Wilson 1992, Meltofte et al. 1994). During the first half of May most birds leave the Wadden Sea and the British Isles on a direct flight to staging sites in either Iceland or northern Norway; it is not known whether some birds fly directly to NE Greenland. During May 270 000 Red Knots stage on intertidal habitats in Iceland, primarily in Breidafjördur and Faxafloi in the western part of the country (Gudmundsson & Gardarsson 1993). The first Red Knots arrive in mid Apr, but numbers are low until May. The main influx takes place during the first 10-12 days of the month with a second and smaller influx two weeks later (Wilson 1981, Gudmundsson & Alerstam 1992). Most birds depart during the last five days of May; median staging time is 21 days (Gudmundsson & Alerstam 1992). In a study on migration routes and orientation of high-arctic migrants departing from Iceland, Alerstam et al. (1990, see also Gudmundsson 1993) found that 95% of approx. 15 000 observed Red Knots departed in a W-NNW (mean WNW) direction, and suggested that the vast majority of the Red Knots staging in Iceland traverse the Greenland inland-ice en route to NW Greenland (AVA) and NE Canada. Some 5% departed in a NNW-N direction, and were probably bound for NE Greenland. It is well known that many arctic birds cross the inland-ice on their way to and from western Greenland and farther (e.g. Salomonsen 1967b, Alerstam et al. 1986). However, little is known about the transglacial migration of the Red Knot. Considering that birds depart from Iceland in directions between W and NNW, they probably reach the Greenland E coast between Tasiilaq/Ammassalik and somewhere north of Kangerlussuaq. Judging from the recoveries they then continue over the inland-ice, reaching W Greenland between MAN and UMA, the majority in the Disko Bay region. Alerstam et al. (1986) noted a shift toward NW in birds arriving on a W course at Sermilik near Tasiilaq/Ammasalik, fitting well with a route leading to Disko Bay. In unfavourable weather some Red Knots may stage in W Greenland; usually they continue directly to the breeding grounds (Meltofte 1985). In some years, at least some Red Knots cross the Davis Strait reaching southern Baffin Island (cf. the recovery off MAN and the two recoveries (in 1972) at Broughton Island off Baffin mentioned by Morrison 1975), but it is not known whether they simply migrate northwards on a broad front (cf. Morrison 1975) or if a more narrow front shifts from year to year depending on weather conditions (cf. Alerstam et al. 1986). A possible explanation for the large number of recoveries in AVA in 1972 and 1974 is that many Red Knots retreated here from their Canadian breeding areas due to adverse weather; the very few recoveries in other years suggest that AVA normally lies outside the migration route of birds bound for NE Canada.

In northern Norway, two spring staging areas, Balsfjord (69ºN) and Porsangerfjord (70ºN), hold 60 000 – 80 000 birds; a considerable interchange takes place between these two sites from year to year, depending on ice conditions (Strann 1992). Probably birds departing from the Wadden Sea as well as from England stage here (Evans 1992). The Red Knots start to arrive during the first week of May, the main influx occurs 10-18 May and most birds depart 25-28 May; birds have been seen departing to the NW (Strann 1992). Thus the birds staging in northern Norway arrive somewhat later and stay for a shorter time than in Iceland. It is tempting to speculate that the majority of these birds breed in N and NE Greenland, but the recovery in UMA demonstrate that some belong to the NW Green-

land/NE Canadian population and migrate over the inland-ice. Furthermore, a bird ringed 11-13 May at Balsfjord was controlled in western Iceland 26 May the same year. Others have been seen in Iceland in subsequent springs, suggesting that some birds may be using different late-spring migration routes in different years (Davidson & Wilson 1992). Both in Iceland and northern Norway birds apparently depart with sufficient fat reserves to fuel a direct flight to N and NW Greenland/NE Canada (Gudmundsson et al. 1991, Evans 1992).

Generally, the first *islandica* birds arrive at the breeding grounds during the last days of May with a peak during the first week of Jun; mean date of first sightings in NE Greenland is 28 May while the first birds arrive on Ellesmere Island 27 May – 1 Jun (Meltofte 1985, Davidson & Wilson 1992). All 2C Red Knots summer in western Europe (Cramp 1998, Meltofte 1985). Though the actual number of these birds is unknown, it is probably in the order of a few tens of thousands (e.g. Prater 1981). Ad. birds depart from the breeding areas from early-mid Jul and most are gone by 10 Aug. 1C birds depart during Aug with the main exodus in the second half of this month (Meltofte 1985).

The migration routes in autumn are less known than those in spring. Few birds migrate along the SW coast of Greenland (cf. the recoveries and Boertmann 1994), so apparently birds breeding in NW Greenland/NE Canada follow the same route as in spring, i.e. flying directly to Iceland via the inland-ice, but perhaps on a broader front (cf. Alerstam et al. 1986). In Iceland, ad. birds arrive in mid Jul, peak in late Jul, and are mostly gone by mid Aug. 1C birds occur in mid Aug – mid Sep and peak in late Aug – early Sep (Wilson 1981, Morrison & Wilson 1992). Apparently much fewer birds stage in Iceland in autumn compared with spring, and the staging period is shorter, 1-2 weeks, so perhaps birds from NE and N Greenland and maybe also from NE Ellesmere Island fly directly to the Wadden Sea and the British Isles (Morrison 1975, Meltofte 1985, Alerstam et al. 1986, Davidson & Wilson 1992). The turnover rate in Iceland may, however, be much higher than in spring (Morrison & Wilson 1992). With ad. birds arriving from mid Jul and 1C birds from mid Aug the early autumn phenology in Britain is much the same as in Iceland and the Wadden Sea (Davidson & Wilson 1992). Many *islandica* Red Knots pass S Norway and W Denmark en route to the Wadden Sea or to the British Isles. In both places migrating ad. birds likewise pass from mid Jul with a peak in late Jul – early Aug, while 1C birds pass from mid Aug with a peak in late Aug – early Sep (Andreassen & Råd 1977, Meltofte 1993). The phenology and numbers of the *islandica* birds involved are obscured by the occurrence of birds of the Siberian breeding subspecies *canutus,* who in early autumn (and late spring) stage for a few weeks in the Wadden Sea en route to their African wintering areas (Piersma et al. 1992). However, the number of *canutus* passing S Norway and W Denmark is supposedly rather small (Lifjeld 1988, Meltofte 1993). Furthermore, at least half the *islandica* population moults in the Wadden Sea during late autumn (Meltofte et al. 1994). After completing the moult, many *islandica* Red Knots move on to the British Isles and other European wintering areas, but according to Meltofte et al. (1994) up to 100 000 birds may remain in the western part of the Dutch Wadden Sea in mild winters.

Red Knots, Qaanaaq, NW Greenland. Photo: K. Kampp.

Sanderling *Calidris alba*

RECOVERIES

4 GRC, 4 FRC.

Northeast Greenland: A bird ringed as a chick 15 Jul 1975 at Danmarkshavn was shot in Charente-Maritime, W France, 7 Sep 1975 (3500 km SSE). A bird ringed as ad. 29 Jul 1974 at Mestersvig was shot in Somme, N France, 1 Aug 1976 (2770 km SSE), while an ad. ringed at Mestersvig in Jun 1978 was killed by a car (!) locally four years later. An ad. breeder ringed in 1999 at Zackenberg was controlled locally one year later.

Apart from the recoveries, 9 Sanderlings colour-ringed or dye-marked around Kong Oscars Fjord in 1974 were subsequently seen in Europe (Green 1978a); these are included in Map 43. Ex-

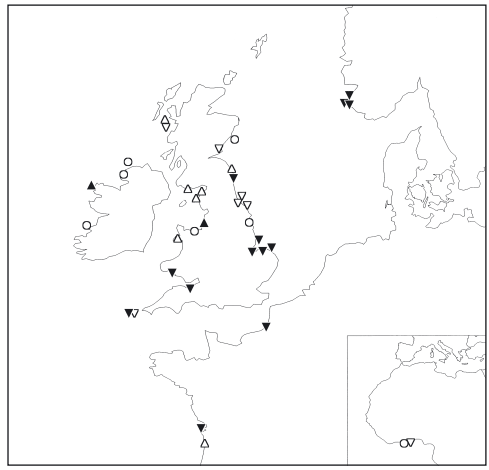
cept 1 in Ireland Mar 1975, all were seen in Britain during mid Aug-Sep 1974. One of these, seen on the Isles of Scilly, was recorded at the same place in the autumns of 1975, 1976 and 1977. These observations suggest a high degree of stopover site fidelity for at least some birds. Stopover and winter site fidelity has been reported from several other studies (Gudmundsson & Lindström 1992 and references therein).

Foreign recoveries: A Sanderling ringed 24 May 1986 at Merseyside, western Britain was found newly dead 5 Jun 1987 in Jameson Land (ITT) 2125 km NNW. Three birds (2 ads, 1 unaged) ringed at Revtangen, southern Norway 2-13 Sep 1951-1969 were recovered in NEA (Danmarkshavn 1, Daneborg 2) in Jun-Jul 1-5 years later c. 2100 km to the NNW.

MOVEMENTS

Outside the breeding season, the Sanderling is basically a bird of temperate and tropical beaches. During the breeding season it is high-arctic, breeding only on the northernmost parts of the circumpolar tundra; important centres are the Canadian arctic archipelago west of Ellesmere Island, NE Greenland and the Taymyr Peninsula in Siberia (Cramp 1998). The Sanderling does not breed in Iceland (Petersen 1998) and only a few pairs breed in Svalbard (Cramp 1998). In Greenland, the Sanderling is an abundant breeder from Kangertitivaq/Scoresby Sund and northwards, common in Peary Land but scarce in NW Greenland (Salomonsen 1967b, Boertmann 1994) and on Ellesmere Island in NE Canada (Freedman & Svoboda 1982, Nettleship & Maher 1973, Parmalee & MacDonald 1960). Meltofte (2001) estimated the size of the Greenland population at 25 000 – 50 000 pairs corresponding to an autumn total of 75 000 – 150 000 birds. In NE Greenland, the breeding population arrives late May – early Jun (mean date of first sightings 25 May) and departs mid Jul – late Aug; ads first (Meltofte 1985). In western Greenland spring migrants occur north of the Nuussuaq peninsula (UMA), but are never numerous. Summer visitors and autumn migrants are more widespread – though most frequent from Qeqertarsuaq (QEQ) and northwards – but, as in spring, they are not numerous (Boertmann 1994).

The Sanderlings breeding in Canada winter on beaches in the Americas; discrete concentrations are found in northwestern USA, Peru, Chile and locally in southeastern Brazil (Myers et al. 1985, Morrison & Ross 1989, Myers et al. 1990). Sanderlings from NE Greenland and western Siberia winter along the Atlantic coasts from the British Isles southwards to S Africa (Cramp 1998). The migratory divide between the Nearctic subpopulations wintering in the New and the Old World respectively is probably situated somewhere between 60º and 90ºW, but the exact position is unknown. Salomonsen (1967b) suggested that the scarce population in NW Greenland could be wintering in the Americas and argued that spring observations in UMA and northwards could be interpreted as birds arriving from the west after crossing the Davis Strait. He also thought that the opposite could be the case, i.e. that the birds arrived from the east after performing a transglacial migration and in autumn returned by the same route. The latter theory was supported by Alerstam et al. (1986), who hypothesized that Sanderlings using Iceland as a spring staging site mainly belong to the NW Greenland and Ellesmere Island population. There are, however, some drawbacks to the transglacial hypothesis. Transglacial migration has not yet convincingly been shown for the



Map 43. Recovery/ringing sites abroad of Sanderlings ringed/recovered in Greenland (n = 15, filled symbols), including sightings. The ringing/recovery sites of 20 birds encountered/ringed in western Iceland in spring (data from Gudmundsson & Lindström 1992; see text) are shown using open symbols. Triangles pointing downwards denote recoveries in Jul-Oct, circles recoveries in Nov-Feb and triangles pointing upwards recoveries in Mar-May.

Kort 43. Genfunds/ringmærkningsteder i udlandet af Sandløbere ringmærket/genfundet i Grønland (,fyldte symboler), incl. aflæsninger. Ringmærknings/genfundssteder af 20 Sandløbere fundet/mærket i det vestlige Island om foråret er angivet med åbne symboler (data fra Gudmundsson & Lindström 1992; se tekst). Nedadvendte trekanter angiver fund i jul-okt, cirkler fund i nov-feb, opadvendte trekanter fund i mar-maj.

Sanderling, and Gudmundsson & Lindström (1992) found that Sanderlings leaving W Iceland in spring were flying nearly due N. The average departure direction differed significantly from that of Red Knots and Ruddy Turnstones who left towards NNW. Both of the latter species are known to undertake large-scale transglacial migrations (Alerstam et al. 1990). Furthermore, the spring observations in western Greenland do not fit particularly well with the patterns observed in waders known to cross the inland-ice (e.g. the Red Knot, where many birds reach western Greenland in the Disko Bay area). Some Sanderlings departing from the British Isles overfly Iceland on their way to NE Greenland (see below). Theoretically, they should be just about able to carry fat loads large enough for fuelling a 4000 km nonstop flight to NE Canada/NW Greenland (e.g. Ferns 1980b, Zwarts et al. 1990, Gudmundsson et al. 1991), overflying Iceland and Greenland, but there are no indications at all of such a migration route. It seems more reasonable to assume that the Sanderlings staging in W Iceland during spring are bound for NE Greenland (cf. Gudmundsson & Lindström 1992), and that the small NW Greenland population probably winters in the Americas.

The few recoveries filed at the ZMUC provide little information about the migration system of the NE Greenland Sanderlings. As the vast majority of the birds staging in Iceland in spring must be of Greenlandic origin, the 20 recoveries of birds ringed/recovered in Iceland in May-Jun published by Gudmundsson & Lindström (1992; see Map 43) provide additional information, as do the sightings of colour-ringed birds mentioned by Gudmundsson & Lindström (1992) and the sightings of nine colour-ringed NE Greenland birds published by Green (1978a). Based on this material, the earliest Sanderlings were recorded in Iceland mid Jul, in Britain late Jul and in France early Aug. In Aug-Sep birds were recovered in Britain (13; 16 Aug – 7 Sep), Norway (3; 2-13 Sep) and France (2; 1 Aug – 7 Sep), while in Oct three birds were recovered from the Outer Hebrides in Scotland (18 Oct) south to Ghana (13 Oct) in W Africa. Many Sanderlings moult after arriving in NW Europe, whereas others only stay for a few weeks before moving farther south to moult (Boere 1976, A.E. Williams in Green 1978b, Ferns 1980b). Birds from the first group apparently mainly winter in Europe while the other group winters in western Africa. Altogether, 66 (56%) of the sightings/recoveries reported by Gudmundsson & Lindström (1992) were from Nov-Feb; of these 63 were from the British Isles, one from the southern Wadden Sea and two from Ghana. Thus, a high proportion of the Sanderlings wintering on the British Isles could be of Greenlandic origin. At least 23 000 Sanderlings winter in Britain and Ireland (Moser 1987, Cayford & Waters 1996), while an additional 10 000 winters in the Wadden Sea (Meltofte et al. 1994); the total East Atlantic flyway population is currently estimated to comprise a minimum of 123 000 birds, but all these estimates are probably too low due to the scattered occurrence of Sanderlings (Smit & Piersma 1989). Given that the recovery probabilities and intensity of ringing activities differ widely between different parts of the Greenlandic Sanderlings potential wintering range and that the estimates of the wintering population on the East Atlantic flyway suggest that approx. three quarters of the wintering Sanderlings are found in western Africa, it does, however, seem likely that a large part of the Greenlandic population winters in Africa, at least south to Ghana. Some Siberian birds winter in S Africa (Myers et al. 1987), but whether Greenlandic Sanderlings occur this far south is still unknown. Approx. 30 000 Sanderlings winter at Banc d'Arguin in Mauritania (Zwarts et al. 1997a, 1997b), which may be important for Greenlandic birds.

Including data on birds ringed/recovered in Iceland (Gudmundsson & Lindström 1992) Greenlandic Sanderlings on spring migration have been recovered in France (1; 9 May), the British Isles (6; 11-24 May, 4 during 15-20 May) and Iceland (20; 14 May – 4 Jun, 14 during 21-29 May). Both in Britain and in the Wadden Sea a wave of Sanderlings arrives in Mar-Apr and another in May (Ferns 1980b, Prater 1981, Meltofte et al. 1994). The first wave may consist of birds that have wintered in Europe, while the second and larger wave probably consists of African winterers. In the Wadden Sea, numbers peak during the last ten days of May and most birds have left by mid Jun; maximum numbers may exceed 40 000 – 50 0000 birds (Meltofte et al. 1994). In Britain numbers peak earlier, in the second and third week of May, with some regional differences (Ferns 1980b). Maximum numbers may exceed 30 000 birds, the vast majority staging on the Irish Sea coasts of NW England (Prater 1981). Most of the Sanderlings staging in NW England are probably Greenlandic breeders (cf. Map 43, Prater 1981, Cramp 1998), while most of the Wadden Sea birds are thought to be Siberian (Meltofte 1993). As in autumn and winter, the situation may be more complex than indicated above. Sanderlings of probable or known

Siberian origin occur in Britain during May (Ferns 1980b, Cramp 1998) and the possibility that some Greenlandic Sanderlings stage in the Wadden Sea in late spring cannot presently be excluded. In Iceland, most Sanderlings arrive 10-20 May and northward departure starts around 25 May (Gudmundsson & Lindström 1992); a minimum of 8000 Sanderlings stage here in spring (Gudmundsson & Gardarsson 1993), but since the turnover rate is high, numbers may be much larger, and Gudmundsson & Lindström (1992) suggested that some 25% of the NE Greenland population staged in Iceland, based on the population estimates presented by Meltofte (1985). As these figures have since been adjusted upwards (Meltofte 2001) the proportion may be lower, but western Iceland is doubtless an important spring staging area. The remaining part of the NE Greenland population probably overflies Iceland on a direct flight from the British Isles – and perhaps from the Wadden Sea.

Purple Sandpiper

Calidris maritima

RECOVERIES

37 GRC of birds ringed in Jun-Aug 1946-1965 (Table 48 and 49, Map 44), 3 FRC.

Upernavik: A bird ringed 3 Jul was shot in MAN (760 km S) 18 Feb five months later.

Qeqertarsuaq: Seven birds ringed in Jun-Jul were recovered: Two were found locally in Jul-Aug 7-1122 days later, 1 was shot in UMA (170 km NE) 70 days later, 1 was shot in MAN (560 km S) in Feb 998 days later and 3 were recovered in NUU (c. 600 km S) in Dec, Jan and Aug 188-1130 days later.

Ilulissat: Thirteen birds ringed in Jun-Jul were recovered. Seven of these (all ringed as chicks) were recovered locally: Two were shot less than two months after ringing, while 5 were found in May-Jun 1-3 years later less than 25 km from the ringing site. Outside ILU, 5 were recovered in MAN (c. 465 km S) in Jan-Apr 260-958 days later and 1 in NUU (550 km S) in Feb 955 days later.

Aasiaat: Five birds ringed in Jun-Jul were recovered, all in MAN (c. 400 km S) 152-1352 days later (Nov 2, Feb 1, Mar 1, May 1).

Kangaatsiaq: A chick ringed 17 Jul was shot in QAT (970 km SSE) 9 Nov 481 days later.

Maniitsoq: Eight birds ringed in Jun-Aug were recovered locally after 9-99 days, one year (Feb) and five years (May), respectively.

Nuuk: A bird ringed as ad. 31 Aug was shot in MAN (150 km NNW) 11 Nov the same year.

Paamiut: A bird ringed as a chick in Jul was recovered locally 38 days later.

Foreign recoveries: Three birds ringed abroad were recovered, all in QAT. A bird ringed 11 Oct in western Iceland was shot 20 Oct one year later near Tasiusaq (1190 km NE). A bird ringed 7 Feb near Liverpool in W England was shot 27 Oct five years later in Aappilattoq (2610 km WNW), and a bird ringed 20 Mar near Tynemouth in NE England was shot 9 Jun the same year near Alluitsup Paa/Sydprøven (2690 km WNW).

MOVEMENTS

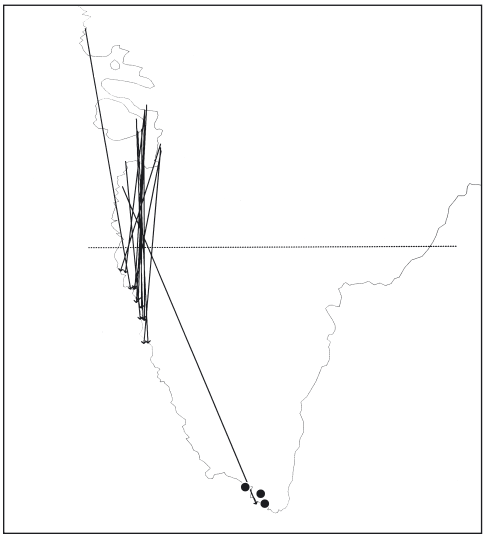
The Purple Sandpiper is a widespread, mainly low-arctic breeder, arriving at the breeding grounds in early Apr – early May (high-arctic late May – early Jun) and leaving during Aug (Boertmann 1994). W Greenland birds breeding from KAN and northwards move south to winter in the littoral zone of the Open Water Region; many birds from Disko Bay winter in MAN-NUU. According to Salomonsen (1967b) Purple Sandpipers may winter as far north as SIS at roughly 67ºN. Birds breeding from MAN and southwards apparently are mostly sedentary, but few have been ringed in

Table 48. Ringing details of recovered Purple Sandpipers, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Sortgrå Ryle, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV			1	1	
QEQ	2		5	7	
ILU	13			13	
ASI	1	1	3	5	
KAN			1	1	
MAN		1	7	8	
NUU		1		1	
PAA	1			1	
Total	17	3	17	37	

Table 49. Temporal and spatial distribution of Purple Sandpipers ringed and recovered in Greenland. An additional bird with incomplete recovery data is excluded.
Tidsmæssig og geografisk fordeling af Sortgrå Ryler ringmærket og genfundet i Grønland.

Recovered	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UMA								1					1
QEQ							1	1					2
ILU					3	2			2				7
MAN	1	5	2	2	2	1	2		1		4		20
NUU	1	1						1				1	4
PAA							1						1
QAT											1		1
Total	2	6	2	2	5	3	4	3	3		5	1	36



Map 44. Purple Sandpipers recovered in Nov-Apr more than 150 km from the site of ringing. Filled circles denote recovery site of three birds ringed abroad. The Arctic circle is indicated by a dotted line.
Kort 44. Sortgrå Ryler genfundet i nov-apr mere end 150 km fra mærkningsstedet. Fyldte cirkler angiver genfundssted for tre fugle mærket i udlandet. Polarcirklen er vist med stiplet linie.

this area. The Jun-recovery in QAT of a bird ringed on the British Isles could be of a bird en route to Canada/NW Greenland. Nothing is known about the movements of the scarce high-arctic population; the population breeding in SE Greenland departs during Oct-Nov (Salomonsen 1967b), but their winter quarters are unknown. That birds from other populations (Canadian, Icelandic) pass or winter in SW Greenland is suggested by the three foreign recoveries. The migratory system of the Canadian-Greenlandic-Icelandic population is, however, complex and poorly understood. Non-breeding birds ringed/recovered in Iceland have been found on Baffin Island, Newfoundland, Greenland, Britain, the Netherlands (3) and northern Spain (Boere et al. 1984, Petersen 1998). Thus Canadian and/or Icelandic birds may stage/winter in SW Greenland while some W and NE Greenland birds may winter/stage in Iceland or migrate to Britain and perhaps mainland Europe. In the order of 10 000 – 100 000 Purple Sandpipers winter in Iceland, but according to Petersen (1998) a considerable part of the breeding population leaves the country probably mostly moving to SW Greenland, Newfoundland and Labrador while others are resident (Summers et al. 1988). During late autumn and winter many foreign birds arrive in Iceland, some most likely of Greenland origin. Canadian birds certainly migrate through Iceland, at least some of them continuing to Europe (Boere et al. 1984, Petersen 1998).

Dunlin *Calidris alpina*

RECOVERIES

24 GRC of birds ringed in 1963-1988 (Table 50 and 51, Map 45), 4 FRC.

Ittoqqortoormiit: Nine birds were recovered abroad: A bird ringed as a chick 14 Jul was shot 11 Sep 59 days later in Somme, N France (2540 km SSE). An ad. male ringed in Jun was controlled in Finistère, N France, 24 Aug three years later (2650 km SSE) and again in S Portugal (3860 km SSE) 9 Aug five years later. Two birds ringed as ads 14 Aug 1963 were shot in Gironde, W France (c. 3050 km SSE) 11-15 Sep 28-32 days later. A bird ringed as a chick 20 Jul was shot in Charente-Maritime, W France (2980 km SSE) the following Feb. Another, ringed as ad. in mid Aug, was shot in Charente-Maritime 24 Aug three years later. An ad. ringed in Jul was controlled 19 May 314 days later in Morecambe Bay, W England (2210 km SSE), and a bird ringed as a chick was controlled in Lin-

Table 50. Ringing details of recovered Dunlins, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Almindelig Ryle, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
ITT	3	6		9	9
NEA	7	8		15	9
Total	10	14		24	18

Table 51. Temporal and spatial distribution of Dunlins recovered or ringed abroad. An additional 2 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Almindelige Ryler genfundet eller ringmærket i udlandet.

Recovered/ringed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Britain					4		1	2	1				8
France		1					1	4	4		1		11
Spain											1		1
Portugal								1					1
Morocco				1									1
Total		1		1	4		2	7	5		2		22

colnshire, E England (2375 km SSE), 29 Aug two years later.

Northeast Greenland: Six birds ringed as ads at Danmarkshavn were recovered locally one year later, while 9 birds were recovered abroad: Two birds were recovered in Morecambe Bay, W England (c. 2600 km SSE) 7 May and 26 Aug three and eight years later. A chick ringed 11 Jul was controlled 5 Sep 56 days later in Udale Bay, NE Scotland (2200 km SSE). Four birds ringed as chicks were recovered in W France (c. 3400 km SSE); 1 was shot 26 Jul one year later (2C), 2 were recovered 24-25 Aug 38-42 days later and 1 was controlled 20 Nov 119 days later. A bird ringed as a chick was shot 5 Nov in Oviedo, N Spain (3775 km SSE), 109 days later, while another chick-ringed bird was shot in W Morocco (4805 km S) 24 Apr 648 days later.

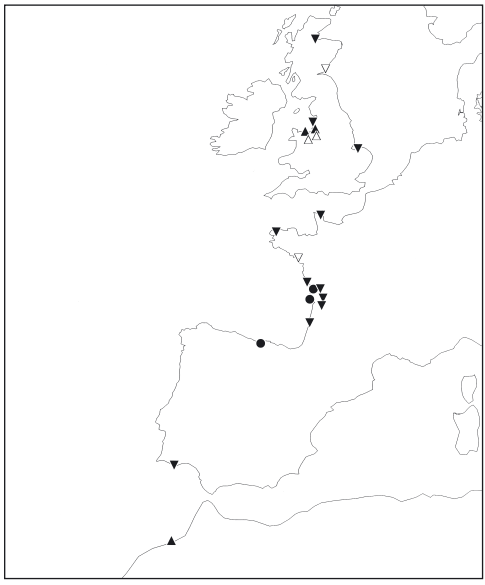
Foreign recoveries: An ad. male ringed 13 Sep in Morbihan, W France, was shot at Kangerterajiva/Hurry Inlet (ITT; 2755 km NNW) 31 May twelve years later. An ad. female ringed 29 Jul in Fife, SE Scotland, was shot at Kangerterajiva/Hurry Inlet (1890 km NNW) 23 Jul two years later, while an ad. ringed 22 May on the Dee estuary, W England was shot 7 Jun 16 days later at Danmarkshavn (NEA; 2680 km NNW). Another ad. ringed 15 May on the Dee estuary was shot at Danmarkshavn (2685 km NNW) 16 Jul 62 days later.

MOVEMENTS

All recoveries are of the endemic subspecies *arctica*, breeding in NE Greenland between 69º and 79ºN. From SE Greenland one proved case of breeding and some observations of the subspecies *schinzii* exists (Salomonsen 1950b). The few pairs occasionally breeding on the W coast are usually referred to as *schinzii*, while most of the vagrants occurring on the W coast have been of the Nearctic subspecies *hudsoni* (Boertmann 1994). Meltofte (2001) estimated the *arctica* breeding population at 7000 – 15 000 pairs and the total autumn population at 20 000 – 45 000 individuals. Still, the *arctica* population only comprises a small percentage of the 2.2 million Dunlins following the East Atlantic flyway (Rose & Scott 1994).

The *arctica* Dunlins arrive at the breeding grounds late May – early Jun (mean date of first sightings 23 May) and depart late Jul – late Aug; ads first (Meltofte 1985). The recoveries suggest that many ad. birds on autumn migration reach Britain from late Jul and that some may stage there until late Aug. Apparently a gradual shift towards northern and western France takes place from late Aug, though some already reach France by late Jul (a 2C bird) and Portugal by early Aug. By mid Sep most ad. birds seem to have left Europe. Young birds (1C) probably reach western Europe in mid Aug; the earliest recoveries being 24-25 Aug in western France. Some may stay at least until late Nov, cf. the recoveries in northern Spain and western France.

Apart from the 3C bird shot in Morocco in late



Map 45. Dunlin ringed in Greenland and recovered abroad (n = 18; filled symbols) and vice versa (n = 4; open symbols). Triangles pointing downwards denote recoveries in Jul-Oct, circles recoveries in Nov-Mar and triangles pointing upwards recoveries in Apr-May.
Kort 45. Alm. Ryler ringmærket i Grønland og genfundet i udlandet (fyldte symboler) og vice versa (åbne symboler). Nedadvendte trekanter angiver fund i jul-okt, cirkler fund i nov-mar, opadvendte trekanter fund i apr-maj.

Apr (probably on migration) and a 2C shot in France in Feb, the recoveries do not present any information about the wintering areas of the *arctica* Dunlins. The Feb recovery from France may be of a sick bird, may be incorrectly dated or may illustrate that a few young birds actually winter this far north. It is, however, obvious that the majority of the population do not winter in western Europe. Using plumage characters, Brederode et al. (1982) identified 325 ad. Dunlins to subspecies near Sidi Moussa (c. 33ºN 8º45'W), Morocco, in Mar-Apr 1982. Of these, 59% were *schinzii* and 41% *arctica*. Though this proportion of *arctica* is far too high to represent the proportion among Dunlins wintering in western Africa, the observation illustrates that many *arctica* Dunlins winter and/or stage in Morocco (cf. Pienkowski & Dick 1975). Farther south, at Banc d'Arguin in Mauritania, approx. one million Dunlins winter (Zwarts et al. 1997a, 1997b). The vast majority of these are *schinzii*, with only a few percent being *arctica* according to measurements and plumage characters (Kersten 1989, Wymenga et al. 1990, see also Pienkowski & Dick 1975 and Meltofte 1985). As a few percent of the wintering population at Banc d'Arguin corresponds to, say, 15-35 000 birds, it must be concluded that a large proportion of the total *arctica* population winters here, while a smaller proportion probably winters on salt pans and tidal flats in NW Morocco. Relatively few Dunlins winter south of Mauritania and on the coast between Mauritania and NW Morocco (Pienkowski & Dick 1975, Zwarts 1988, Smit & Piersma 1989).

Most Dunlins depart from Banc d'Arguin late Apr – early May (Piersma et al. 1990) and apparently at the same time from Morocco (Brederode et al. 1982). Zwarts et al. (1990) suggested that many waders leaving Banc d'Arguin fly directly to the NW European estuaries, a distance of approx. 4000 km. Considering that the four spring recoveries in Europe are concentrated in western Britain this may be true also of the *arctica* population in general, whether the birds leave from Mauritania or from Morocco. Arrival in Britain takes place from early May, and during the last weeks of this month many birds apparently stage in the estuaries of Dee and Morecambe Bay (Hardy & Minton 1980). When leaving Britain they stage for a very short time only, or even overfly Iceland on their way to the breeding grounds (Meltofte 1985, Gudmundson & Gardarsson 1993).

Ruddy Turnstone

Arenaria interpres

RECOVERIES

27 GRC (Table 52) of birds ringed 1956-1997, 36 FRC (Table 53, 54 and 55) of birds ringed 1942-1995 (Map 46 and 47).

Avanersuaq: A bird ringed as a chick 7 Jul was shot 15 Nov 131 days later in S Portugal (5230 km SE).

Uummannaq: A bird ringed 12 Sep was shot the same day near the ringing site.

Qeqertarsuaq: A bird ringed 23 Aug was recovered 25 Sep 33 days later in N Portugal (4130 km SE).

Qaqortoq: A bird ringed 30 Aug was recovered 3 Nov 65 days later in Galway, W Ireland (2240 km ESE).

Ittoqqortoormiit: An ad. bird ringed in Jun was controlled in Clwyd, Wales (2145 km SSE), 10 Nov four years later.

Northeast Greenland: An ad. bird ringed at Danmarkshavn was controlled locally three years later. Five birds were recovered abroad: An ad. ringed in Jun was controlled in Dumfries & Galloway, SE Scotland (2510 km SSE), 12 May four years later, an ad. ringed in Jun was controlled in Essex, SE

Table 52. Ringing details of recovered Ruddy Turnstones, broken down according to age and ringing district. *Ringmærkningsdata for genfund af Stenvender, opdelt efter mærkningsalder og -distrikt.*

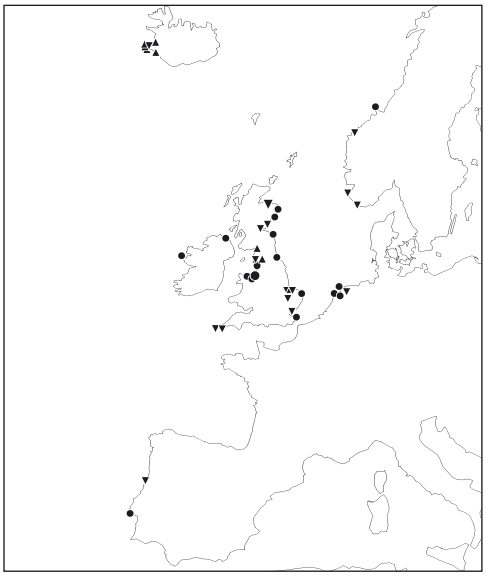
	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	1			1	1
UMA			1	1	
QEQ			1	1	1
QAT			1	1	1
ITT		1		1	1
NEA*	5	16		21	20
NOR	1			1	1
Total	7	17	3	27	25

* incl. 12 controls of one bird and 4 of another

England (2700 km SSE), in mid Aug two years later, and an ad. ringed in Jun was recovered in Norfolk, E England (2600 km SSE), 25 Jan three years later. A bird ringed as a chick 19 Jul at Karup Elv was controlled at Den Helder, the Netherlands (2580 km SSE), 9 Oct 82 days later. A 1C-bird ringed at Danmarkshavn 20 Aug 1987 apparently also liked Den Helder, where it was controlled 12 times: 1 Nov – 8 Dec 1989, then 6 Nov 1990, 4 Apr 1991, 15-27 Sep 1992, 9 Oct 1994 and 2-22 Oct 1995. A chick ringed at Zackenberg in Jun 1997 was controlled near Camperduin, the Netherlands (2697 km SSE), in Oct 1997 and again on three occasions during 24 Jul – 24 Aug 2001. These controls illustrate the high degree of stopover and winter site fidelity shown by many ad. Ruddy Turnstones (e.g. Branson et al. 1978, Metcalfe & Furness 1985, Burton & Evans 1997).

North Greenland: A bird ringed as a chick 30 Jun at Jørgen Brønlund Fjord, Peary Land was taken by a cat 15 Dec 168 days later in Sør Trøndelag, Norway (2330 km SSE).

Foreign recoveries: Most of the 36 birds ringed abroad were caught in NW Europe (Table 53 and 55, Map 46), 1 was ringed at Banc d'Arguin in Mauritania (ad. ringed 24 Apr 1985 shot northern UPV 28 May 1986). The majority were recovered in western and northern Greenland during May-Jul (Table 54, Map 47); the earliest recoveries being 25 May in ASI, 28 May in UPV, 29 May in AMM, 1 Jun in NEA, 2 Jun in NOR and 15 Jun in AVA. The latest recoveries are from 10 Aug and 10 Sep, both in UMA. All recoveries in NOR and NEA refer to breeding birds, including 1 ringed in Mar 1982 in Wales and controlled at Danmarkshavn in the summer of both 1987 and 1988. Ten of the recoveries are from 1974 (all in AVA); there were none in 1972 (cf. Red Knot). A Ruddy Turnstone ringed on the Scilly Islands, Britain, in Sep 1960 and found dead at the inland-ice station DYE2 (66°30'N 46°18'W) 28 Jul 1968 is the only bird yet recovered on the Greenland inland-ice.



Map 46. Recovery and ringing sites abroad of Ruddy Turnstones ringed or recovered in Greenland (n = 44). Triangles pointing downwards denote recoveries/ringing sites in Aug-Oct, circles recoveries/ringing sites in Nov-Mar and triangles pointing upwards recoveries/ringing sites in Apr-May.
Kort 46. Genfunds- og ringmærkningslokaliter i udlandet for Stenvendere ringmærket/genfundet i Grønland. Nedadvendte trekanter angiver fund i jul-okt, cirkler fund i nov-mar, opadvendte trekanter fund i apr-maj.

MOVEMENTS

The nominate subspecies *interpres* (to which all recoveries refer) is an abundant breeder in NE Greenland, common in N Greenland and scarce in AVA; it also breeds abundantly on Ellesmere and Axel Heiberg islands in NE Canada (Cramp 1998).

Table 53. Temporal and spatial distribution of Ruddy Turnstones ringed abroad.
Tidsmæssig og geografisk fordeling af Stenvendere ringmærket i udlandet.

Ringed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Norway								2	1				3
Iceland					5			1					6
Britain	1	1	4	3				2	4	4	1	3	23
The Netherlands								1		2		3	
Mauritania				1									1
Total	1	1	4	4	5			5	6	4	3	3	36

Table 54. Temporal and spatial distribution of Ruddy Turnstones ringed abroad and recovered in Greenland.
Tidsmæssig og geografisk fordeling af Stenvendere ringmærket i udlandet og genfundet i Grønland.

Recovered	May	Jun	Jul	Aug	Sep	Uncertain dates	Total
AVA		5	2			4	11
UPV	2	2					4
UMA			2	1	1		4
QEQ	1						1
ILU						1	1
ASI	1	1					2
Inland ice			1				1
AMM	1	1	1				3
NEA		4	2	1			7
NOR		1	1				2
Total	5	14	9	2	1	5	36

Table 55. Spatial distribution of Ruddy Turnstones ringed abroad and recovered in Greenland.
Geografisk fordeling af Stenvendere ringmærket i udlandet og genfundet i Grønland.

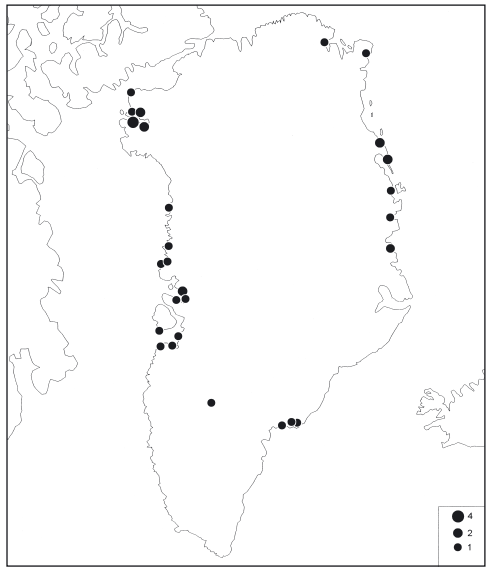
	Ringed in					
Recovered	Iceland	Norway	Britain	Netherlands	Mauritania	Total
AVA	4		7			11
UPV			3		1	4
UMA	2	2				4
QEQ			1			1
ILU		1				1
ASI			1	1		2
Inland ice			1			1
AMM			3			3
NEA			5	2		7
NOR			2			2
Total	6	3	23	3	1	36

Meltofte (2001) estimated the Greenland breeding population at 20 000 – 40 000 pairs. The small population breeding in QEQ and UMA probably belongs to the subspecies *morinella* which breeds in arctic Canada south of 74ºN and winters in the Americas (Salomonsen 1967b, Boertmann 1994). In W Greenland, most spring migrants occur from Disko Bay northwards; in autumn (late Jul-Sep) the Ruddy Turnstone is common and widespread all over W Greenland. In SE Greenland it is rather common as a passage migrant in the northern parts, especially in autumn (Boertmann 1994).

Judging from the recoveries, the Greenland/NE Canadian population winters along E Atlantic coasts between 65º and 19ºN, i.e. from central Norway south to Mauritania in W Africa. Analysing the recoveries of birds breeding in Greenland/NE Canada (the NW population) and Fennoscandinavia/Russia (the E population), Branson et al. (1978) concluded that the NW pop-

ulation primarily winters in western Europe, while the E population mainly winters in western Africa south of 20ºN. There is, however, a considerable geographical overlap in the winter distribution. A minor part of the E population winters as far north as NW Europe, while several birds from both populations have been recovered in Morocco. Apparently only a small part of the NW population winters south of Morocco (Branson et al. 1978), though it may be larger than hitherto believed (Ens et al. 1990, Wymenga et al. 1990). The 2000-5000 birds wintering in Iceland (Petersen 1998) are most likely of Greenland/NE Canadian origin. Many birds from the NW population have been recovered on the British Isles, suggesting that Britain and Ireland is an important wintering area. Approx. 73% of the 67 000 birds estimated to winter in Europe are found here, but several European coasts holding numbers of Ruddy Turnstones were not surveyed and thus not included in the estimate (Smit & Piersma 1989); a more recent estimate of Ruddy Turnstones wintering in the British Isles reached 64 000 birds (Cayford & Walters 1996). Within the British Isles, the birds are scattered along practically all coastlines with a few large concentrations, e.g. at Morecambe Bay in western England and on Shetland (Prater 1981). Although a high site fidelity is usual among wintering ad. birds, some movements occur (Clapham 1979, Metcalfe & Furness 1985). These movements appear to be more pronounced in young birds; on the Wash in eastern England virtually all first-year birds depart in early winter and return in Feb (Branson et al. 1978).

In Britain, spring migration commences by mid Apr, but there is evidence of movements to more northerly spring staging areas from late Feb (Cramp 1998, Metcalfe & Furness 1985). From Morecambe Bay, the wintering birds depart in small parties from early May and most are gone by the end of this month; in late May only 5% of the caught birds were local winterers compared with 45% in early May. Some of the birds leaving early are known to make a stopover in Iceland, while late birds most likely fly directly to NE Greenland; birds caught in late May were heavier than birds caught early in the month (Clapham 1979). Many birds from the NW population wintering farther south apparently stage in Britain during spring (Branson et al. 1978, Clapham 1979). Most of the relatively few Nearctic birds staging in the Wadden Sea depart during the first half of May (Meltofte et al. 1994), but their migration route is unknown. In Iceland, an obvious increase in the



Map 47. Ruddy Turnstones ringed abroad and recovered in Greenland (n = 36).
Kort 47. Stenvendere ringmærket i Grønland og genfundet i udlandet.

numbers of Ruddy Turnstones is noted from mid Apr onwards. Numbers continue to increase during May and peak in the last third of the month; most birds depart during the last week of May (Wilson 1981). Some 40 000 birds are estimated to stage here in May (Gudmundsson & Gardarsson 1993). Alerstam et al. (1990) found that 81% of 1357 observed Ruddy Turnstones departed in a W-NNW direction while 19% departed in a NNW-N direction. This suggests that the majority of the Ruddy Turnstones staging in Iceland cross the Greenland inland-ice on their way to NW Greenland and NE Canada, while a smaller part is bound for NE Greenland. Judging from the recoveries, birds on a transglacial migration reach W Greenland between KAN and UMA, and then head north without stopping; the routes used on this northward leg are largely unknown. The recoveries in AVA (ten in 1974) could be of birds mainly retreating here due to unfavourable weather at the breeding grounds (cf. Red Knot).

The Greenland/NE Canadian breeding population generally arrives late May – early Jun (mean date of first sightings in NE Greenland 23 May; Meltofte 1985). Ruddy Turnstones do not breed until two years old; most imms stay in the wintering areas during their first summer (Cramp 1998, Meltofte 1985, Ens et al. 1990), but a few apparently migrate northward (Clapham 1979). The

birds depart mid Jul – early Sep; ads first. By the end of Sep very few birds remain in Greenland; there is one winter record from SW Greenland (Meltofte 1985, Boertmann 1994).

Many Ruddy Turnstones from NW Greenland/NE Canada pass SW Greenland in autumn and probably fly directly to the British Isles, while others cross the inland-ice probably en route to Iceland (cf. the recovery in late Jul on the inland-ice). In Iceland, the passage of ad. birds begins late Jul and continues through Aug, while 1C birds pass from mid Aug to late Sep (Wilson 1981). Migrating ads pass S Norway and W Denmark in late Jul – early Aug and 1C birds in Aug-Sep, but the phenology here is obscured by the occurrence of birds from the E population (Meltofte 1993). The first ads arrive in Britain in mid Jul (females from NE Greenland?), but the main influx of both ad. and 1C birds takes place during Aug (Branson et al. 1978). After their arrival, many birds from the NW population moult and subsequently winter on the British Isles, while relatively few moult and winter in the Wadden Sea (Branson et al. 1978, Meltofte et al. 1994). Another part of the population moults and winters farther south and thus pass (or overfly) Britain or the Wadden Sea, while some winter in Norway and Iceland. The migration routes of these birds are still unknown.

Red-necked Phalarope

Phalaropus lobatus

2 GRC: Two birds ringed as chicks near Saattut (UMA) in Jul 1947 and 1956 were shot at the same place after one year and 42 days, respectively. The Red-necked Phalarope is a widespread, primarily low-arctic breeder (Boertmann 1994), arriving at W Greenland breeding areas in mid May and departing in Jul – early Aug (ad.) and Sep (1C). Outside the breeding season, the Red-necked Phalarope is pelagic. Nearctic breeders mainly winter off western S America south of the Equator (del Hoyo et al. 1996), but the migration routes and wintering quarters of the Greenland population are unknown.

Arctic Skua

Stercorarius parasiticus

RECOVERIES

22 GRC (Table 56) of birds ringed 1947-60, 6 FRC. The 16 unaged GRC birds were most likely ringed as chicks, and are treated as such here.

Uummannaq: A bird ringed in late Jun was shot near the ringing site in early Sep.

Qeqertarsuaq: Five birds were recovered locally 2-3 years later.

Ilulissat: A bird ringed in Jun was recovered in ILU 200 km SSW two years later.

Maniitsoq: A bird ringed 19 Jul was shot off Little Fogo Island, Newfoundland 15 Aug the same year (1710 km S). The remaining 12 were recovered less than 205 km from the ringing site 2 years (5; 10-100 km away), 3 years (1; local) and 4-7 years later (6; 0-204 km away).

Nuuk: A bird was recovered locally five days later, another 109 km NNW 8 years later.

Foreign recoveries: Five birds ringed as chicks in Shetland (3; c. 2600 km WNW), Iceland (1; 1725 km W) and Finland (1; 3600 km W) were recovered along the W coast between Qullissat (QEQ) and Ivissuartooq (MAN) in Jul-Aug, all two years old (3C). Additionally, a bird ringed as a chick on Orkney 1995 was shot in NUU Aug 1996; the only 2C bird hitherto recovered in Greenland.

MOVEMENTS

On the Greenland W coast, Arctic Skuas are locally common breeders as far north as southern UPV; small numbers also breed in AVA between Uummannaq/Dundas and Iterlassuaq/MacCormick Fjord. In eastern Greenland, Arctic Skuas breed from about 70ºN on the Kialiip Kialia/Blosseville Kyst north to Hold With Hope at about 74ºN. Generally, the Arctic Skuas arrive at the breeding

Table 56. Ringing details of recovered Arctic Skuas, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Almindelig Kjove, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA			1	1	
QEQ	2		3	5	
ILU			1	1	
MAN	3		10	13	1
NUU	1		1	2	
Total	6		16	22	1

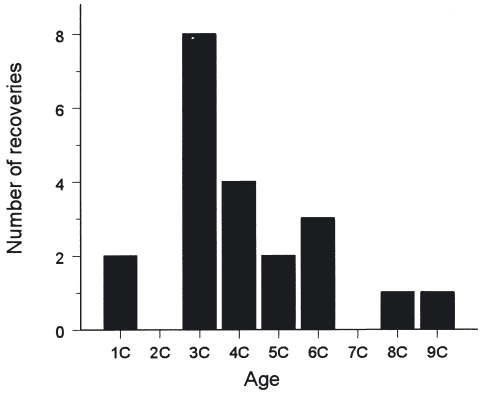


Fig. 13. Age at recovery of Arctic Skuas ringed and recovered in Greenland.
Aldersfordeling af Almindelige Kjover ringmærket og genfundet i Grønland.

grounds late May – early Jun and depart late Aug-Sep; in SW Greenland, a few may linger on to late Oct – early Nov (Boertmann 1994).

The recovery from Newfoundland is the only indication of the migration route used by Greenland Arctic Skuas towards the wintering quarters, which are likely to be situated off southern South America and perhaps southern Africa (Furness 1987, Olsen & Larsson 1997). Twelve of 19 birds recovered more than one year later were found less than 35 km from the ringing site, and none more than 205 km away. Assuming that all birds were ringed as chicks, 3C birds were generally recovered farther away than older age classes (mean 64 km compared with 36 km; $\chi_1^2 = 7.3$, $P < 0.01$), suggesting a high degree of philopatry among breeding birds. Arctic Skuas are usually 3-7 years old when they commence breeding (Furness 1987). As illustrated by the recoveries in Greenland, many non-breeding imms return to their natal breeding area, while others undertake extensive travels through northern waters. Note, however, that local 2C birds do not seem to return to Greenland (Fig. 13).

Long-tailed Skua
Stercorarius longicaudus

2 GRC: A breeding bird ringed Kangerterajiva/Hurry Inlet (ITT) 19 Jun was shot near Ittoqqortoormiit/Scoresbysund (ITT) in "summer" two years later. Another breeding bird ringed at Mestersvig (NEA) 1 Jul was controlled the same place one year later. Long-tailed Skuas generally winter in the southern seas between 30º and 55ºS (Furness 1987, Olsen & Larson 1997).

Great Skua *Stercorarius skua*

RECOVERIES

82 FRC of birds ringed 1935-97; Table 57, Map 48.

MOVEMENTS

The Great Skua is a widespread visitor to Greenland, where more than eighty birds ringed abroad have been recovered. The majority of these were ringed as chicks in Iceland and Great Britain (Shetland) and were recovered as imm. birds (Fig. 14) in summer (Fig. 15) south of 71°30'N (Map 48). Most of the birds were recovered on the W coast, but the relatively large numbers of recoveries from Ittoqqortoormiit/Scoresbysund (7) and Tasiilaq/Ammassalik (4), the only towns in eastern Greenland, suggest that Great Skuas are also widely distributed along the E coast. Both British (4) and Icelandic (7) birds have been recovered along the E coast.

Great Skuas start to breed when 5-8 years old (Furness 1987). Analysing the recoveries of British-ringed birds, Furness (1978) and Klomp & Furness (1992) found that most 2C birds stayed south of the breeding area. Many older imms, however, reached arctic areas and Iceland during summer, with 27% of all 3C birds, 18% of all 4C birds and 3% of all 5C birds recovered here; only one

Table 58. Ringing totals, number of recoveries in Greenland and recovery percentage (RPCT) of Great Skuas ringed as chicks in Iceland and Britain 1941-90. Ringing data from Iceland supplied by Æ. Petersen (in litt.). Ringing data from Britain extracted from Furness (1978) and from annual ringing reports published in Ringing & Migration.
Ringmærkningstotaler, antal genfund i Grønland og genfundsprocent (RPCT) hos Storkjover ringmærket i Island og Storbritannien 1941-90.

	Iceland			Britain		
Period	Ringed	Recovered	RPCT	Ringed	Recovered	RPCT
1941-60	1362	8	0.59	1975	2	0.10
1961-70	4110	17	0.41	11969	11	0.09
1971-80	8287	19	0.23	24977	22	0.09
1981-90	4084	1	0.02	13130	1	0.01

Table 57. Great Skua: origin and age of ringing for birds ringed abroad and recovered in Greenland.
Oprindelse og alder ved ringmærkning af Storkjover ringmærket i udlandet og genfundet i Grønland.

	Ringed as		
Ringed	Chick	Unknown	Total
Iceland	42	1	43
Faeroe Isl.	2		2
Britain	37		37
Total	81	1	82

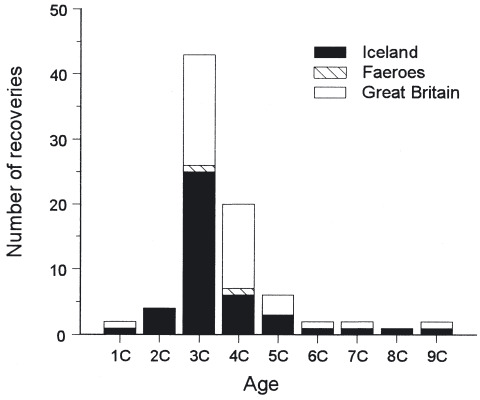


Fig. 14. Age-class distribution at recovery of Great Skuas ringed as chicks in Iceland (n = 42), Faeroe Islands (n = 2) and Great Britain (n = 37) and recovered in Greenland.
Aldersfordeling af Storkjover ringmærket i Island, Færøerne samt Storbritanien og genfundet i Grønland.

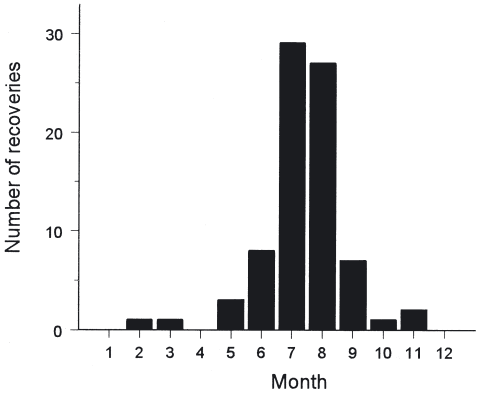
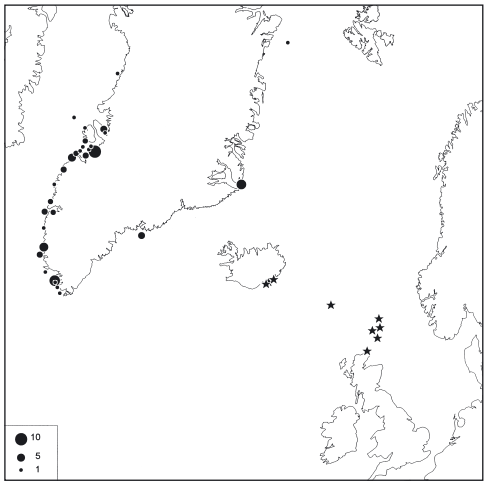


Fig. 15. Monthly distribution of Great Skuas ringed as chicks abroad and subsequently recovered in Greenland (n = 79).
Månedsvis fordeling af genfund af Storkjover ringmærket i udlandet og genmeldt i Grønland.



Map 48. Recoveries (filled circles) of Great Skuas ringed abroad (n = 82). Stars denote ringing sites.
Kort 48. Genfund af Storkjover ringmærket i udlandet. Mærkningsstederne er vist med stjerner.

British 1C bird and no 2C birds have been recovered in Greenland. Apparently Icelandic birds behave much the same way, as there are no significant differences in the age distribution of British and Icelandic birds recovered in Greenland (Fig. 14; $\chi_3^2 = 6.43$, P = 0.092). Adult birds mostly winter in the Atlantic between Great Britain and the Iberian Peninsula and off Newfoundland. Coinciding with a marked increase (Furness 1987), the occurrence of Great Skuas in Greenland increased up to the 1980s (Salomonsen 1981). The number of recoveries also rose in this period (Table 58), but around 1980 a sharp drop occurred and only three birds have been recovered in Greenland since. Although some large breeding colonies have decreased in numbers, a large-scale decline of the population has not occurred during this period (del Hoyo et al. 1996), and many chicks were still ringed in Great Britain and Iceland (Table 58). Whether the lower number of recoveries is due to changed hunting habits or to an actual decrease in the numbers of Great Skuas visiting Greenland waters is not known.

South Polar Skua

Stercorarius maccormicki

1 FRC: A bird ringed as a chick 20 Jan 1975 on Shortcut Island, Antarctic Peninsula (64º45'S 64º05'W) was shot 31 Jul 1975 in Nuup Kangerlua/Godthåb Fjord (NUU; 14 370 km N). The recovery constitutes the second Greenlandic record of this Antarctic species (Salomonsen 1976,

Boertmann 1994). Apparently ad. birds are short distance migrants or dispersive, while juvs and imm. birds are known to undertake long-distance migrations. Part of the population migrates to the northern Pacific, another part to the northwestern Atlantic, where quite a few seem to winter on the Grand Banks off Newfoundland (Salomonsen 1976, Devillers 1977, Jensen 1982, Furness 1987, Olsen & Larsson 1997).

Black-headed Gull

Larus ridibundus

5 FRC: Five recoveries of birds ringed as chicks in Iceland. One ringed in Jun 1976 was shot near Ittoqqortoormiit/Scoresbysund (ITT) in May 1978. The remaining 4 were recovered in QAT in Jun (8 years old), Aug (2 years old), Oct (4 months old) and Dec (18 months old). The Black-headed Gull breeds locally in low numbers in southwestern Greenland; vagrants have occurred as far north as Disko Bay in western Greenland and Danmarkshavn in eastern Greenland (Boertmann 1994).

Lesser Black-backed Gull

Larus fuscus

3 FRC: A bird ringed as a chick on the Faeroe Islands 3 Aug 1958 was shot near Nuuk (NUU) 4 Jun 1964. A 2C bird ringed Gloucester, England 16 May 1988 was shot in Sermilik fjord 19 Jul 1992 (AMM), while another 2C bird ringed 26 Aug 1997 in Gloucester was shot near Tasiilaq (AMM) 6 Aug 1998. All birds probably belonged to ssp. *graellsii*. The Lesser Black-backed Gull is today a regular breeder in W Greenland, and summer visitor elsewhere (D. Boertmann pers. comm.).

Herring Gull *Larus argentatus*

3 FRC: A bird ringed Bass Rock, East Lothian, Scotland 25 Jul 1965 (ssp. *argenteus*) was recovered near Saarloq (QAT) 17 May 1972. Two birds ringed Witless Bay, Newfoundland, Canada (ssp. *smithsonianus*) 4 Aug 1966 and 20 Jul 1971 were shot at Kangersuatsiaq/Prøven (UPV) 8 Jul 1976 and near Alluitsup Paa/Sydprøven (QAT) 20 Aug 1971, respectively. The Herring Gull occurs as a vagrant in Greenland and a few pairs breed in QAT and probably also farther north in W Greenland (Boertmann 1994).

Iceland Gull *Larus glaucoides*

RECOVERIES

641 GRC of birds ringed 1936-97 (Table 59), 1 FRC. Note that a small percentage (5-10%) of the birds may have been wrongly identified to species. When ringing chicks, the possibility of confusing Iceland Gull with Glaucous Gull (*Larus hyperboreus*) is substantial. To reduce this source of error, the tarsus of most of the legs handed in to the ZMUC was measured, showing that a zone of overlap exists. Of the 641 recoveries of Iceland Gulls, 566 legs were measured and 34 (6%) had a tarsus longer than 63 mm. Among measured Glaucous Gulls 20 of 197 (10%) had a tarsus shorter than 64 mm. In cases of overlapping measurements or where no legs were received, the birds were assigned to the species that the ringer proposed, taking into consideration where the birds were ringed and of what species birds from the same ring series were, if known.

The 13 unaged birds (Table 59) were most likely ringed as chicks and are treated as such here. Of 630 chicks ringed and recovered in Greenland, 481 (76%) were in their first calendar-year (1C), 66 in their second (2C), 16 in their third (3C) and 67 were older (4C+) when recovered. Eleven were more than 15 years old, the oldest 23 years. Older birds were primarily recovered in summer and autumn, 1Y birds in Aug-Nov (Fig. 16).

Upernavik: A total of 73 birds was recovered in their first year of life (1Y); 44 of these in UPV where the latest were shot 26 Sep and 23 Oct (see Table 60, Map 50). Among ten older birds, 4 were recovered in UPV during summer 4-6 years later less than 65 km from the ringing site, 5 2Y were recovered in QAT (Oct), MAN (Jan, Mar), SIS (Aug) and UMA (autumn) and a 6Y bird was shot

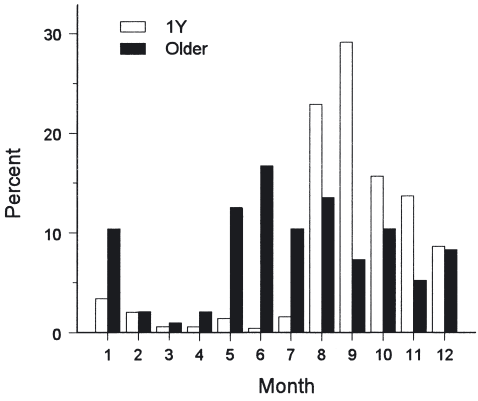


Fig. 16. Monthly distribution of Iceland Gulls ringed as chicks in western Greenland and subsequently recovered as 1Y (n = 498) or older (n = 96).
Månedsvis fordeling af Hvidvingede Måger ringmærket som unger i V Grønland og genmeldt som hhv. 1Y eller ældre.

Table 59. Ringing details of recovered Iceland Gulls, broken down according to age and ringing districts. Four recoveries from W Greenland without sufficient ringing data are excluded.
Ringmærkningsdata for genfund af Hvidvinget Måge, opdelt efter mærkningsalder og ringmærknings distrikter. Fire genfund uden mærkningsdata er udeladt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	83			83	2
UMA	102		10	112	
QEQ	57			57	
ILU	206		3	209	1
ASI	9			9	
KAN	31			31	
SIS	116			116	2
MAN	8			8	
PAA	3			3	1
QAT	9			9	
Total	624		13	637	6

Table 60. Temporal and spatial distribution of Iceland Gulls ringed in UPV and recovered in their first year of life. An additional 5 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Hvidvingede Måger ringmærket i UPV og genfundet i deres første leveår.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA									1				1
UPV								23	19	1			43
UMA				1					5	2			8
QEQ													
ILU	2								1	1	1	3	8
ASI			1		1								2
KAN	1	2			1								4
SIS													
MAN													
NUU											1		1
Norway												1	1
Total	3	2	1	1	2			23	26	4	2	4	68

Table 61. Temporal and spatial distribution of Iceland Gulls ringed in QEQ and recovered in their first year of life. An additional bird with incomplete recovery data is excluded.
Tidsmæssig og geografisk fordeling af Hvidvingede Måger ringmærket i QEQ og genfundet i deres første leveår.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UMA									3	1			4
QEQ					1			2	6	4		1	14
ILU				2				1	2	3	1		9
ASI										1	5	1	7
KAN									1				1
SIS													
MAN	1												1
NUU										1		1	2
PAA													
QAT										1	1		2
											7		
Total	1			2	1			3	12	11	7	3	40

Table 62. Temporal and spatial distribution of Iceland Gulls ringed as chicks in ILU and recovered in their first year of life. An additional 6 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Hvidvingede Måger ringmærket i ILU og genfundet i deres første leveår.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UMA									8	7	2	2	19
QEQ					1			5	11				17
ILU	1	1			1			18	37	8	3	1	70
ASI						1		3	7	5	6	5	27
KAN	1							2	2	4	4	3	16
SIS											1		1
MAN	1	1								3	2	1	8
NUU		1	1		1					1		1	5
PAA										1			1
QAT		1	1							3			5
Total	3	4	2		3	1		28	65	32	18	13	169

Table 63. Temporal and spatial distribution of Iceland Gulls ringed as chicks in SIS 1954 and recovered in their first year of life.
Tidsmæssig og geografisk fordeling af Hvidvingede Måger ringmærket i SIS 1954 og genfundet i deres første leveår.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
QEQ									2		1		3
ILU													
ASI									2	2	1	2	7
KAN	1							1	8	7	8	5	30
SIS	2							2	1	4	10		19
MAN									1	1	9	2	13
NUU	2	2			1				1	1	2	1	10
PAA													
QAT					1				1	2	8	2	14
Faeroes												1	1
Britain	1												1
Total	6	2			2			3	16	17	39	13	98

Table 64. Dispersal of Iceland Gulls ringed in ILU-UPV combined and recovered in Greenland during their first year of life. MRD = Median Recovery Distance, i.e. the median distance between the ringing and the recovery site in km. PLR = proportion of local recoveries, i.e. within 100 km of ringing site (%).
Ungfuglespredning hos Hvidvingede Måger ringmærket som unger i ILU-UPV og genmeldt i Grønland i deres første leveår. MRD = median genfundsafstand, PLR = andel af lokale genfund (< 100 km fra mærkningssted).

Period	MRD	Max Rec. Dist. (km)	PLR	n
Aug	37	202	94	108
Sep	77	807	75	141
Oct	109	1142	43	81
Nov	145	1019	30	77
Dec	192	857	26	38
Jan-Mar	405	1071	11	28
Apr-Jul	136	914	43	14

in ILU in late May. Two birds were recovered abroad: A bird ringed 1950 was shot in southern Labrador, Canada (2240 km S), in "winter" probably 1950-51, and another was shot in southern Norway (3075 km ESE) 31 Dec in the ringing year (Map 49).

Uummannaq: A total of 97 1Y birds was recovered; 84 of these in UMA where the latest were shot 14 Nov and 4 Dec (Map 50). Thirteen 1Y birds recovered south of UMA were found in Disko Bay (8; Aug-Nov), KAN (3; Sep 1, Jan 2), MAN (1; Feb) and QAT (1; spring). Among 15 older birds, ten were recovered in UMA Jun-Oct 1-22 years later less than 130 km from the ringing

Table 65. Mean recovery direction of Iceland Gulls ringed in UPV-UMA (combined), ILU and SIS and recovered in Greenland during their first autumn. MRDi = Mean recovery direction in degrees.
Gennemsnitlig genfundsretning hos Hvidvingede Måger ringmærket som unger i UPV-UMA, ILU og SIS og genmeldt i deres første efterår i Grønland. MRDi = gennemsnitlig genfundsretning.

	UPV-UMA		ILU		SIS	
	MRDi	n	MRDi	n	MRDi	n
Aug	240	54	204	24	267	3
Sep	238	38	193	61	287	16
Oct	172	10	220	29	255	17
Nov	196	7	196	18	221	39
Dec	188	6	188	13	198	12

Table 66. Centre of gravity, recovery distance and proportion of birds recovered north of the ringing site for Iceland Gulls ringed as chicks in UPV-UMA pooled, ILU and SIS and recovered during their first winter (Dec-Mar) in Greenland. MRD = Median Recovery Distance, ie. the median distance between the ringing and the recovery site in km.
Genfundscenter, genfundsafstand og andel af fugle genfundet nord for mærkningsstedet hos Hvidvingede Måger ringmærket som unger i UPV-UMA, ILU og SIS og genmeldt i deres første vinter (dec-mar) i Grønland. MRD = median genfundsafstand.

Ringing district	Ringing latitude	Center of gravitity in winter (range)	MRD	North	n
UPV-UMA	72°53'-70°30'N	68°36'N (70°43'-66°10'N)	427	7%	15
ILU	69°04'-70°01'N	66°59'N (70°49'-60°27'N)	200	13%	23
SIS*	67 °45'N	65°58'N (68°49'-60°36'N)	149	37%	19

* all birds ringed in Nassuttooq/Nordre Strømfjord in 1954

Table 67. Pairwise comparisons (Mann-Whitney U-test) of the recovery distance of different age classes of Iceland Gulls ringed in ILU-UPV combined and recovered in Greenland. MRD = Median Recovery Distance, ie. the median distance between the ringing and the recovery site in km.
Parvise sammenligninger af genfundsafstanden hos forskellige aldersgrupper af Hvidvingede Måger mærket i ILU-UPV og genfundet i Grønland. MRD = median genfundsafstand.

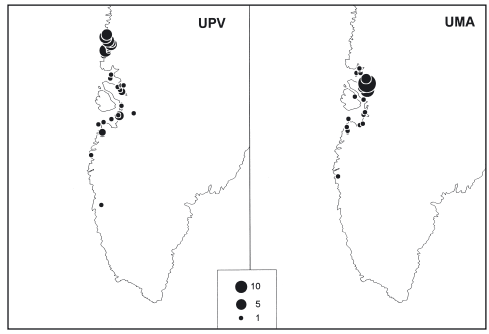
Age	Period	n	MRD	U	P
3W+	Dec-Mar	15	197		
1W	Dec-Mar	66	350	409.5	0.301
4S+	May-Jul	24	85		
1-2S	May-Jul	15	133	128.5	0.141
2S	May-Jul	4	91		
1S	May-Jul	11	161	12.0	0.215
3C+	Aug-Sep	13	101		
1C	Aug-Sep	249	48	977.0	0.016

site. The remaining 5 were recovered in QEQ (1; undated), KAN (3; May, Oct, Jan) and MAN (winter).

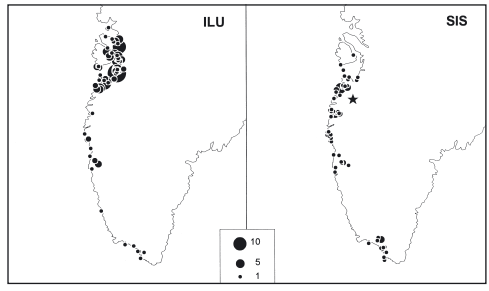
Qeqertarsuaq: A total of 41 1Y birds was recovered; 14 of these in QEQ where the latest were shot 8 Oct and 20 Dec (see Table 61). Among 16 older birds, 6 were recovered in QEQ in Jun-Oct and Jan (1) 1-18 years later, less than 105 km from the ringing site. The remaining ten were recovered in UMA (mid May 11 years later), ILU (2; Sep, Nov), ASI (3; May, Jun, Dec), KAN (2; May, Dec), MAN (1; Jan) and NUU (1; winter).

Ilulissat: A total of 86 birds was recovered in ILU. Of these 69 were in their first winter (1W), the 2 latest shot 3 Jan and 6 Feb. Seventeen birds were recovered in May-Nov 1-20 years later, less than 130 km from the ringing site. Outside ILU 123 birds were reported; 105 of these were in their first year of life (1Y), 18 older. Map 51 and Table 62 show the dispersal of 1Y birds; the earliest southwards moving birds were taken in NUU 7 Oct (610 km) and in QAT 8 Oct (1085 km). The 18 older

Map 49. Iceland Gulls ringed in Greenland and recovered abroad (n = 6).
Kort 49. Hvidvingede Måger ringmærket i Grønland og genfundet i udlandet.



Map 50. First-year dispersal (Aug-May) of Iceland Gulls ringed in UPV (n = 70) and in UMA (n = 80). A recovery from abroad of a bird ringed in UPV is omitted.
Kort 50. Ungfugle-spredning (aug-maj) hos Hvidvingede Måger ringmærket i UPV og UMA. Et genfund i udlandet er udeladt.



Map 51. First-year dispersal (Aug-May) of Iceland Gulls ringed in ILU (n = 175) and in Nassuttooq/Nordre Strømfjord, SIS (n = 96). Star denotes ringing site. Two recoveries from abroad of birds ringed in SIS are omitted.
Kort 51. Ungfugle-spredning (aug-maj) hos Hvidvingede Måger ringmærket i ILU og i Nassuttooq/Nordre Strømfjord, SIS (mærkningssted vist med stjerne). To genfund i udlandet er udeladt.

birds were recovered 2-23 years later in QAT (1; Feb), NUU (3; Jan, May, Aug), SIS (1; Nov), KAN (5; Dec-Feb 4, Jun), ASI (2; Aug), QEQ (3; Jan, Jun, Aug), UMA (Oct), AMM (Oct; 2Y), and a bird was found dying near Durham in eastern England (3070 km SE; 2Y) in Jul (Map 49).

Aasiaat: Eight birds were recovered locally (< 80 km away) after 5-80 days (7) and 790 days (1). A bird ringed in Jul was shot in QAT (990 km S) late Nov the same year.

Kangaatsiaq: A total of 24 1Y birds was recovered; ten of these in KAN, where the two latest were shot 16 Oct and 11 Jan. Fourteen 1Y birds recovered elsewhere were found in Disko Bay (6; Aug-Dec), MAN (2; Oct-Nov), NUU (Oct-Jan) and QAT (1; Nov). Among 7 older birds, 2 were recovered in KAN in May and Jan 3-5 years later, less than 70 km from the ringing site. The remaining 5 were recovered in UMA (Sep), ILU (May), MAN (Nov), NUU (Dec) and QAT (Jan).

Sisimiut: All 116 recoveries originate from ringings carried out by F. Salomonsen in the inner Nassuttooq/Nordre Strømfjord in 1954, i.e. in the northernmost part of SIS. Map 51 shows the dispersal of the 98 birds recovered in their first year of life (1Y), excluding 2 birds recovered abroad: One shot in the Faeroes (2220 km ESE) 4 Dec 1954 and 1 caught when visiting a fish market in eastern Scotland (2725 km ESE) 15 Jan 1955 (Map 49). The earliest southwards moving birds were taken in NUU 7 Sep (420 km) and in QAT 26 Sep (810 km). Only few birds were recovered after Dec (Table 63), most of these south of SIS. The remaining 18 birds were recovered 1-21 years later 70-300 (mean 120) km from the ringing site; the majority (13) in SIS-KAN in Jun-Jan and 5 in the neighbouring districts (MAN, ASI, ILU) in Sep-Nov.

Maniitsoq: Five birds were recovered in MAN 26-236 days later less than 20 km from the ringing site. A bird was shot in NUU (32 km S) 3 Sep one year later, 1 was shot in SIS (127 km NNW) in Sep 55 days after ringing and 1 was shot in KAN (330 km NNW) in Sep 82 days later.

Paamiut: A bird ringed 27 Jul was shot in NUU 19 days later (280 km NNW), while another, ringed 4 Jul, was shot in QAT 45 days later (150 km ESE). A bird ringed 16 Jul 1950 was recovered in northwestern Iceland (1360 km ENE) 11 Dec one year later (Map 49).

Qaqortoq: Seven birds were recovered in QAT 27 days – 5 years later 8-90 km from the ringing site. A bird ringed 13 Jul was shot 14 Sep the same year near Isortoq in AMM (625 km NNE), while another bird, ringed 21 Jul, was shot near Tasiilaq/Ammassalik (674 km NNE) in "autumn" in the year of ringing.

Foreign recoveries: A bird ringed as ad. near Reykjavik, Iceland 18 Jan was shot 16 Nov two years later near Tasiilaq/Ammassalik (760 km WNW). As Iceland Gulls do not breed in Iceland (Petersen 1998), the bird belonged to the Greenland breeding population.

MOVEMENTS

All recoveries refer to the subspecies *glaucoides* breeding exclusively in Greenland. On the W coast, the breeding range extends north to UPV at 74ºN; some pairs may also breed in AVA. On the E coast, Iceland Gulls breed north to Tasiilaq/Ammassalik at 66ºN; stragglers occur as far north as Hochstetter Forland (Boertmann 1994, Boertmann et al. 1996). The W Greenland breeding population has been estimated to number in excess of 20 000 pairs, perhaps as many as 100 000 pairs with the highest densities in NUU – Disko Bay (Boertmann et al. 1996). No information is available on the size of the much smaller E coast population. Some birds of the high-arctic (sub)species *thayeri* probably breed or have bred in AVA; in winter, small numbers of the subspecies *kumlieni* breeding in southern Baffin Island occur regularly in western Greenland (Boertmann 2001). During winter, Iceland Gulls are common and widespread throughout the Open Water Region, occurring both in coastal and offshore areas. The wintering population is roughly estimated to be in the order of 300 000 birds (D. Boertmann pers. comm.). Though stragglers have been recorded in most of the Atlantic, the majority of the population appears to remain within Greenland waters during winter. Spring migration takes place in late Mar – early May, autumn migration in Oct-Nov (Salomonsen 1967b) with southward movements continuing into Dec; northern populations generally winter further north than southern.

Large numbers of Iceland Gulls have been ringed north of 67º30'N, i.e. from the northernmost part of SIS north to UPV at 73ºN. These ringings have provided a total of 617 recoveries (Table 59). When cleaned for uncertain recovery dates etc., a total of 569 recoveries remain of which 481 (85%) were birds recovered in their first year of life. This data set allows a closer view of the movements, especially first-autumn dispersal (see Table 64-67; Map 50-51). Young birds from these populations begin dispersing from the breeding grounds around mid Aug. Initial dispersive movements seem to advance slowly and among 108 1C birds recovered in Aug, only six (6%) were recovered more than 100 km from the ringing site (Table 64). Many colonies of Iceland Gulls are situated in inner fjords. After fledging, the young gulls generally follow the fjords towards the sea and then disperse both north- and southward along the coast. In Oct-Dec, a southward movement takes place but many young gulls may remain in their district of birth until forced south by ice conditions. The main southward movement appears to start in Sep-Oct for the most northerly populations, but not until Nov-Dec for the southerly populations (e.g. SIS; Table 65). Generally, birds from UPV-UMA winter further north than birds from Disko Bay and especially SIS (Table 66, Map 50-51).

To some extent, coastal autumn dispersal of different populations depends on local geographical and climatic conditions: Most of the birds hatched in the inner parts of Nassuttooq/Nordre Strømfjord about 130 km from the coast follow the fjord system westwards (Salomonsen 1967b), the earliest birds reaching the coast in late Aug – early Sep. A few cross the inland, moving north to the southern part of Disko Bay. As several birds have been recovered in the inner parts of the Ikertoq (SIS) and Nuuk fjords, Salomonsen (1967b) suggested that others follow the interior lowlands as far south as Nuuk, a distance of more than 350 km. In Sep, most of the Nassuttooq/Nordre Strømfjord-birds were recovered in coastal ASI-SIS (i.e. south of Disko Bay) with only a single bird recovered as far south as QAT. In the following months, the birds were mainly recovered from KAN south to MAN, with increasing numbers reaching QAT during Nov and Dec (Table 63, Map 51). The wintering area for young gulls from this population thus stretches from KAN south to QAT, a distance of more than 1000 km.

After the initial postfledging dispersal (which may take birds as far north as AVA), young Iceland Gulls hatched in UPV and UMA move south during late autumn to winter mainly in open water areas in the Disko Bay and KAN region. Many birds from ILU in the Disko Bay appear to remain in Disko Bay throughout the autumn while others move southwards, reaching QAT as early as Oct. The birds from this population mainly winter from southern Disko Bay south to MAN, although some may winter as far south as QAT. Thus, birds from UPV-UMA generally winter farther north than birds from SIS, with birds from ILU being intermediate, overlapping the wintering areas of both UPV-UMA and SIS birds (Table 66, Map 50-51).

Though few, the recoveries of older birds suggest that their movements differ little from those performed by 1Y birds, except that ad. birds seem to leave the breeding area faster than the young

birds of the year (Table 67). Apparently, many imm. birds return to their general natal area during summer but do not attend the breeding colonies (Salomonsen 1967b). The median recovery distance of 18 4S+ birds recovered during Jun-Jul was 60 km (range 0-134 km), suggesting that the Iceland Gulls exhibit a fairly high degree of natal site fidelity.

The few recoveries (20) of birds ringed in SW Greenland south of SIS suggest that young birds from these areas may also disperse widely, at least during early autumn. The median recovery distance of 10 1C birds recovered in Aug-Sep is 110 km, which does not differ significantly from the median distance found in 246 1C birds hatched north of MAN ($U = 840.5$, $P = 0.090$, Mann-Whitney U-test). Among these ten birds, a bird ringed in QAT was recovered in AMM on the E coast (635 km NNE) while two had moved 280-330 km northwards along the W coast; another 1C bird ringed in QAT was also recovered in AMM during "autumn". Eight of the remaining nine birds were recovered less than 35 km from the ringing site and one, a 2W bird ringed as a chick in PAA, was found in Iceland.

Very little is known about the movements of the E Greenland population. Salomonsen (1967b) speculated that most of this population winters in Iceland. The recovery of the bird ringed in PAA does, however, show that some young birds from W Greenland also reach Iceland. Petersen (1998) roughly estimated the Icelandic winter population at 5000 – 10 000 birds, noting that annual numbers show a considerable variation probably related to weather and ice conditions. In Iceland, the first birds arrive in late Sep with numbers building up during Oct. Adult birds depart in Feb-Mar so that in late Mar practically only imm. birds remain. Most of these leave in Apr-May though a few remain throughout the summer (Petersen 1998).

Apart from the bird recovered in Iceland, five other birds ringed in W Greenland have been recovered abroad (Map 49), illustrating this gull's potential for long-distance dispersal. All but one of these were in their first or second winter (earliest 4 Dec in the Faeroes) when recovered. The Iceland Gull is a regular visitor in the Faeroes (Fjeldså & Jensen 1985) and in Great Britain, especially in Scotland, during Nov-Apr (Cramp 1998). Stragglers have been reported as far south as the Mediterranean Sea and the Azores in the Atlantic; what appear to be small numbers of *glaucoides* also occur on the NE American seaboard (Cramp 1998). Apparently, young females tend to disperse farther than males. Of 64 Iceland Gulls collected in the Faeroes during a number of years, more than 90% were young females (Fjeldså & Jensen 1985).

Iceland Gulls, Qaqortoq, SW Greenland. Photo: K. Kampp.

Glaucous Gull *Larus hyperboreus*

RECOVERIES

247 GRC of birds ringed 1946-84 (Table 68), 31 FRC of birds ringed 1939-97 (Table 69). Note that a small percentage (5-10%) of the birds ringed in Greenland may have been confused with Iceland Gulls (which see). The 57 unaged GRC were most likely ringed as chicks, and are treated as such here. Of the 244 chicks ringed and recovered in Greenland, 186 (76%) were in their first calendar-year (1C), 16 in their second (2C), 3 in their third (3C) and 39 were older (4C+) when recovered. Six were more than 15 years old, the oldest 22 years. 1Y birds were primarily recovered in Aug-Nov, older birds in May-Sep (Fig. 17).

Upernavik: 104 1Y birds were recovered, the majority in UPV (see Table 70, Map 52) where the latest bird was reported 19 Nov. Four 1Y birds were recovered in AVA (2 "autumn", 2 Sep), but species identity was only confirmed for one of these. Much of the postfledging dispersal is apparently directed northward: Among 58 birds recovered more than 10 km from the ringing site in Aug-Sep, 44 (76%) were found to the north (median recovery distance 41 km). In Oct-Nov, 46% (n =13) were found north of the ringing site, declining to 0% (n = 6) in Dec-Mar. Genuine southward movements toward the wintering area seemingly start in late Sep – early Oct, as exemplified by a 1Y bird recovered in NUU as early as 7 Oct. Only 2 2S birds were recovered; 1 in UPV (Aug, 59 km) and 1 in ILU (Jul, 331 km). Twenty-one birds older than one year were recovered, the oldest 19 years. Thirteen were recovered in May-Aug (UPV 13), 6 in Sep-Nov (UPV 1, UMA 4, KAN 1) and 2 in Apr (UMA, ILU). Of 11 4Y+ birds recovered during May-Aug, 1 was recovered in UMA (210 km) and 10 in UPV (median recovery distance 27 km).

Uummannaq: Twenty-one 1Y birds were recovered in Jul-Jan (UPV 1, UMA 14, QEQ 2, ILU 2, KAN 2). Seven older birds were recovered in May-Aug 2-19 years later (UMA 4, QEQ 2, ILU 1).

Qeqertarsuaq: Five 1Y birds were recovered in Aug-Jan (UMA 1, QEQ 2, ILU1, ASI 1).

Ilulissat: Twenty-five 1Y birds were recovered in Aug-Jan (UPV 1, UMA 5, QEQ 2, ILU 14, ASI 2, KAN 1); the earliest bird in UMA was taken 3 Sep, in KAN 30 Aug. An undated bird was found in KAN, 8 birds were recovered locally (<95 km away) in May-Aug 2-22 years later and a bird was shot near Isortoq in AMM 25 Sep one year later (however, the species identity of this bird was not confirmed).

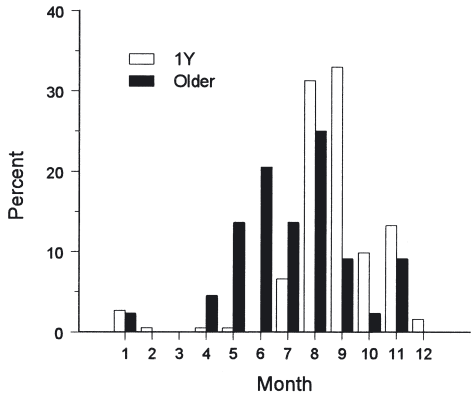


Fig. 17. Monthly distribution of Glaucous Gulls ringed as chicks in western Greenland and subsequently recovered as 1Y (n = 182) or older (n = 44).
Månedsvis fordeling af Gråmåger ringmærket som unger i V Grønland og genmeldt som hhv. 1Y eller ældre.

Table 68. Ringing details of recovered Glaucous Gulls, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Gråmåge, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	105		22	127	
UMA	14	1	13	28	
QEQ	3		2	5	
ILU	23		12	35	
ASI	20		2	22	
KAN	8		2	10	
SIS	12			12	
NUU	2		2	4	
ITT			2	2	
NEA		2		2	
Total	187	3	57	247	

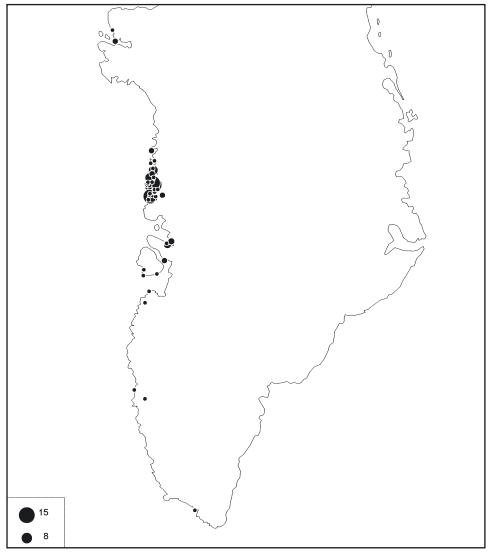
Table 70. Temporal and spatial distribution of Glaucous Gulls ringed in UPV and recovered in their first year of life. An additional 8 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Gråmåger ringmærket i UPV og genfundet i deres første leveår.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AVA									2				2
UPV							8	35	26	6	3		78
UMA								3		1	2	1	7
QEQ											2	1	3
ILU										1			1
ASI													
KAN	1										1		2
SIS													
MAN	1												1
NUU										1			1
PAA													
QAT				1									1
Total	2			1			8	38	28	9	8	2	96

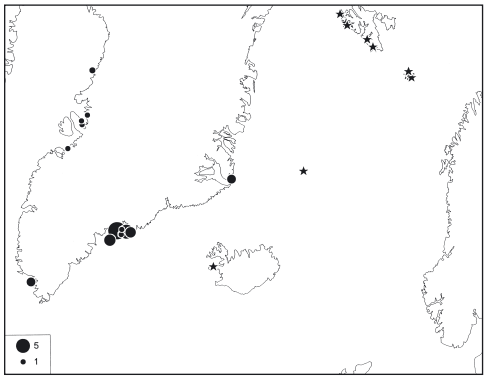
Aasiaat: Twenty 1Y birds were recovered in Jul-Feb (19) and May (1) in UMA (1), ILU (1), ASI (16) and KAN (2). A 4C bird was shot in NUU in Jan and a ring was found in a Gyrfalcon nest in MAN 25 years later.
Kangaatsiaq: Seven 1Y birds were recovered in Aug-Jan (ILU 2, KAN 2, SIS 3, MAN 1), an undated bird was shot in UMA, 1 was shot in QAT in early May three years later and 1 was shot in ASI in mid Jun eight years later.
Sisimiut: The 12 recoveries originate from ringings by Salomonsen in the inner Nassuttooq/Nordre Strømfjord in 1954. Ten 1C birds were recovered in Sep-Nov (UMA 2, ILU 1, ASI 1, KAN 5, NUU 1); the earliest bird in UMA was taken 18 Sep, in NUU 7 Sep. A 2C bird was shot in UMA and a 4C bird in Nassuttooq/Nordre Strømfjord, both in Sep.
Nuuk: Two birds were recovered in PAA in Aug 59-376 days after ringing, 1 was shot in MAN in Oct 83 days later and 1 was shot locally Apr six years later.
Ittoqqortoormiit: Two birds ringed at Fame Ø in Aug were shot near Ittoqqortoormiit/Scoresbysund in early Sep and mid Oct the same year.
Northeast Greenland: Two ad. birds ringed at Danmarkshavn in Jul were shot locally in late May three years later.
Foreign recoveries: Thirty-one birds ringed in Svalbard, Jan Mayen and Iceland (Table 69, Map 53) have been recovered in Greenland. Ten were recovered in their first calendar year, all on the E coast in late Jul (1; Iceland) and late Sep – mid Nov (9 from Bear Island and Spitsbergen). Sixteen were recovered in their second calendar year; 6 of these were taken on the W coast in Jun (UMA) and Aug-Oct (QAT, ASI, UMA and UPV 2), ten on the

Table 69. Glaucous Gull: Origin and age of ringing for birds ringed abroad and recovered in Greenland.
Oprindelse og alder ved ringmærkning af Gråmåger ringmærket i udlandet og genfundet i Grønland.

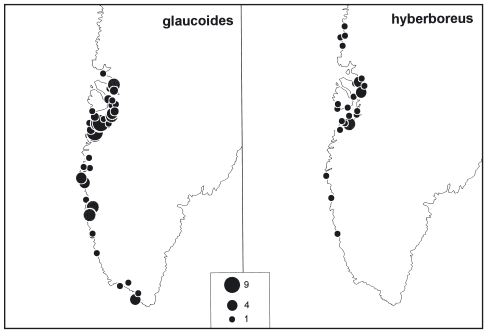
	Ringed as		
Ringed	Chick	Older	Total
Iceland	1		1
Jan Mayen	1		1
Spitsbergen	9	1	10
Bear Isl.	19		19
Total	30	1	31



Map 52. Dispersal of Glaucous Gulls ringed in UPV and recovered in their first year of life (n = 104).
Kort 52. Spredning hos Gråmåger ringmærket som unger i UPV og genmeldt i deres første leveår.



Map 53. Recoveries (filled circles) of Glaucous Gulls ringed abroad (n = 31); stars denote ringing sites.
Kort 53. Genfund af Gråmåger ringmærket i udlandet. Ringmærkningsstedet er vist med stjerne.



Map 54. Winter (Nov-Mar) recoveries in W Greenland of Iceland Gulls (left, n = 108) and Glaucous Gulls (right, n = 37) ringed in KAN-UPV.
Kort 54. Vintergenfund (nov-mar) i V Grønland af Hvidvingede Måger (til venstre) og Gråmåger (til højre) ringmærket i KAN-UPV.

E coast in Jun (1) and Aug-Oct (9, 1 undated). Three older birds (2 3C, 1 4C) were shot on the E coast in Aug-Nov, and 2 were reported in AMM and QAT (ringed as ads) 21 years after ringing; both do, however, have dubious finding data.

MOVEMENTS

Being a widespread breeder in most of Greenland, the Glaucous Gull is only absent in the extreme northern parts from Hall Land east to J. P. Koch Fjord (Boertmann 1994). The breeding population in western Greenland (including AVA) has roughly been estimated at 30 000 – 100 000 pairs with the highest densities in Disko Bay – UPV (Boertmann et al. 1996); no information is available on the size of the E Greenland population. Glaucous Gulls from W Greenland seem to winter almost exclusively in the Open Water Region, where they occur mainly in coastal waters but sometimes also on the shelf, particularly when ice is present. Glaucous Gulls have also been recorded in very low densities farther offshore west of the Greenland shelf (Mosbech & Johnson 1999). The W Greenland winter population has tentatively been estimated to be in the order of 300 000 birds (D. Boertmann pers. comm.). The wintering area of the E coast population is unknown. Salomonsen (1967b) suggested that many birds from the E coast population winter in Iceland, but no proof of such movement is available. Petersen (1998) estimated the Icelandic wintering population at 30-50 000 birds. As older age-classes of the Icelandic breeding population (estimated at 8000 pairs) are mainly resident, local birds must constitute a large proportion of the wintering population. Still, it does seem reasonable that some E Greenland birds also winter in Iceland together with birds from Svalbard/Jan Mayen, especially in cold winters. Glaucous Gulls leave high-arctic Greenland before the end of Sep and AVA by late Oct. On the E coast, the birds disappear from the Ittoqqortoormiit/Scoresbysund area in late Oct and from the Tasiilaq/Ammassalik area in Dec-Jan (Salomonsen 1967b). In low-arctic W Greenland, southward movements occur during Oct-Nov and even into Dec. In northern Greenland, arrival at the breeding grounds takes place during mid Apr through late May (Boertmann 1994).

As the majority (75%) of the recoveries refer to birds found during their first autumn, information on the movements of older birds is limited. No Glaucous Gulls ringed in Greenland have been recovered abroad, indicating that at least the populations breeding in western Greenland are mainly sedentary or dispersive. Though considerable overlap occurs, Glaucous Gulls born in KAN-UPV on average seem to winter farther north than Iceland Gulls from the same area (Map 54). For both species the ice-free areas in and just south of Disko Bay are important wintering quarters, but few Glaucous Gulls from these northerly populations seem to move south of KAN; for Glaucous Gulls the centre of gravity of recoveries in Nov-Mar falls on 69º35'N (n = 37), for Iceland Gulls on 67º28'N (n = 108). Apparently, many 1S Glaucous Gulls from W Greenland do not return to their general natal area during summer. The median recovery distance of five 1S birds recovered during May-Aug was 222 km, which is significantly different from the median recovery distance of 28 km (range 0-210) in 20 4S+ birds recovered during the same

period ($U = 11.5$, $P = 0.01$, Mann-Whitney U-test). Like Iceland Gulls, ad. Glaucous Gulls seem to exhibit a high degree of fidelity to their general natal area.

Unknown, but probably relatively small numbers of predominantly young Glaucous Gulls from Svalbard and Jan Mayen occur in Greenland. 1C birds from these populations arrive at the E coast in mid-late Sep and disappear again when the ice closes the coast in mid Nov – Dec. Their whereabouts during the following months are unknown, but from Jun to Nov 2C birds turn up both on the E and on the W coast as far north as UPV. Apparently, a few older birds from Jan Mayen/Svalbard also reach Greenland. Several (mainly imm.) Glaucous Gulls ringed in Svalbard have also been recovered in the Faeroes and Iceland (Norderhaug 1989, Petersen 1998), suggesting that they disperse widely in the North Atlantic. The single recovery of an Icelandic hatched Glaucous Gull suggests that low numbers of young birds from this population also reach eastern Greenland. However, most of the autumn movements of young Icelandic-bred birds seem directed in an easterly direction. Several Icelandic birds have been recovered in Europe from northern Norway south to France, with a concentration of recoveries on the Faeroe Islands and the northern parts of the British Isles (Petersen 1998). Whether Glaucous Gulls originating in Canada occur in W Greenland remains unknown.

Great Black-backed Gull

Larus marinus

RECOVERIES

99 GRC of birds ringed as chicks in Jun-Aug 1938-1987 (Table 71), 4 FRC. Of the birds ringed and recovered in Greenland, 65 (67%) were in their first calendar-year (1C), 18 in their second or third (2-3C) and 16 were older (4C+) when recovered. Two of these were more than 10 years old, the oldest 23 years. 1Y birds were primarily recovered in Aug-Nov (Fig. 18).

Upernavik: A bird was shot 19 Jan four years later in MAN (765 km S), while 2 birds were shot within the district in Aug and Oct 24-69 days later.

Qeqertarsuaq: A bird was shot within the district in Sep the same year.

Ilulissat: A bird was shot within the district in Aug 30 days later, while another was shot 14 Nov eight years later in ASI (144 km SSW).

Aasiaat: Three birds were recovered locally less than 100 days after ringing.

Sisimiut: A bird was shot within the district (90 km S) in mid Nov the same year.

Maniitsoq: Eighteen birds were recovered within the district (Table 72), 14 less than 50 km from the ringing site, 4 90-145 km away. Two were more than three years old; 1 10 years and 1 23 years old. Seven out of 9 birds recovered in Aug were young (1C). Eleven birds were recovered in other districts (115-650 km away); 9 1-3C birds south and 2 ads north of MAN (ASI in May and KAN in

Glaucous Gull, Kippaku, Upernavik, W Greenland. Photo: K. Kampp.

Table 71. Ringing details of recovered Great Black-backed Gulls, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Svartbag, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				Recovered
Ringed	Chick	Older	Unknown	Total	abroad
UPV	3			3	
QEQ	1			1	
ILU	2			2	
ASI	3			3	
SIS	1			1	
MAN	29			29	
NUU	35			35	
PAA	3			3	
QAT	22			22	
Total	99			99	

Table 72. Temporal and spatial distribution of Great Black-backed Gulls ringed in MAN.
Tidsmæssig og geografisk fordeling af Svartbage ringmærket i MAN.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ASI					1								1
KAN												1	1
SIS													
MAN	1	1					2	9	2	2	1		18
NUU	1		1						1	2			5
PAA													
QAT	1	1								1	1		4
Total	3	2	1		1		2	9	3	5	2	1	29

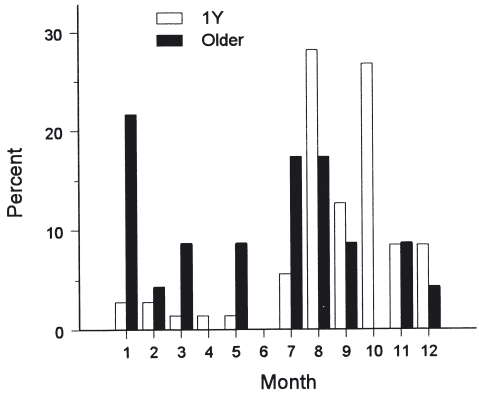


Fig. 18. Monthly distribution of Great Black-backed Gulls ringed as chicks in western Greenland and subsequently recovered as 1Y (n = 71) or older (n = 23).
Månedsvis fordeling af Svartbage ringmærket som unger i V Grønland og genmeldt som hhv. 1Y eller ældre.

Dec). During winter (Oct-Mar), 13 of 14 birds were recovered either within (5) or south of (8) the district, suggesting that southward dispersal was more common than northward.

Nuuk: Twenty-five birds were recovered within the district (Table 73), twenty-one less than 50 km from the ringing site, 4 110-140 km away. Four of these were 6-17 years old, the remaining 0-2 years old. Seven out of 8 birds recovered in Aug were young (1C). Ten birds were recovered in other districts (32-970 km away); 6 1-2C birds south of NUU, 3 1C birds and 1 ad. north of. The latter, shot in southern UPV 6 Aug seven years after ringing, had probably emigrated. During winter (Oct-Mar), 7 of 13 birds were recovered within the district, 3 north and 3 south of NUU.

Paamiut: Three birds were recovered locally less than 60 days later.

Qaqortoq: All 22 birds were recovered within the district in Jul-Mar (16 Sep-Mar) 38-2731 days after ringing. Seventeen were found less than 50 km from the ringing site, 5 50-125 km away. The majority (17) were less than three years old when recovered, 5 were 5-8 years old.

Foreign recoveries: Four birds ringed as chicks abroad have been recovered in Greenland: A bird ringed in northwestern Iceland was shot in autumn or winter almost twenty years later near Tasiusaq

Table 73. Temporal and spatial distribution of Great Black-backed Gulls ringed in NUU. One recovery in UPV in Aug is omitted.
Tidsmæssig og geografisk fordeling af Svartbage ringmærket i NUU. Et genfund fra UPV i aug er udeladt.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ASI												1	1
KAN													
SIS													
MAN										1		1	2
NUU		1			1		4	8	4	5	2		25
PAA								1				1	2
QAT	1			1	1						1		4
Total	1	1		1	2		4	9	4	6	3	3	34

(QAT; 1245 km SW), a bird ringed in northern Iceland was shot near Isortoq (AMM; 950 km W) 15 Oct four months later and a bird ringed west of Murmansk, Russia, was shot near Isortoq (AMM; 3020 km W) in the winter the same year. A bird ringed as a chick in northern Jutland, Denmark, in 1997 was found dead Mar 1998 in QAT (3250 km W).

MOVEMENTS

The Greenland breeding population of Great Black-backed Gulls has roughly been estimated at 3000-5000 pairs, occurring from QAT north to UPV; small numbers also breed in SE Greenland (Boertmann et al. 1996). Stragglers have been recorded as far north as Qaanaaq/Thule (c. 77°30'N) on the W coast and Kronprins Christians Land (c. 81°N) on the E coast; Great Black-backed Gulls occur as annual summer vagrants in NE Greenland as far north as Germania Land (Boertmann 1994). During the last half of the 20th century a northward range expansion in W Greenland has taken place: In the mid 1940s the northernmost breeding pairs were found at 69°30'N, in 1994 at 74°02'N (Salomonsen 1967b, Boertmann et al. 1996). Great Black-backed Gulls are common and widespread in SW Greenland during winter, as far north as open water is present. They occur mainly in inshore waters, but also on the shelf when ice is present (e.g. Durinck & Falk 1996).

The recoveries suggest that the populations in SW and W Greenland are mainly sedentary or dispersive, while birds from the northern part of the breeding range (i.e. northern Disko Bay, UMA and UPV) moves south to winter in the Open Water Region. A postfledging dispersal seems to take place in Aug, and movements towards the wintering areas during Oct-Nov. During Aug-Oct, the median recovery distance of 1W birds from QAT, NUU and MAN combined was significantly shorter than during Nov-Mar (22 km versus 205 km, n = 45, U = 328, P = 0.008, Mann-Whitney U-test). Otherwise, the recoveries are too few to allow a detailed breakdown. Salomonsen (1967b) stated that return movements take place in Apr, for the most northerly populations continuing into May. Apart from the fact that Great Black-backed Gulls occur in the Tasiilaq/Ammassalik area during winter (Boertmann 1994), nothing is known about the movements of birds breeding in SE Greenland.

As shown by two recoveries, some Icelandic Great Black-backed Gulls reach SE and SW Greenland during autumn and winter but since the Icelandic population is mainly resident (Petersen 1998), the annual numbers reaching Greenland must be low. Being far from their normal wintering areas in NW Europe, the two recoveries of young birds from Denmark and Russia probably represent extreme dispersal rather than migration (Cramp 1998). A few birds from the mainly sedentary or dispersive North American population (Good 1998) could likewise reach Greenland. However, the vast majority of Great Black-backed Gulls wintering in Greenland is clearly of local origin.

Black-legged Kittiwake

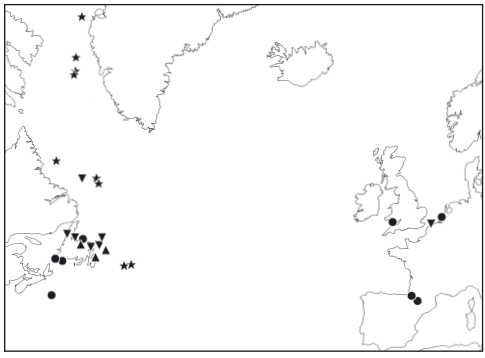
Rissa tridactyla

RECOVERIES

811 GRC of birds ringed in Jun-Aug 1926-1984 (Table 74, Map 55), 764 FRC of birds ringed 1936-2000, primarily as chicks in Jun-Jul (Table 75, Map 56). Of 565 chicks ringed and recovered in Greenland, 101 (18%) were in their first calendar-year (1C), 43 in their second (2C), 92 in their third (3C) and 329 were older (4C+) when recovered. Six were more than 17 years old, the oldest 20 years. The Greenland Black-legged Kittiwakes were recovered 3 Apr – 24 Nov, with the majority (80%) during 15 May – 14 Sep. Young birds (1Y) were generally recovered later in the season than older birds (Fig. 19).

Table 74. Ringing details of recovered Black-legged Kittiwakes, broken down according to age and ringing district. *Ringmærkningsdata for genfund af Ride, opdelt efter mærkningsalder og -distrikt.*

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	39	1	5	45	1
UMA	260		96	356	4
QEQ			4	4	
ILU	279	2	51	332	10
ASI	2		2	4	
KAN	5		4	9	
SIS			1	1	
MAN	2	9	2	13	
NUU	46		1	47	3
Total	633	12	166	811	18



Map 55. Recoveries abroad of Black-legged Kittiwakes ringed in Greenland (n = 18) and ringing sites of birds ringed on board ships in the W Atlantic (stars; n = 9). Triangles pointing downwards denote recoveries in Oct-Nov, circles recoveries in Dec-Mar and triangles pointing upwards recoveries in Apr-May.
Kort 55. Ride. Genfund i udlandet af fugle ringmærket i Grønland og mærkningssteder for Rider ringmæket om bord på skibe i den vestlige Nordatlant (stjerner). Nedadvendte trekanter angiver fund i okt-nov, cirkler fund i dec-mar, opadvendte trekanter fund i apr-maj.

Upernavik: 23 birds were recovered within UPV in the period 30 May – 3 Sep 0-72 (mean 32) km from the ringing site 0-13 years later, while 21 birds were recovered elsewhere in Greenland during Apr-Nov, mostly during migration or in summer south to ASI. A bird ringed Aug 1958 was recovered 15 Mar 1961 off Nova Scotia, Canada (3210 km S; Map 55).
Uummannaq: 254 birds were recovered within UMA in the period 3 May – 15 Oct 0-130 (mean 30) km from the ringing site 0-16 years later, while 98 birds were recovered elsewhere in Greenland during May-Nov, mostly during migration or in early summer south to ASI (see Table 76). A bird ringed as a chick 28 Jul 1958 was shot 15 Aug 1971 at Kap Tobin, ITT (1110 km E). Four birds ringed as chicks 1926-68 were recovered in Newfoundland (c. 2400 km S; Map 55) in Nov (2; 97-103 days later) and Jan (2; 152-171 days later).
Qeqertarsuaq: Four birds ringed Jun 1959 were recovered in May-Jul 1-6 years later less than 70 km from the ringing site.
Ilulissat: 151 birds were recovered within ILU in the period 8 Apr – 24 Nov 0-119 (mean 51) km from the ringing site 0-18 years later. Elsewhere in Greenland, 171 birds were recovered in May-Nov mostly during migration or in summer in the neighbouring districts (see Table 77). Very few Black-legged Kittiwakes were recovered north of Disko Bay, the northernmost a bird ringed as a chick 1957 and shot in UPV 3 Jun 1963 (380 km NW).

Ten birds ringed as chicks Jul-Aug 1946-60 were recovered abroad: A bird ringed 1957 was caught off Labrador, Canada (1565 km S) 26 Oct the same year and 5 were shot in Newfoundland (Nov 2, Jan 1, May 2) less than one year later. Four birds were recovered in Europe in Feb-Mar; 1 in France (4260 km SE) 2 Feb 1961 175 days after ringing, 1 in France (4200 km SE; found 100 km inland) 12 Feb 1957 almost two years later, 1 in the Netherlands (3350 km SE) 28 Feb 1957 10 years later and 1 in Britain 4 Mar 1957 (3260 km SE) 6 years later. The 3 1957-birds were probably storm-driven as deep depressions dominated the eastern Atlantic weather-system in the late winter of 1956-57 (Salomonsen 1967).
Aasiaat: Two birds ringed as chicks in 1969 were shot in UMA (c. 200 km N) in Jun 1971, while 2 unaged were recovered locally nine days and one year later.
Kangaatsiaq: Nine birds ringed Jul 1950-54 were recovered in May-Oct 2-11 years later less than 75 km from the ringing site.

Table 75. Black-legged Kittiwake: origin and age of ringing for birds ringed abroad and recovered in Greenland. *Oprindelse og alder ved ringmærkning af Rider ringmærket i udlandet og genfundet i Grønland.*

	Ringed as			
Ringed	Chick	Older	Unknown	Total
At sea		8	1	9
Iceland	150	10		160
Svalbard	3	3		6
Russia	234	14		248
Norway	148	7	3	158
Sweden	1			1
Denmark	5			5
Britain	129	20		149
Ireland	7			7
Faeroe Isl.	1	1		2
France	17	1		18
Newfoundland	1			1
Total	696	64	4	764

Sisimiut: A bird ringed Jul 1954 was shot in ASI (100 km NNE) in early autumn 1960.
Maniitsoq: Ten birds ringed Aug 1946-60 were recovered in Apr-Aug 1 day – 6 years later less than 75 km from the ringing site. An ad. bird ringed 12 Aug 1955 was shot five days later in SIS (210 km NNW), while a chick ringed 9 Aug 1948 was shot 48 days later in ASI (327 km N). A bird ringed 7 Aug 1959 was shot 17 May 1963 near Isortoq in AMM (550 km E).
Nuuk: 39 birds were recovered within NUU in the period 13 Apr – 5 Oct 1-53 (mean 36) km from the ringing site 0-16 years later, while 4 birds ringed as chicks were recovered elsewhere in Greenland. One was found in ILU (560 km N) 17 Sep 47 days after ringing, 1 in ASI (506 km N) 24 Jun two years later, 1 on Store Hellefiskebanke off SIS (390 km NNW) 21 Sep five years later and 1 in MAN (190 km NNW) 28 Jun one year later. A bird of unknown age was shot in QAT (300 km SE) 20 Nov ten years later. Three chicks ringed 7 Aug 1926 were recovered abroad: One was found on a lightship off the Dutch coast 23 Nov 1926 (3460 km ESE) and 2 were recovered in Newfoundland (c. 1670 km S) 6 Nov 1926 and in Apr 1927.

Foreign recoveries: Since 1936 1-45 Black-legged Kittiwakes ringed abroad have been recovered annually in Greenland, resulting in 764 recoveries (Table 75, Fig. 20). The vast majority of these were ringed as chicks throughout the NW European breeding range and recovered in south-western Greenland in Jun-Oct (Map 56). From outside Europe, there are 9 recoveries of birds ringed onboard ships in the western Atlantic and 1 of a chick ringed in Newfoundland 20 Jul 1971 and shot three months later in QAT.

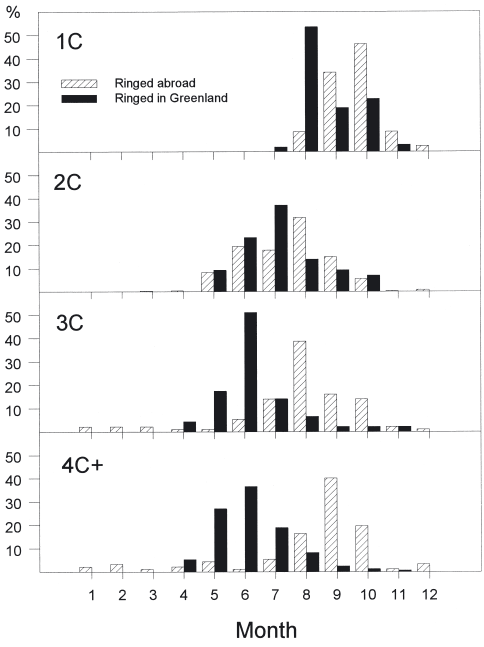


Fig. 19. Monthly distribution of Black-legged Kittiwakes ringed abroad as nestlings and recovered in Greenland (1C, n = 75; 2C, n = 334; 3C, n = 72; 4C+, n = 69) and of Black-legged Kittiwakes ringed in Greenland as nestlings and subsequently recovered in Greenland (1C, n = 101; 2C, n = 43; 3C, n = 92; 4C+, n = 329).
Månedsvis fordeling af Rider ringmærket som redeunger i hhv. udlandet og i Grønland og genmeldt i Grønland.

The 9 birds ringed in the western Atlantic (Map 55) were recovered as follows: Two 2C birds ringed in the Davis Strait in Jun 1969 were recovered in NUU 120 days later and in QAT Jul one year later. A 1C bird ringed in the Davis Strait in

Table 76. Temporal and spatial distribution of Black-legged Kittiwakes ringed in UMA and recovered in Greenland. One recovery from ITT in Aug and an additional 49 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Rider ringmærket i UMA og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV							1		1				2
UMA					20	95	35	66	15	2			233
QEQ					6	8	2		2				18
ILU					3	5	3			2	1		14
ASI					3	5	5						13
KAN					1					2			3
SIS						4				2			6
MAN				1						1			2
NUU					2	2			1	3			8
PAA							1						1
QAT						1				1			2
Total				1	35	120	47	66	19	13	1		302

Table 77. Temporal and spatial distribution of Black-legged Kittiwakes ringed in ILU and recovered in Greenland. An additional 45 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Rider ringmærket i ILU og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV						1							1
UMA						2	1		3				6
QEQ					11	10	11	13	2	2			49
ILU				3	60	26	14	33	6	2	2		146
ASI					18	10	9	4	4	2	2		49
KAN					1	1	1		5	5			13
SIS						2	1			1			4
MAN										2			2
NUU					1					5			6
PAA													
QAT					1								1
Total				3	92	52	37	50	20	19	4		277

Table 78. Temporal and spatial distribution of Black-legged Kittiwakes ringed as chicks in W Europe and recovered in Greenland. An additional 72 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Rider ringmærket som unger i Vesturopa og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AMM								4	12	9			25
AVA													
UPV													
UMA						1	1	8	3				13
QEQ						4	6	4					14
ILU						4	6	2	2				14
ASI				2	2	11	22	23	4	5		2	71
KAN					2	1	1	7	5	1	1	1	19
SIS		1			5	16	6	7	2	8			45
MAN	2	2	1	2	4	12	5	5	4			2	39
NUU				1	15	20	9	34	41	25	3	3	151
PAA	1				7	7	16	19	13	12			75
QAT	1	2	3				10	60	48	27	6	1	158
Total	4	5	4	5	35	76	82	173	134	87	10	9	624

Kittiwakes, Upernavik, W Greenland. Photo: P. Lyngs.

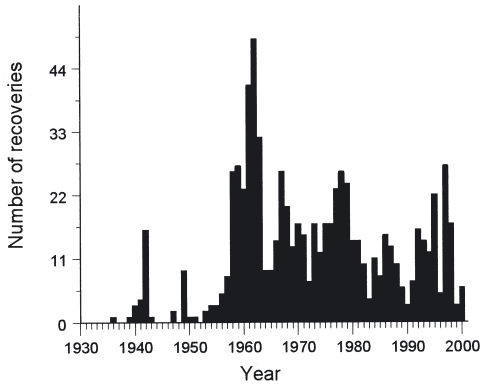


Fig. 20. Annual numbers of foreign-ringed Black-legged Kittiwake recovered in Greenland (n = 663).
Årligt antal udenlandske Rider genmeldt i Grønland.

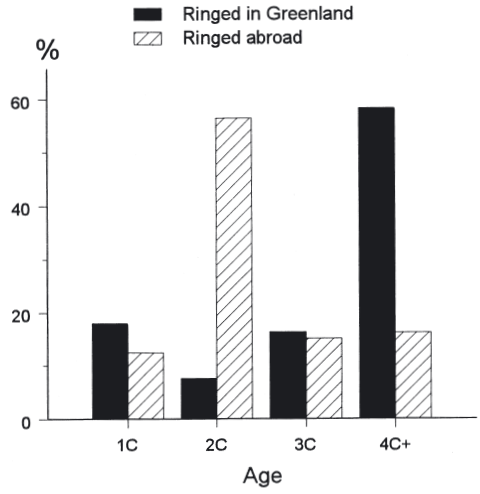


Fig. 21. Age at recovery of Black-legged Kittiwakes ringed as nestlings in Greenland (n = 565) and abroad (n = 606).
Alder ved genfund af Rider mærket som redeunger i hhv. Grønland og udlandet.

Sep 1970 was shot in MAN five years later, while an unaged bird ringed Nov 1965 was shot in AVA Jun 1967. Three ad. birds ringed off Labrador in Nov 1971 were shot Apr-Jul in UMA two years later, QEQ one year later and in NUU eight years later. Two birds ringed off Newfoundland in Jan 1963 were shot May 1966 in ILU (ringed as 2C) and Jul in QAT (ringed as 3C).

A total of 754 Black-legged Kittiwakes ringed in Europe has been recovered. Of these, 36 ad. birds ringed Apr-Aug in Svalbard (3), Britain (11), Iceland (8), Norway (6) and Russia (8) were recovered in QAT-SIS (33), ILU (2) and AMM (1). Four birds had imprecise finding dates, the others were recovered throughout the year with the majority (19) in Aug-Oct. Two ads ringed in Britain (Feb) and Norway (Oct) were shot in QAT Oct nine years later and in AMM Oct seven years later, respectively. An additional 9 full-grown or unaged birds (Britain 3, Iceland 2, Russia 4) were recovered 1-12 years later during Jun-Sep in PAA-UMA and AVA (1, a British bird ringed in Mar). Including birds ringed as ads, 131 (20%) of 703 recoveries refer to birds older than two years (3C+). These older birds were recovered throughout the year, with 70% of the recoveries from Aug-Oct.

Most of the 695 European Black-legged Kittiwakes ringed as chicks were recovered in their second calendar-year (2C; Fig. 21), a distribution differing significantly ($\chi_3^2 = 406.7$, $P < 0.0001$) from that of chick-ringed Greenlandic birds recovered in Greenland. Among 691 birds ringed as chicks, 86 (12%) were recovered as 1C, 391 (57%) as 2C, 104 (15%) as 3C and 111 (16%) as 4C+. The earliest 1C bird recorded was shot 9 Aug 20 days after being ringed in Orkney (Scotland), the latest 31 Dec; 80% of the recoveries are from the period 4 Sep – 2 Nov. 2C birds were recovered 10 Mar – 23 Dec with 80% 2 Jun – 18 Sep, 3C birds somewhat later (Fig. 19) with 80% 14 Jun – 8 Oct (range 1 Jan – 2 Dec). Older birds (4C+) were primarily recovered in Aug-Oct (range 25 Jan – 16 Dec). The birds were recovered both on the E coast (AMM) and on the W coast northwards to UMA (Table 78). In AMM, about half (54%) of the Black-legged Kittiwakes recovered were of Icelandic origin (Table 79) and 69% were 1C-birds (Table 80), in both cases significantly larger proportions than found in W Greenland (χ_1^2 = 20.2 and 68.5,

Table 79. Black-legged Kittiwakes ringed abroad as chicks and recovered in Greenland. An additional 2 birds with incomplete recovery data are excluded.
Rider ringmærket som unger i udlandet og genmeldt i Grønland.

	Group 1: N Norway, Russia, Svalbard	Group 2: Iceland	Group 3: Scotland, Faeroes	Group 4: S Norway, Denmark, Sweden	Group 5: Irland, England, France	Total
AMM	4	14	3	3	2	26
UMA	3	3	4	2	2	14
QEQ	15				1	16
ILU	12			1	2	15
ASI	51	6	5	9	1	72
KAN	9	6		3	3	21
SIS	24	8	3	6	8	49
MAN	23	6	2	3	10	44
NUU	56	48	11	31	27	173
PAA	36	9	8	16	13	82
QAT	42	49	15	42	34	182
Total	275	149	51	116	103	694

Table 80. Black-legged Kittiwakes ringed as chicks in W Europe. Number of recoveries of different age-classes in selected areas of Greenland.
Rider ringmærket som unger i Vesteuropa: Antal genfund af forskellige aldersgrupper i udvalgte dele af Grønland.

	QAT-NUU	MAN-KAN	Disko Bay	AMM	Total
1C	58	5	1	18	82
2C	200	83	84	2	369
3C+	146	22	16	6	190
Total	404	110	101	26	641

Table 81. Number of recoveries in Greenland of Black-legged Kittiwakes ringed in selected countries.
Antal genfund i Grønland af Rider ringmærket i udvalgte lande.

	Norway	Russia	Iceland	British Isles
1940-49		32	1	
1950-59	4	38	3	14
1960-69	5	125	8	41
1970-79	19	47	34	49
1980-89	13	4	43	20
1990-99	10	1	67	22
Total	51	247	156	146

respectively, P <0.0001). In W Greenland, the majority of all Black-legged Kittiwakes were recovered in the southwestern part of the Open Water Region (QAT-NUU). When grouping the recoveries according to ringing area (Table 79), one obvious difference in the geographical distribution within W Greenland emerges: Among southern-ringed birds (group 2-5) 77% were recovered in QAT-NUU and 23% in MAN-UMA with no significant difference between any one group (χ_3^2 = 2.1, P = 0.87), while 49% of the northern-ringed birds (group 1) were recovered north of NUU. This distributional difference between northern- and southern-ringed birds is highly significant (χ_1^2 = 52.2, P < 0.0001). There are also some differences in the geographical distribution of the different age-classes recovered in Greenland (Table 80). The age-distributions of birds found in MAN-KAN and in Disko Bay are similar (χ_2^2 = 3.2, P = 0.20), but there is a highly significant difference when comparing QAT-NUU to MAN-KAN/Disko Bay combined (χ_1^2 = 53.3, P < 0.0001). This dif-

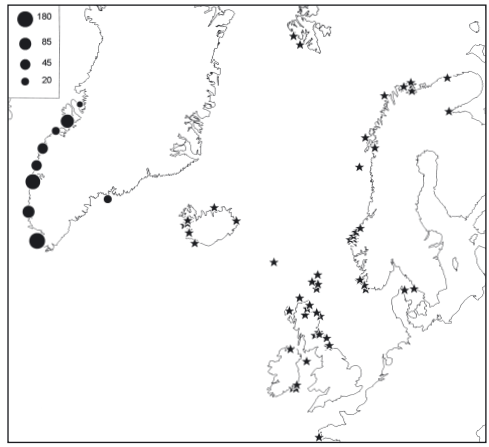
ference is also found when comparing 2C birds versus 3C+ birds ($\chi_1^2 = 32.4$, $P < 0.0001$) and 1C birds versus older (2C+; $\chi_1^2 = 18.5$, $P < 0.0001$). In other words, more 2C birds and fewer 1C and 3C+ birds were recovered north of NUU than in and south of this region.

Though the annual number of recovered foreign Black-legged Kittiwakes has fluctuated greatly (Fig 20), proportionally fewer birds have been recovered since the 1970s. Compared with the 1960-70s, the number of e.g. Russian Black-legged Kittiwakes recovered in Greenland was very low during the 1980-90s (Table 81), while the numbers of recovered Icelandic birds increased. Part of the explanation for this is varying ringing activity, which has been increasing in Iceland and Norway but decreasing in Russia (Petersen & Gudmundsson 1998, R. Barrett & Y. Krasnov in litt.). However, the percentage of Norwegian birds recovered in Greenland dropped from 0.59 during the 1960s to 0.12 during the 1980s while the corresponding figure for Russian birds dropped from 1.68 to 0.08. Likewise, the percentage for Icelandic birds dropped from 1.27 during the 1970s to 0.4 during the 1980s. The decreasing percentage could reflect changes in the occurrence patterns of foreign Black-legged Kittiwake populations, suggesting that fewer birds visited Greenland during the last three decades of the 20th century than before (cf. Great Skua). However, as no other data is available, changes in human hunting habits cannot be excluded.

MOVEMENTS

The Black-legged Kittiwake is a common and widespread breeder in Greenland, especially on the W coast. With colonies from AVA in the north to QAT in the south, the W Greenland breeding population is estimated to number at least 100 000 and no more than 200 000 pairs (Boertmann et al. 1996). On the E coast, a small number of scattered colonies are found from Kangerlussuatsiaq/Lindenow Fjord at 60º30'N northward to Mallemukfjeld at 80º16'N (Boertmann 1994, Falk & Møller 1995a). The size of the breeding population here is not known, but it is much smaller than that on the W coast. Outside the breeding season, the Black-legged Kittiwake is pelagic, leaving Greenland coastal waters in Aug (ad. birds) through Oct (young birds; see Fig. 19 and below). Adult breeders return to their colonies in Apr-May, imm. non-breeders in May-Jun. Birds from W Greenland apparently winter offshore in the Atlantic somewhere between 65-40ºN; nothing is known about the movements of the E coast population. Many imm. Black-legged Kittiwakes from Europe summer in Greenland, arriving during May-Jun and departing during Sep-Oct (see Fig. 19 and below).

Black-legged Kittiwakes initiate breeding when 4-5 years old (Wooller & Coulson 1977). In a British study, Coulson & Nève de Mévergnies (1992) found that about 36% of the Black-legged Kittiwakes returned to breed in their natal colony, while 43% bred in another colony within 100 km of their natal colony. The remaining 21% emigra-



Map 56. Recoveries (filled circles) of Black-legged Kittiwakes ringed abroad (n = 763); stars denote ringing sites for birds ringed as chicks. The recoveries are plotted as total number per district (ASI+ILU+QEQ combined). Two recoveries from AVA are not shown.
Kort 56. Genfund af Rider ringmærket i udlandet (mærkningssteder fugle mærket som unger er vist med stjerner). Genfundene er plottet som det totale antal pr distrikt (ASI+ILU+QEQ slået sammen). To genfund fra AVA er udeladt.

Table 82. Recovery distance of different Black-legged Kittiwake age-classes during Jun-Jul. Only birds ringed as chicks in W Greenland are included.
Genfundsafstande hos forskellige aldersgrupper af Rider genmeldt i jun-jul. Kun fugle mærkett som unger i V Grønland er inkluderet.

Distance (km)	1Y	2Y	3Y	4Y+
<100	7	31	33	93
100-200	12	12		9
200-300	9	7		3
300-400	2	1		
400-500	2	3		3
500-600		1		
600-700				
700-800	1		1	
Total	33	55	34	108
Median (km)	177	77	8	30

ted to colonies situated 100-900 km from the colony of birth. If not heavily disturbed, ads hardly ever change colony (Coulson & Nève de Mévergnies 1992, Baird 1994). As young Black-legged Kittiwakes mature, they tend to stay closer and closer to a colony, but will not normally enter the colony before they are three years old (Cramp 1998). Usually, breeding Black-legged Kittiwakes forage near their colony and most studies have reported a foraging radius of <50 km (Baird 1994 and references therein). The Greenland recovery data generally fits well into these patterns. Of 108 4Y+ birds ringed as chicks in W Greenland and recovered during Jun-Jul, 66% were recovered <50 km from their colony of birth, 20% 50-100 km away and 14% 100-500 km away; the median recovery distance of 93 4Y+ birds recovered <100 km from their natal colony being 24 km (SD = 27.9). Thus, the data suggests high natal fidelity to the general area of birth (i.e. breeding <100 km from the colony of birth) and that many Black-legged Kittiwakes feed relatively close to their breeding colony. As in other Black-legged Kittiwake populations, a small proportion appears to emigrate to colonies several hundred km away. The two W Greenland birds recovered on the E coast (4Y AMM mid May and 3Y ITT mid Aug) could have been long distance emigrants. Table 82 presents recovery distances of different age-classes of W Greenland birds reported during Jun-Jul, illustrating that 1-2Y birds are recovered farther away from their colony of birth than older birds. Apparently, many 1Y birds do not return to Greenland at all (Fig. 21), and those that do mostly stay south of their natal colony – a typical pattern for young Black-legged Kittiwakes (cf. Baird 1994, Barrett & Bakken 1996, Nikolaeva et al. 1997, Cramp 1998).

Ad. Kittiwakes leave W Greenland coastal waters from late Jul through Aug (Fig. 19); a few may linger on until Nov and occasionally into Jan. Apparently, most ads become pelagic shortly after leaving the colony: The median recovery distance of 39 4Y+ birds recovered in Greenland during Aug-Nov is only 77 km. When returning to the breeding area in spring, the ad. Black-legged Kittiwakes seem to move directly from offshore areas to the colonies; the median recovery distance of 18 4Y+ birds reported in W Greenland during Apr being 37 km. During winter, only two 4Y+ birds have been recovered abroad – both wind-driven birds found in W Europe in late winter 1957. Young Black-legged Kittiwakes, especially 1C birds, leave Greenland during Sep-Oct, a few remain until Nov. After some postfledging dispersal in Aug, many 1C birds move south along the W coast. The median recovery distance within W Greenland is 80 km in Sep (n = 26) rising to 503 km in Oct (n = 30). In mid-late Oct, 1C birds from UPV and UMA have been recovered as far south as NUU and QAT. By the same time 1C birds have reached Labrador and in early Nov the first apparently reach Newfoundland. Many young birds appear to remain off Newfoundland during at least the first part of the winter (8 recoveries during Nov-Jan). Others move farther out in the North Atlantic, as suggested by the recoveries of 1W birds in the Netherlands 23 Nov and in France 2 Feb; a 2W bird was also recovered in France (12 Feb 1957). Comparatively few 2C birds return to Greenland (Fig. 21) and three Apr-May recoveries from Newfoundland suggest that many remain in areas south of Greenland during their first summer, probably staying in the Newfoundland-Labrador-southern Davis Strait area. The recoveries only provide limited information on the wintering areas of the Greenland population. Generally, the migratory system of the Greenland Black-legged Kittiwakes resembles that of the Northern Fulmar (which see), and the two species probably winter in essentially the same areas, i.e. in the North Atlantic somewhere between 65-40ºN. For both species the waters off Nova Scotia, Newfoundland and Labrador are important areas, especially for imm. birds (cf. Huettmann & Diamond 2000).

Numbers of mainly imm. Black-legged Kittiwakes from the entire European breeding range

Kittiwakes, Hakluyt Island, Qaanaq, NW Greenland. Photo: K. Falk.

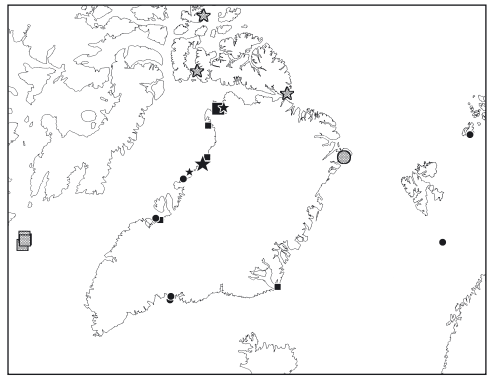
enter Greenland waters during summer and early autumn (Table 78, Fig. 19 and Map 56). At least two million pairs breed in this area (Lloyd et al. 1991, Barrett & Bakken 1996, Petersen 1998), suggesting a winter population of some 6-8 million birds. Recovery data suggests that many ads remain in the eastern parts of the North Atlantic, while many younger birds (1-2C) move to the western parts, i.e. Greenland and Canada (Barrett & Bakken 1996, Nikolaeva et al. 1997, Cramp 1998, this material). Though the actual number reaching Greenland is unknown and probably fluctuates from year to year, it is likely to comprise at least some hundred thousand birds. Apparently, only few Canadian birds move to Greenland. The different age-classes of European Black-legged Kittiwakes arrive sequentially in Greenland: 2C birds in May-Jun, 3C birds in Jun-Jul, ad. and 1C birds in late Jul-Aug. Most of the birds have departed by the end of Oct, but a few may linger on throughout the winter. Within Greenland, European Black-legged Kittiwakes occur on the E coast and on the W coast north to UMA but the majority have been recovered on the SW coast north to MAN. On the W coast, 1C birds are almost exclusively found south of MAN (92% of the recoveries) while 2C birds are much more evenly distributed. Older birds (3C+) are also mainly recovered south of MAN. Though substantial overlap occurs, Black-legged Kittiwakes from the northern part of the European breeding range (N Norway, Svalbard, Russia) generally move farther north along the W coast than birds from the central and southern part of the breeding range do. This tendency for segregation of different populations also exists among birds recovered outside Greenland (Barrett & Bakken 1996, Cramp 1998).

Ivory Gull *Pagophila eburnea*

RECOVERIES

61 GRC of 55 birds, 29 FRC (Map 57).

North Greenland: A total of 231 2C+ Ivory Gulls was ringed in early Jun – early Aug 1963-1967 at Station Nord (81º36'N 16º40'W). Apart from 3 birds recovered shortly after ringing, 46 were subsequently controlled or recovered in the same place 1-12 years later. One of these, a bird ringed in 1966, was controlled here in 1967 and in Jul 1980 at Kilen (40 km E). Four birds were recovered elsewhere in Greenland: One was shot 14 May fifteen year later in southern UPV (1385 km WSW), 1 was shot 10 May three years later in QEQ (1685 km WSW) and 2 were shot in Dec 11-12 years later at Isortoq (ITT; 1900 km SSW). Two



Map 57. Recoveries of Ivory Gulls ringed in Greenland (circles; n = 6) and abroad (Canada (stars, n = 17), Labrador Sea (squares, n = 10)). Shaded symbols denote ringing sites.

Kort 57. Genfund af Ismåger ringmærket i Grønland (cirkler) og i udlandet (Canada (stjerner), Labradorhavet (firkanter)). Gråtonede symboler angiver mærkningssteder.

birds were recovered abroad: One was caught 28 Apr nine years later on Bear Island (1120 km SE) and 1 was found recently dead on Zemlja Aleksandry, Franz Josef Land (1040 km E), in Jul three years later.

Foreign recoveries: Ten ad. birds ringed early Apr 1964 and 1966 in the Labrador Sea were recovered in Greenland: Seven were shot in AVA (c. 1900 km N) in Jun-Sep 2-17 years later, 1 was shot 6 Jun 16 years later near Kullorsuaq (UPV; 1600 km N), 1 was shot 10 Jun one year later off Ilimanaq/Claushavn (ILU; 1100 km NNE) and 1 was shot mid Jun one year later at Uunarteq/Kap Tobin (ITT; 2100 km ENE). Nineteen birds ringed early Jun – early Aug 1971-83 at Seymour and Ellesmere Island in the NE Canadian Arctic were recovered in Greenland as follows: Six birds ringed as chicks on Seymour Island were recovered early May – late Aug in UPV (c. 1200 km ESE; May 2, Jun 1, Jul 1, Aug 1, "summer" 1) 1-19 years later, while 3 Seymour-birds ringed as ads were recovered in AVA (c. 840 km E) during "summer" three or more years later. Two ad. birds ringed on NE Ellesmere were shot near Kullorsuaq (UPV; 890 km S) in early Jun 5-7 years later. Eight ad. birds ringed in southern Ellesmere were shot late May – late Oct in the northern parts of UPV (7; May 1, Jun 3, Jul 1, Sep 1, Oct 1; c. 750 km ESE) 78 days – 10 years later and in AVA (1; 370 km ENE) in early Nov 130 days later.

MOVEMENTS

The Ivory Gull breeds from high-arctic Canada

eastward to arctic Russia at about 140ºE (Haney & Macdonald 1995). In Greenland, it mostly breeds in scattered colonies from Washington Land east to Kronprins Christian Land (NOR), i.e. north of 80ºN. Undiscovered colonies may well exist further south in NOR, but the only certain record of breeding Ivory Gulls in this area dates back to 1908 (Boertmann 1994). Three colonies are known inland on nunataqs in SE Greenland between 66º and 68ºN (Wright & Matthews 1980) and breeding has occasionally taken place or been suspected in NE Greenland. No information is available on the size of the Greenland population; the world population has tentatively been estimated at 15 000 – 30 000 pairs (Haney & Macdonald 1995). The Greenland breeders arrive at their colonies in early Jun and depart in Aug (Salomonsen 1967). Outside the breeding areas, Ivory Gulls are regularly seen during summer in northern UPV, AVA, NEA and in the northern parts of SE Greenland. During winter, Ivory Gulls are mainly reported as irregular or rare visitors to harbours on the SW Greenland coast (Boertmann 1994). In spring (May), considerable numbers have been recorded in drift-ice west of Disko (R.M. Kristensen pers. comm.) and low numbers occur regularly in UPV (own data).

Little is known about the migratory movements of the Ivory Gull. Haney & MacDonald (1995) summarized the movements as follows: after the breeding season the birds perform an immediate movement from the colonies and coastal zone to offshore foraging areas. Later, birds from different populations migrate east or west and subsequently southwards; the Canadian populations generally move eastward into Baffin Bay and later southward to the Davis Strait. Some birds from the Russian populations move east to winter in the Bering Sea, others west and south into the Barents and Greenland Sea, either wintering here along the ice edge or moving as far as the Davis Strait.

On two days in early Sep 1975, Hjort (1976) witnessed a large-scale migration of Ivory Gulls at 74º30'–75º30'N 12º30'W off Daneborg in E Greenland. At least 500, probably 1000-1500 birds, were moving south in a 200 km wide band of pack ice. The destination and origin of these birds are unknown, but considering the rather high number, it is possible that both Greenland and European populations were involved. Apparently, some Ivory Gulls from eastern North Greenland winter in the Greenland Sea (cf. the two Dec recoveries at Isortoq and the Apr recovery at Bear Island), others in the Labrador Sea/Davis Strait (cf. the two May recoveries in QEQ and UPV in W Greenland and the recovery of a bird ringed in the Labrador Sea and shot mid Jun in ITT).

Some 35 000 Ivory Gulls are estimated to winter along the 2000 km ice edge extending from the Labrador Sea to the Davis Strait between Greenland and Canada (Orr & Parsons 1982); the highest densities being found near seal whelping grounds. This large number further suggests that birds from both the Canadian Arctic and eastern N Greenland as well as the European Arctic congregate in the Davis Strait, as is also supported by a recovery of a bird ringed at Franz Josef Land (Russia) and recovered in Labrador in early Mar (Dementev & Gladkov 1969). The recovery of a Station Nord Ivory Gull on Franz Josef Land in Jul also shows a connection between these populations.

Perhaps the Ivory Gulls from eastern N Greenland wintering in the Labrador Sea/Davis Strait reach their breeding areas by moving north and later east via Baffin Bay (cf. the May recoveries in QEQ and UPV), either along the N Greenland coast or across the inland-ice. If so, the Ivory Gull is the only species circumnavigating Greenland during its annual migration.

Arctic Tern *Sterna paradisaea*

RECOVERIES

523 GRC of birds ringed in Jun-Aug 1938-1987, the majority in 1946-75 (Table 83, Map 58), 1 FRC. Of 431 chicks ringed and recovered in Greenland, 232 (54%) were in their first calendar-year (1C), 23 in their second (2C), 25 in their third (3C) and 151 were older (4C+) when recovered. Nineteen were more than 17 years old, the oldest 28 years. Arctic Terns were recovered in Greenland 28 May – 30 Sep, with the majority (80%) during 22 Jun – 5 Sep.

Avanersuaq: A chick ringed 18 Aug 1948 at Siorapaluk was shot 1 Aug 1967 at Qeqertarsuaq/Herbert Ø, 40 km to the south.

Upernavik: A total of 156 birds was recovered within UPV in the period 6 Jun – 26 Sep 0-264 (mean 18) km from the ringing site 0-21 years later. Five birds ringed as chicks were recovered elsewhere in Greenland: Two less than 50 days after ringing, in QEQ 14 Sep (295 km S) and in UMA 20 Sep (230 km SE), 1 in ASI (no other finding data) and 2 in UMA 14 Jun and 3 Jul four and two years after ringing, respectively. Thirteen birds ringed 1964-77 were recovered abroad: Eleven birds ringed as chicks were recovered in their first autumn/winter in Great Britain (29 Sep), France (2; 9 Oct and 1 Nov), Morocco (17 Oct), Senegal

Table 83. Ringing details of recovered Arctic Terns, broken down according to age and ringing district. Four recoveries from W Greenland with insufficient ringing data are excluded.
Ringmærkningsdata for genfund af Havterne, opdelt efter mærkningsalder og -distrikt. Fire genfund uden mærkningsdata er udeladt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	1			1	
UPV	167		7	174	13
UMA	147		27	174	7
QEQ	5	1	3	9	2
ILU	8			8	
ASI	117	9	20	146	6
KAN			3	3	
MAN	1			1	
ITT	1			1	
NEA	2			2	1
Total	449	10	60	519	29

(letter dated Mar, but probably recovered in autumn), Ghana (15 Oct), in Congo (2; 13-15 Nov) and South Africa (3; 26 Dec – 20 Jan). Another 2 birds were recovered when about three years old: One was caught in W Nigeria 20 Sep three years later, while another was found dying sometime in spring (date of letter 4 May) near Macaúbas (9500 km S, 3 years later) in the Brazilian highland, more than 400 km from the coast.

Uummannaq: A total of 128 birds was recovered within UMA in the period 28 May – 30 Sep 0-143 (mean 15) km from the ringing site 0-25 years later. Fourteen birds were recovered elsewhere in Greenland. Two of these have no finding data, 8 were recovered late Jun – early Aug in UPV (100-180 km N) 1-16 years later, 2 were shot Aug-Sep in ASI (c. 290 km S) 26 days – 4 years later, 1 was shot in KAN in autumn four years later and a six year old bird was controlled breeding at Mestersvig (NEA; 1040 km E) 5 Aug 1974. Seven birds ringed as chicks in 1962-69 were recovered abroad: Four were recovered in their first autumn/winter in Great Britain (15 Sep), Spain (1 Oct), Ghana (30 Nov) and eastern South Africa (6 Jan). A bird in its second autumn was found recently dead near Cape Town, South Africa 15 Nov, and a bird was recovered off the coast of Namibia 15 Jan five years after ringing. Additionally, a bird with unknown ringing date was recovered in Sierra Leone (24 Sep).

Qeqertarsuaq: Nine birds ringed 1947-63 were recovered mid Jul – late Aug 31 days – 24 years later 0-115 km from the ringing site. Two birds were recovered abroad: a 1C in southeastern Great Britain (20 Oct), and a 11C shot near Bogota, Colombia some 400 km from the Pacific coast in "spring" (probably recovered a few weeks before the date of the letter (16 Jun), rather late for an ad. bird).

Ilulissat: Eight birds ringed as chicks in 1947-49 were recovered in early Jul – early Sep 35 days – 19 years later 0-30 km from the ringing site.

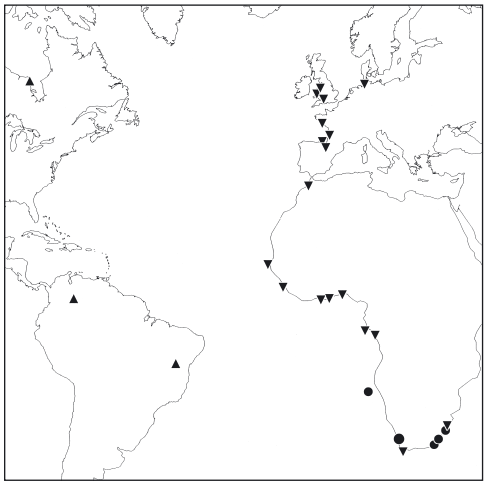
Aasiaat: A total of 128 birds was recovered within ASI in the period 1 Jun – 18 Sep 0-112 (mean 15) km from the ringing site 0-21 years later. Ten birds (9 ringed as chicks, 1 unaged) were recovered in other districts in late Jun – mid Aug 22 days – 19 years later: Seven were recovered in the neighbouring districts, less than 90 km from the ringing site, 1 was shot in UMA (200 km N) 16 days later, 1 in UPV (390 km NNW) 13 days later and 1 in PAA (700 km S) one year later. Six birds ringed as chicks in 1949-80 were recovered abroad: Five were recovered in their first autumn/winter, in the German Wadden Sea (6 Oct), France (13 Oct), Spain (possibly Sep), Senegal (25 Sep) and eastern South Africa (30 Oct; 13 100 km in 114 days), and a 2C was shot in James Bay, Canada, 4 Jul 1948.

Kangaatsiaq: Three birds of unknown age ringed Jul-Aug were recovered in Aug-Sep 5-13 years later 20-90 km from the ringing site.

Maniitsoq: A chick-ringed bird was shot locally in Jun two years later.

Ittoqqortoormiit: A chick ringed on Fame Ø in Aug was controlled breeding in the same place five years later.

Northeast Greenland: A chick ringed at Mestersvig in Aug was found dead nearby a month later, while a chick ringed at Danmarkshavn in Jul was



Map 58. Arctic Terns ringed in Greenland and recovered abroad (n = 27). Triangles pointing downwards denote recoveries in Sep-Nov, circles recoveries in Dec-Jan, and triangles pointing upwards recoveries in May-Jul.
Kort 58. Havterner ringmærket i Grønland og genfundet i udlandet. Nedadvendte trekanter angiver fund i sep-nov, cirkler fund i dec-jan, opadvendte trekanter fund i maj-jun.

Table 84. Recovery distance of different age-classes of Arctic Terns recovered in Greenland during 20 Jun - 10 Aug.
Genfundsafstand hos forskellige aldersgrupper af Havterner genmeldt i Grønland i perioden 20. jun - 10. aug.

km	1Y	2Y	3Y	4Y+
0-50	6	11	13	35
50-100	1		1	7
100-200	2	2	2	4
>200	2	3		5
Total	11	16	16	51

killed at Pointe Noire, Congo, in Oct or Nov the same year.

Foreign recoveries: A chick ringed Jul 1960 at Kandalaksha, Murmansk, Russia was shot 29 Jul 1962 near Killiit/Vester Ejland in ASI (3527 km W).

MOVEMENTS

The Arctic Tern is a widespread breeder in most parts of Greenland, the highest densities occurring in NUU, Disko Bay, UMA and UPV. In the remaining parts of the country Arctic Terns are more localised and generally breed in lower numbers (Boertmann 1994); the breeding population on the W coast has been estimated at 30 000 – 60 000 individuals (Boertmann et al. 1996). The northernmost breeding sites have been found on Kap Morris Jesup/Constable Bugt at about 83º39'N (Salomonsen 1967c, K. de Korte in litt.). Generally, the breeding population arrive in late May – early Jun and depart during Aug-Sep (Boertmann 1994; earliest recovery of 5C+ birds 1 Jun, latest 12 Sep; earliest 2C bird 10 Jun).

From pole to pole: A Greenland Arctic Tern on the wings. Photo: K. Falk.

Arctic Terns initiate breeding when about four years old (Cramp 1998). Of 51 5C+ birds recovered in Greenland during 20 Jun – 10 Aug, 35 (69%) were found less than 50 km from the ringing site (Table 84) and only two (4%) more than 200 km away. One of the latter was ringed in UMA and controlled as a breeder in NE Greenland six years later. These recoveries suggest that though some Greenland Arctic Terns may emigrate considerable distances, most show a high degree of fidelity to their general natal area. Interestingly, the spatial distribution of imm. Arctic Terns recovered in Greenland does not differ from that of older birds (2-3C versus 4C+; $\chi_1^2 = 0.334$, P = 0.56). In other words, many imm. Greenland birds return to their general natal area during summer, though some may wander widely (cf. the recoveries of a 2C bird in Canada and a 3C Russian bird in Greenland) and others probably remain in rich feeding areas nearer the wintering area (especially 2C birds).

Wintering in the Antarctic, Arctic Terns perform the most spectacular migration of any Greenland bird; their annual journeys may exceed 40 000 km. After fledging, juv. Arctic Terns typically disperse from their colony, following their parents for at least 1-2 months after fledging (Cramp 1998). In Greenland, this postfledging dispersal involves both northward and southward movements: 26 young birds recovered more than 20 km from their colony in Aug-Sep were on average

found 92 km away. Twelve were recovered south (22-293 km) and 14 north (25-390 km) of the colony. These pre-migratory movements seem to last up to a month. Apparently, the Arctic Terns build up fat reserves for the first part of the autumn migration during this stage. Among 50 ad. birds shot in Disko Bay 14-22 Aug 1949, 38% had no fat deposits, 58% were fat and 4% exceedingly fat (Salomonsen 1950b).

After the postfledging dispersal, the Arctic Terns leave coastal Greenland. Judging from 21 recoveries of young birds reported during autumn-winter from abroad (Map 58) and the lack of long-distance recoveries within Greenland, the autumn migration is initiated by a rapid, mainly offshore movement southward along the Greenland coast. The birds then move southeast towards the European and African coasts. At least for W Greenland birds, this movement probably takes place along a wide corridor. The first young terns seem to reach NW Europe during early Sep. In Oct, the first birds have reached southern South Africa (30ºS; suggesting a rapid journey) while others still linger on in NW Europe (5 of 8 Oct-recoveries are from Europe). By Nov, most of the birds appear to have left Europe and crossed the Equator. Of five recoveries from this month, one is from France (1 Nov) and four from Africa at 4-5ºS. Four young birds have been recovered in Dec-Jan (the latest 20 Jan), all in South Africa south of 29ºS; three of the recoveries are from the coast east of Cape Agulhas (i.e. in the Indian Ocean). Only three older birds have been recovered during autumn/early winter: A 2C bird 15 Nov in South Africa, a 4C bird 20 Sep in Nigeria and a 6C bird 15 Jan off SW Africa (20ºS, probably wintering here). These recoveries suggest that the autumn migration of older birds roughly follow the same route as 1C birds at least as far as South Africa, though older birds probably migrate further offshore than young birds. Alerstam (1985) suggested that the autumn migration could be carried out in a few long distance flights between rich feeding areas, i.e. Greenland – NW Europe – W Africa – Equatorial Africa – S Africa – the Antarctic. If so, each leg of the journey would consist of flights of 3-4000 km.

No Greenland terns have been recovered during late winter and only three during spring migration (two ads inland in northern South America and a 2C bird in eastern Canada), providing little information on the remaining stages of the annual migration. The majority of the world population of Arctic Terns winter in the Antarctic, though a few may remain farther north (Salomonsen 1967c, Cramp 1998, Underhill et al. 1999). Although to some degree speculative, Salomonsen (1967c) and Alerstam (1985; see also Gudmundsson et al. 1992 and Bourne & Casement 1996) described the winter movement of Arctic Terns as follows: After leaving South Africa, the terns are drifted east by the strong westerlies in this area (the "Roaring Forties" and the "Shrieking Fifties"), reaching the Antarctic pack-ice belt somewhere between 30-110ºE. This movement is completed before the moult of the remiges, which ads initiate in late Dec, 1W birds about a month later. During Oct-Mar concentrations of Arctic Terns have been found in the eastern Antarctic and in the Amundsen, Ross and Weddell Seas. In Mar, the pack-ice is reduced to its minimum size and the ice-edge is now within the continental zone of easterly winds. Many terns (perhaps mainly ads) then move westward to the Weddell Sea area from where they start their northward spring migration. Others (perhaps mainly young birds) may circumnavigate the Antarctic continent. In early Mar 1989, Gudmundsson et al. (1992) recorded intensive movements of Arctic Terns crossing the Antarctic Peninsula from Bellingshausen Sea to Weddell Sea. It is, however, not known whether this migration route is of regional importance only or if it is a part of a regular circumpolar Antarctic migration.

Little is known about the routes taken during spring migration. Most Arctic Terns seem to depart from the Antarctic in Mar – early Apr. Assisted by the westerly winds off the Antarctic continent, many terns perhaps move northeast and north, roughly retracing the autumn migration route. If so, most of the spring migration seems to take place farther offshore than the autumn migration as few Arctic Terns have been recovered along the African coast in spring. In fact, northward migrating birds occur regularly in April in the mid Atlantic between Africa and South America (Kampp 2001), suggesting movements over a wide front. Others, e.g. some of the birds circumnavigating the Antarctic, may follow a Pacific offshore route off South America's W coast. The Greenland bird recovered in Colombia might suggest that some Greenland birds follow such a route and at some point cross South America on a high-altitude overland flight to the Atlantic – Arctic Terns are known to perform high-altitude overland crossings (Alerstam 1985). Even less is known about the final stages of the spring migration of the Greenland Arctic Terns. Alerstam et al. (1986) suggested that Arctic Terns breeding in NW and W Greenland used the Irish Sea as a spring staging site, moving

from there via Iceland and across the inland ice to Disko Bay. This route has, however, not been confirmed – there is still much to be learned about the impressive migration system of the Arctic Tern.

Common Guillemot *Uria aalge*

RECOVERIES

21 GRC, 3 FRC.

Qaqortoq: Twenty-one birds ringed Jul-Aug 1985-99 on Kitsissut Avalliit/Ydre Kitsissut were subsequently recovered or controlled. Ten birds ringed as ads were controlled locally in Aug 1992 (9) and 1999 (1), while 11 birds were reported as shot elsewhere. Of these, 2 birds ringed as chicks were shot in NUU (420 km NNW) in Oct 15 years later and in "winter" 10 years later, while 2 were shot in SIS in Sep and Nov the same year (730 km NNW). Seven birds ringed as ads were recovered as follows: Two were shot in PAA (c. 150 km NNW) in Nov 7-9 years later, 3 in NUU (c. 380 km NNW) in Oct-Nov 5-15 years later and 2 in MAN (c. 600 km NNW) in autumn or winter 5-8 years later.

Foreign recoveries: A bird possibly of this species and ringed as a chick on Funk Island, Newfoundland in Jul 1956 (ring partly illegible) was shot Sep 1962 in QEQ (2200 km N). Two birds (1 ad., 1 chick) ringed in colonies in the Barents Sea, Russia, were shot in QAT (c. 4000 km SW) in Oct and Feb 1-10 years later.

MOVEMENTS

Common Guillemots breed among Brünnich's Guillemots in 4-5 colonies from QAT northwards to Disko Bay (Boertmann et al. 1996). The only large colony is situated at Kitsissut Avalliit/Ydre Kitsissut in QAT where about 630 pairs bred in 1992 (Kampp & Falk 1994); the entire Greenland population hardly exceeded 3000 individuals in the early 1990s. The recoveries suggest that the Greenland birds winter in the Open Water Region, plausibly mainly between NUU and SIS. Whether some also winter off the Canadian coast (cf. Brünnich's Guillemot) or off Iceland is unknown. Apparently only few if any birds from other populations winter in Greenland. The two Russian birds could have been wrongly identified when ringed; birds of W Palearctic origin winter from off Iceland eastwards to the E Atlantic coasts and no others have been recovered in Greenland or Canada, despite large numbers being ringed (Brown 1985, Nikolaeva et al. 1996, Petersen 1998). Canadian populations winter off Newfoundland, Nova Scotia and New England (Brown 1985, Gaston & Jones 1998).

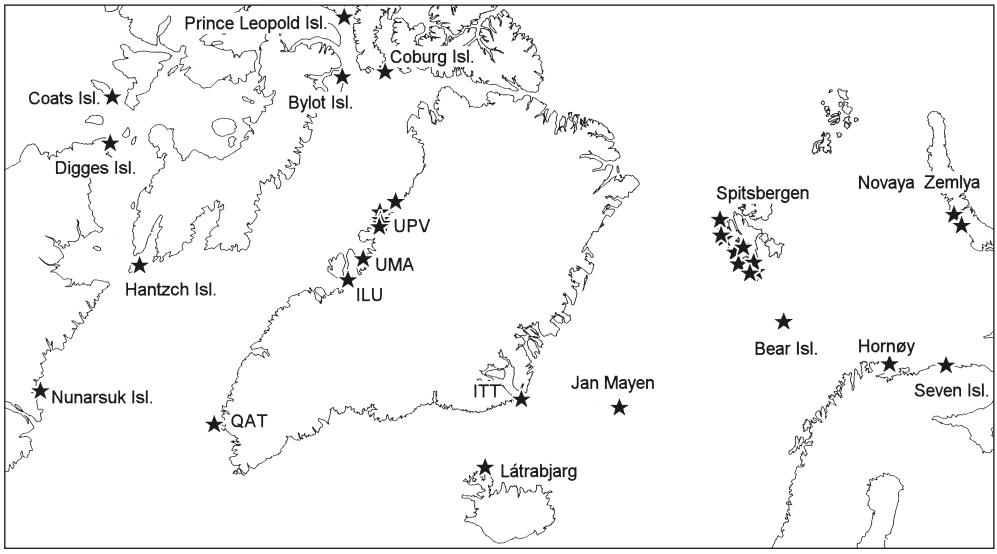
Brünnich's Guillemots, Kippaku, Upernavik, W Greenland. Photo: P. Lyngs.

Brünnich's Guillemot *Uria lomvia*

RECOVERIES

3142 GRC of birds ringed in 1926-1992 (Table 85, Map 59), 543 FRC of birds ringed in 1938-1999 (Table 86, Map 59). Generally, no differences in the recovery patterns during winter of birds ringed in UPV, UMA and ILU could be found (Table 87-89). The vast majority of all recoveries concern birds reported as shot (Table 90); most of the recoveries labelled "unknown" were undoubtedly also shot. All birds reported as drowned in fishing nets were among the large bycatch of guillemots taken by the autumn salmon fishery in the Davis Strait during the 1960s and 1970s (see Tull et al. 1972, Christensen & Lear 1977, Kampp 1988 and Falk & Durinck 1991 for details). Recoveries labelled "other" include 17 birds controlled in a colony. Of 1964 chicks ringed and recovered in Greenland, 404 (21%) were in their first calendar-year (1C), 199 in their second (2C), 255 in their third (3C) and 1106 were older (4C+) when recovered (Fig. 22). Thirty-one of the latter were more than 15 years old, the oldest 24 years.

Avanersuaq: Very few birds have been ringed in AVA; 69 ads in 1987 and 56 ads plus 31 chicks in



Map 59. Ringing sites (stars) of Brünnich's Guillemots recovered in Greenland.
Kort 59. Ringmærkningslokaliteter for Polarlomvier genfundet i Grønland.

1996-1998. Of these, 2 chicks ringed in 1998 have been recovered, both off Newfoundland: One was shot in Jan 1999, the other in Nov 1999.

Upernavik: More than 30000 Brünnich's Guillemots have been ringed in UPV, resulting in 2200 recoveries. About half of these (1160) were due to birds ringed on Kippaku and Apparsuit in northern UPV, the remaining to birds ringed in six colonies near Upernavik town, approx. 120 km to the south. As no significant differences in the winter movements of birds from these two areas were found (Kampp 1988, see also Donaldson et al. 1997), the recoveries have been combined.

A total of 1246 birds (57%) was recovered in UPV in late Apr – late Oct 5 days – 22 years after ringing; the few birds reported in Nov-Jan were presumably wrongly dated. Sixty birds were reported in the same year as ringed, 28 of these in Oct 1967. Most birds arrive in May and leave in Aug-Sep (Fig. 23, Table 91-94). Immature birds (1-3S) returning to UPV arrive later than ad. birds, but apart from that, the temporal differences between these age-classes are small. However, not all imms return to UPV. The proportion of 1-3S birds recovered outside UPV during the breeding season (15 Jun – 31 Jul; Table 91) is significantly higher than that of ads (Fisher's exact test, $P < 0.0001$), and there is no difference in the spatial distribution of younger age-classes (1-3S; $\chi_2^2 = 4.51$, $P = 0.10$). The majority (72%) of the imm. birds returning to UPV were recovered in their general natal area (Table 91); the true proportion is likely to be higher, partly due to late-arriving northward migrating birds being shot en route in southern UPV, partly due to the arbitrary border chosen to subdivide UPV. This segregation of northern and southern UPV birds is even more pronounced between older birds (including birds ringed as ads; Table 91, Map 60).

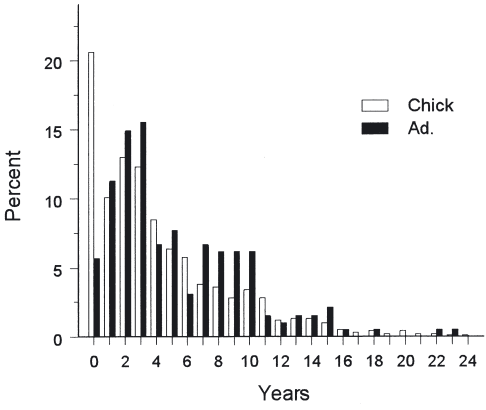


Fig. 22. Elapsed time (years) between ringing and recovery of Brünnich's Guillemots ringed as chicks (n = 1964) or adults (n = 194) in UPV and recovered in Greenland.
Forløben tid i år mellem ringmærkning og genfund hos Polarlomvier fra UPV mærket som unger eller som adulte og genmeldt i Grønland.

Of the remaining 954 recoveries of UPV birds, 590 were found elsewhere in Greenland and 364

Table 85. Ringing details of recovered Brünnich's Guillemots, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Polarlomvie, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	2			2	2
UPV	1819	184	197	2200	364
UMA	315	1	227	543	24
ILU	251	25	95	371	34
QAT	2	19		21	2
ITT	5			5	1
Total	2394	229	519	3142	427

Table 86. Brünnich's Guillemot: origin and age of ringing for birds ringed abroad and recovered in Greenland.
Oprindelse og alder ved ringmærkning af Polarlomvier ringmærket i udlandet og genfundet i Grønland.

	Ringed as			
Ringed	Chick	Older	Unknown	Total
Iceland		10		10
Jan Mayen	1			1
Spitsbergen	158	27	1	186
Bear Isl.	19	5		24
Seven Isl.	12	6		18
Novaja Zemlja	4	2		6
Norway		1		1
Labrador			1	1
Hudson Strait*	51	5		57
NW Baffin Bay**	94	144	2	239
Total	339	200	4	543

* Coats, Digges and Hantsch Island
** Coburg, Bylot and Prince Leopold Island

Table 87. Spatial distribution of recoveries of 1W and 3W+ Brünnich's Guillemots ringed in selected areas of W Greenland and recovered during Oct-Mar in Canada and Greenland. 1W: χ_2^2 = 3.62, P= 0.16, 3W+: χ_2^2 = 5.91, P= 0.05.
Geografisk fordeling af genfund af Polarlomvie ringmærket i udvalgte områder af V Grønland og genfundet som 1W og 3W+ fugle i okt-mar i Canada og Grønland.

	1W		3W+	
Ringed	Greenland	Canada	Greenland	Canada
UPV	295	189	46	68
UMA	8	5	4	3
ILU	12	16	12	5

abroad (363 in Canada; a bird ringed as a chick reported from the Faeroes in Dec thirteen years later may actually have been transported from Greenland on a fishing boat) – more than half (541) in their first year of life. The earliest 1C birds were found in Disko Bay in mid Sep, in SIS and Newfoundland early Oct, in MAN mid Oct, in NUU mid Nov and in QAT late Nov. In Oct, numbers of young birds were recovered from UPV in the north to MAN in the south, while in Nov the majority were recovered in ASI-MAN and Newfoundland (Table 92). Almost all Dec-Mar recoveries are from SIS-QAT, Newfoundland and Nova Scotia. After Apr most recoveries are from W Greenland north of KAN, but some 1S birds apparently remain in Newfoundland waters. The recovery patterns of 2Y birds (Table 93, Fig. 23) are somewhat intermediate between those of 1Y birds (Table 92) and older birds (Table 94), but most similar to that of older birds. During winter

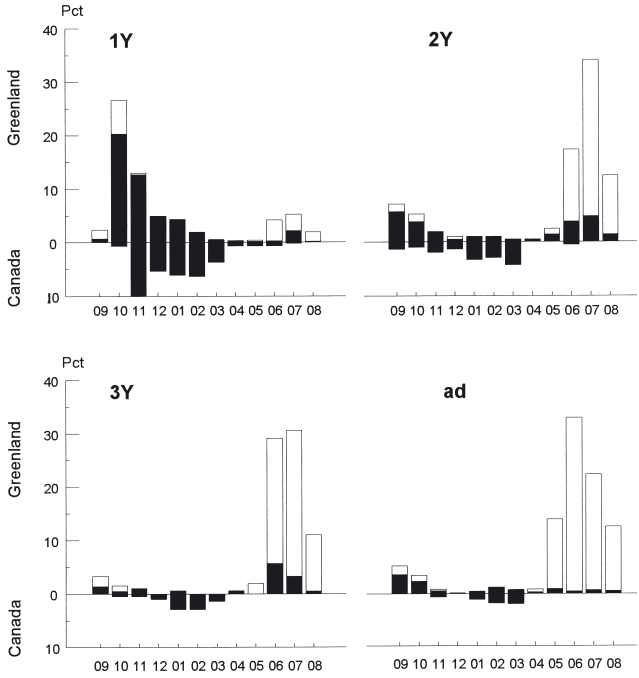


Fig. 23. Monthly distribution of Brünnich's Guillemots ringed in UPV and recovered as 1Y (n = 575), 2Y (n = 209), 3Y (n = 191) or older (n = 741; birds ringed as ad. included). The vertical axis shows percentages within each age-class, with recoveries in Greenland above the axis and in Canada below. Filled bars show all recoveries outside UPV (redrawn after Kampp 1988).
Månedsvis fordeling af Polarlomvier ringmærket i UPV og genmeldt som 1Y, 2Y, 3Y eller ældre (fugle mærket som adulte inkluderet). Den vertikale akse viser procentfordelingen inden for hver aldersgruppe, med genmeldinger i Grønland opad og genmeldinger i Canada nedad. Fyldte søjler viser alle genfund uden for UPV (omtegnet efter Kampp 1988).

the majority of this age-class was recovered in MAN-QAT and in Newfoundland. Relatively, a higher number of older birds (3Y+ and ad.-ringed combined) were recovered in Sep and fewer in Nov compared with 1Y birds (χ_2^2 = 115.2, P < 0.0001; recoveries in UPV excluded). During winter, older birds were primarily recovered in Newfoundland and in SIS-NUU, but the Dec-Mar distribution within Greenland does not differ significantly from that of 1W birds (Fisher's exact test, P = 0.058). In Newfoundland, the number of recoveries in Jan-Mar is higher than in Oct-Dec, differing signficantly from the temporal distribution of 1W birds (Fisher's exact test, P = 0.0002).

Uummannaq: During 1926-1970 more than 5000 Brünnich's Guillemots were ringed at the now extirpated colony of Salleq, resulting in 543 recoveries. A total of 480 birds (88%) was recovered in UMA in late Apr – early Oct 0 days – 17 years after ringing; the few birds (5) reported in Nov-Feb were presumably wrongly dated. Approximately 30% (161) of the local recoveries were reported shortly after ringing, a much higher proportion than in UPV and ILU combined (χ_1^2 = 272.8, P < 0.0001). Of the 319 birds recovered in UMA one or more years later, 195 were ringed as chicks, 124 were unaged. As in UPV, older birds (4Y+) returned earlier than imm. birds (1-3Y; Table 95). Thirty-nine birds were recovered in other parts of Greenland and 24 in Canada. Twelve 1W birds were recovered in UPV (Sep), ASI (Sep), SIS (Oct), QAT (2; Dec) and Newfoundland (7; Nov-Apr), respectively. During winter, all age-classes were primarily recovered in SIS-QAT and in Newfoundland (Table 96). All 5 birds recovered in UPV in May-Jul were 2-5 years old.

Ilulissat: About 2500 birds ringed in 1946-1963 and 300 ads ringed in 1984 at Innaq/Ritenbenk have produced a total of 371 recoveries. Three birds were reported shortly after ringing. During summer, most birds were recovered in Disko Bay and UMA-UPV (Table 97). Older birds (4Y+) returned earlier to the general breeding area in Disko Bay than imm. birds (1-3Y; Table 98). Thirty birds out of 35 recovered in UMA-UPV during May-Jul were less than six years old. During winter most of the recoveries are from ASI-MAN and Newfoundland (Table 97). Twelve ad. birds (4Y+ and ad.-ringed combined) were recovered in western Greenland south to MAN (5) and in Newfoundland (6). Twenty-seven 1W birds were recovered in UMA (2; Sep), SIS (5; Oct-Dec), MAN (Nov), QAT (Dec), Quebec (Dec), Newfoundland (16; Nov-May) and Labrador (Apr).

Qaqortoq: Of 504 ads and 51 chicks ringed on Kitsissut Avalliit/Ydre Kitsissut in 1985 and 1992, twenty-one were subsequently recovered or controlled: Six ads were controlled in the colony 7-14

Table 88. Temporal distribution of recoveries of 1W and 3W+ Brünnich's Guillemots ringed in selected areas of W Greenland and recovered during Oct-Mar. 1W: $\chi_2^2 = 1.97$, P= 0.38, 3W+: $\chi_2^2 = 0.06$, P= 0.97 (Oct-Dec vs Jan-Mar).
Tidsmæssig fordeling af genfund af Polarlomvie ringmærket i udvalgte områder af V Grønland og genfundet som 1W og 3W+ fugle i okt-mar.

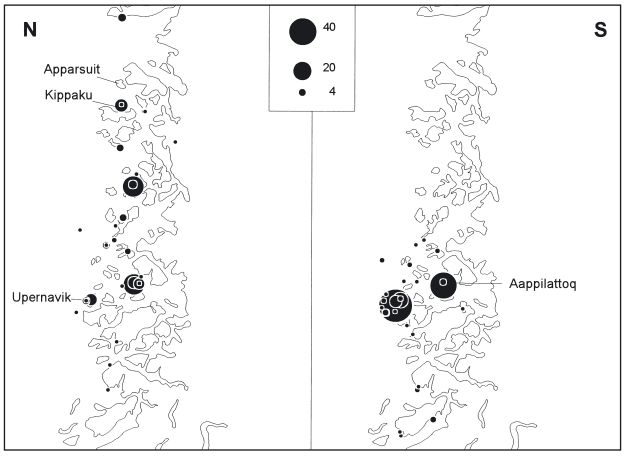
		Month of recovery					
Age	Ringed	Oct	Nov	Dec	Jan	Feb	Mar
	UPV	157	133	59	60	47	24
1W	UMA	5	2	2	1	1	2
	ILU	4	6	7	5	5	1
	UPV	38	15	5	19	30	24
3W+	UMA	2	1	0	0	1	3
	ILU	3	3	2	4	1	4

Table 89. Temporal and spatial distribution of Brünnich's Guillemots ringed in UPV, UMA and ILU combined and recovered in W Greenland during Sep-Mar.
Tidsmæssig og geografisk fordeling af Polarlomvier ringmærket i UPV, UMA samt ILU og genmeldt i V Grønland i sep-mar.

Area	Age	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
QAT	1W			2	7	7	2	1	19
	2W+				1	1	1	1	4
PAA	1W				2	1			3
	2W+		1						1
NUU	1W			3	3	9			15
	2W+	1	2	2	1	3	5	3	17
MAN	1W		11	17	10	5	2	1	46
	2W+	1	3			3	2	3	12
SIS	1W		14	13	6	3	4	1	41
	2W+	5	12	3	2	3	1	1	27
KAN	1W		16	12	4				32
	2W+	5	3	1					9
Disko Bay	1W	6	67	28	2		3		106
	2W+	24	11	8	2	1	1		47
UMA-UPV	1W	13	54	5					72
	2W+	37	23	2	1	1	1	1	66
Total	1W	19	162	80	34	25	11	3	334
	2W+	73	55	16	7	12	11	9	183

Table 90. Recovery circumstances for Brünnich's Guillemots ringed and/or recovered in Greenland.
Genfundsårsager hos Polarlomvier ringmærket og/eller genfundet i Grønland.

Ringed/recovered	Shot	Fishing net	Unknown	Other	Total
Greenland/Greenland	2443	63	164	44	2714
Greenland/Abroad	381	5	29	13	428
Abroad/Greenland	500	8	24	2	534
Total	3324	76	217	59	3676



Map 60. Adult Brünnich's Guillemots ringed in northern Upernavik (N; n = 137) and in southern Upernavik (S; n = 152) and recovered 15 Jun – 31 Jul. The recoveries include birds ringed as ad. and birds ringed as chicks recovered as older than three years (4Y+).
Kort 60. Adulte Polarlomvier ringmærket i det nordlige Upernavik (N) og i det sydlige Upernavik (S) og genfundet i perioden 15 jun – 31 jul. Genfundene omfatter fugle mærket som adulte samt fugle mærket som unger og genfundet som ældre end tre år (4Y+).

Table 91. Summer (15 Jun - 31 Jul) recoveries of Brünnich's Guillemots ringed in southern (SU) and northern Upernavik (NU) as chicks or adults. In the recovery rows, UPV has been divided into a southern (<73°N) and a northern part (>73°N), including the settlement of Aappilattoq in the southern part and Ikeq/Upernavik Isfjord in the northern. See also Map 60.
Sommergenfund (15. jun - 15. jul) af Polarlomvier ringmærket i hhv. det sydlige (SU) eller nordlige Upernavik (NU) som unger eller voksne. I genfundskolonerne er UPV delt i en sydlig og nordlig del ved 73°N; bygden Aappilattoq hører til den sydlige del mens Ikeq/Upernavik Isfjord hører til den nordlige. Se også Kort 60.

	1st summer		2nd summer		3rd summer		Older		Ad.		
Recovered	SU	NU	SU	NU	SU	NU	SU	NU	SU	NU	Total
Newfoundland	1	1		1							3
Disko Bay	1	2	1	5	3	1	2		1		16
UMA	3	6	3	5	4	7	1	2			31
UPV S	18	4	29	31	52	19	123	30	25	7	338
UPV N		12	1	16	1	15	7	74	2	21	149
AVA					1						1
Total	23	25	34	58	61	42	133	106	28	28	538

Table 92. Temporal and spatial distribution of Brünnnich's Guillemots ringed as chicks in UPV and recovered in their first year of life (1Y).
Tidsmæssig og geografisk fordeling af Polarlomvier ringmærket som unger i UPV og genmeldt i deres første leveår.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
UPV	9	36	2						1	22	18	10	98
UMA		14	2								9	1	26
QEQ	2	16	5	1							2		26
ILU		6	4								1		11
ASI	2	42	18			3			1	2			68
KAN		16	12	4									32
SIS		12	11	4	3	4	1						35
MAN		11	16	10	5	2	1	1					46
NUU			3	3	9								15
PAA				2	1								3
QAT			3	4	7	2	1						17
Labrador			7						1				8
Newfoundland		4	50	31	34	35	19	4	2	4	1		184
Nova Scotia					1	1	2						4
Quebec			1						1				2
Total	13	157	134	59	60	47	24	5	6	28	31	11	575

Table 93. Temporal and spatial distribution of Brünnnich's Guillemots ringed as chicks in UPV and recovered in their second year of life (2Y).
Tidsmæssig og geografisk fordeling af Polarlomvier ringmærket som unger i UPV og genmeldt i deres andet leveår.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
UPV	3	3		1					2	28	61	23	121
UMA	2	2								7	5	2	18
QEQ	1								1				2
ILU									1		1		2
ASI	3	1	1						1	1	4		11
KAN	2	1						1					4
SIS	4	3											7
MAN					2	1	1					1	5
NUU			1										1
PAA		1											1
QAT				1		1							2
Labrador													
Newfoundland	3	2	4	3	6	6	9		1				34
Nova Scotia				1									1
Quebec													
Total	18	13	6	5	9	8	10	1	5	37	71	26	209

Table 94. Temporal and spatial distribution of Brünnnich's Guillemots ringed in UPV and recovered as older than two years (3Y+; birds ringed as ad. included). One recovery fron AVA (Jun) and one from the Faeroes (Dec) are omitted.
Tidsmæssig og geografisk fordeling af Polarlomvier ringmærket i UPV og genmeldt som ældre end to år (3Y+; fugle mærket som adulte inkluderet). Et genfund fra AVA (jun) og et fra Færøerne (dec) er udeladt.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
UPV	16	10	2			1		4	100	290	217	111	751
UMA	6	5					1		3	14	5	3	37
QEQ	11	2							2		1		16
ILU	4	1									3		8
ASI	3	3	3						1		3		13
KAN	2	2	1						1				6
SIS	1	7	1	1	2	1		1				2	16
MAN	1	2				3	1						7
NUU	1	2	1		2	4	2	2					14
PAA													
QAT							1						1
Labrador													
Newfoundland		2	6	3	13	17	16						57
Nova Scotia					1	2	1						4
Quebec													
Total	45	36	14	4	18	28	22	7	107	304	229	116	930

Table 95. Temporal distribution of Brünnnich's Guillemots ringed as chicks in UMA and recovered locally one or more years later.
Tidsmæssig fordeling af Polarlomvier ringmærket som unger i UMA og genmeldt lokalt efter et eller flere år.

	1Y	2Y	3Y	4Y+
Apr				2
May		1		43
Jun	3	15	10	20
Jul	3	17	9	20
Aug	3	2	4	31
Sep	1			4
Total	10	35	23	120

years later, an ad. was shot in PAA (55 km N) in "spring" one year later, another i QAT (137 km ESE) in Dec 11 years later, 7 ads were shot in NUU (c. 410 km NNW) Oct-Feb 164 days – 11 years later, an ad. was shot in MAN (490 km N) Jan 170 days later and 2 ads were shot in SIS (730 km NNW; Sep and "winter" 3-13 years later) as was a bird ringed as a chick (Oct 68 days later). Two birds were recovered in Newfoundland: A chick was shot in Jan six months later (1100 km SSW) while an ad. was shot in Jan four years later (1350 km SSW).

Ittoqqortoormiit: A total of 1533 chicks was

Table 96. Temporal and spatial distribution of Brünnnich's Guillemots (all ages) ringed in UMA. An additional 179 birds either with incomplete recovery data or recovered shortly after ringing are excluded.
Tidsmæssig og geografisk fordeling af Polarlomvier ringmærket i UMA (alle aldre).

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
UPV	1	1							1	2	2	2	9
UMA	8	1				1		2	76	79	76	65	308
QEQ		1								1			2
ILU		1								3			4
ASI	1	1									1		3
KAN				1									1
SIS		3	1										4
MAN		2					2				1		5
NUU					1	1							2
PAA													
QAT			1	2	1								4
Labrador													
Newfoundland		3	1	1	2	6	5	2		1			21
Nova Scotia					1								1
Quebec													
Total	10	13	3	4	5	8	7	4	77	86	80	67	364

Table 97. Temporal and spatial distribution of Brünnnich's Guillemots (all ages) ringed in ILU. An additional 39 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Polarlomvier (alle aldre) i ILU.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
UPV									1	2	5	1	9
UMA	3				1			1	3	15	9	7	39
QEQ	1	2	2		1	1		1	7	2	19	17	53
ILU	1	2	1	2		1		3	46	46	51	14	167
ASI	1	5	2	1					1	1	3	1	15
KAN	1												1
SIS		1	3	3			1						8
MAN		1	1		1	1							4
NUU				1				1					2
PAA													
QAT				1									1
Labrador								1					1
Newfoundland	1		7	2	7	7	4	1	2				31
Nova Scotia													
Quebec				1									1
Total	8	11	16	11	10	10	5	8	60	66	87	40	332

ringed at Kangikajik/Kap Brewster in Aug 1970. Only 5 were subsequently recovered: One was shot near Naajanngivit/Kap Dan in ITT (810 km WSW) 23 Sep the same year, 1 was recovered near Illoqqortoormiut/Scoresbysund in "summer" seven years later, 1 was shot in QAT (1510 km WSW) the following "winter", 1 was recovered in UMA (1230 km W) probably in autumn 1973 and 1 was shot in Newfoundland (3100 km WSW) 26 Jan 1971.

Foreign recoveries: A total of 542 Brünnich's Guillemots ringed abroad has been recovered in Greenland (Table 86, see also Map 59). Of these,

Table 98. Temporal distribution of Brünnnich's Guillemots ringed as chicks in ILU and recovered in Disko Bay during Apr-Sep one or more years later.
Tidsmæssig fordeling af Polarlomvier ringmærket som unger i ILU og genmeldt i Disko Bugt i apr-sep et eller flere år efter.

	1Y	2Y	3Y	4Y+
Apr				2
May		1	5	28
Jun	1	7	11	17
Jul	3	9	7	31
Aug		3	2	18
Sep				1
Total	4	20	25	97

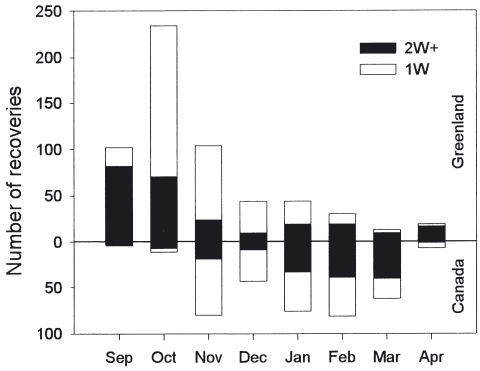
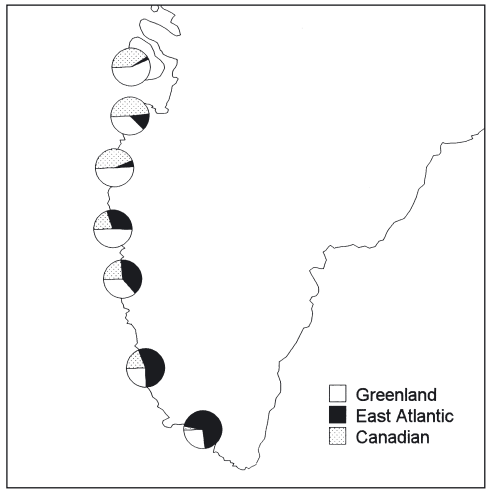


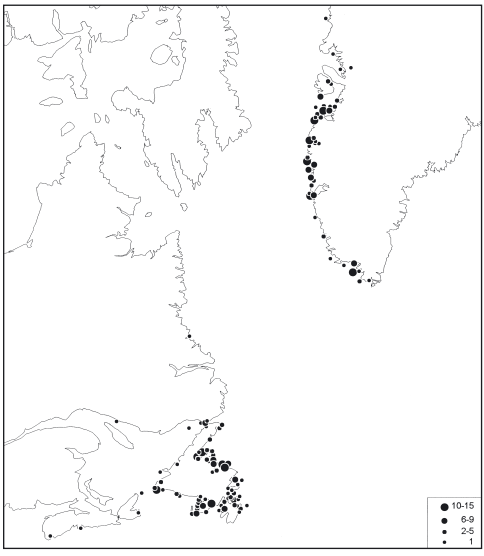
Fig. 24. Monthly distribution in Sep-Apr of Brünnich's Guillemots ringed in W Greenland and recovered as 1W (n = 338 in Greenland, 212 in Canada) or older (2W+; n = 252 in Greenland, 152 in Canada; birds ringed as ad. included). The vertical axis shows the number of recoveries, with recoveries in Greenland above the axis and recoveries in Canada below.
Månedsvis fordeling i sep-apr af Polarlomvier ringmærket i V Grønland og genfundet som 1W eller ældre (2W+; fugle mærket som adulte inkluderet).

296 were ringed in Canada (primarily in Lancaster and Jones Sound in NW Baffin Bay) and 246 in the NE Atlantic (primarily Spitsbergen). Below those ringed in Canada are referred to as western birds and those ringed in the NE Atlantic as eastern birds.

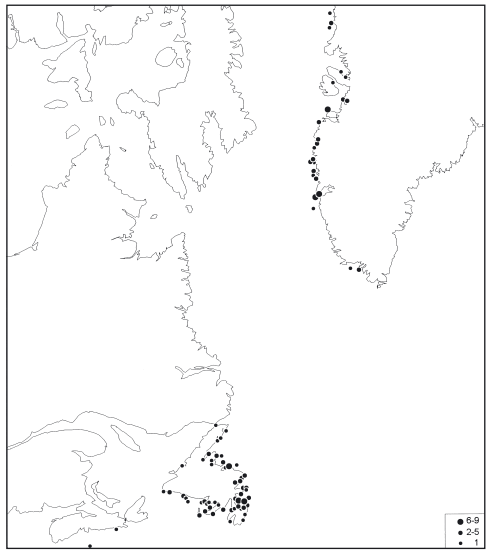


Map 61. Proportion of Brünnich's Guillemots ringed in W Greenland (n = 220; open areas on pie charts), in the E Atlantic (n = 187; filled areas) and Canada (n = 148; stippled areas) and recovered in the Open Water Region of W Greenland during Nov-Mar.
Kort 61. Proportional fordeling af Polarlomvier ringmærket i hhv. V Grønland, i den østlige del af Nordatlanten samt i Canada og genfundet i det Vestgrønlandske åbentvandsområde i nov-mar.

Western birds: Generally, most Canadian birds were recovered in Greenland during Oct-May in ASI-NUU (Table 99 and 100, Map 61); 56 (41%)



Map 62. Winter (Nov-Mar) recoveries of Brünnich's Guillemots ringed as chicks in W Greenland (n = 365) and recovered in their first winter (1W).
Kort 62 .Vintergenfund (nov-mar) af Polarlomvier mærket som unger i Vestgrønland og genfundet i deres første vinter (1W).

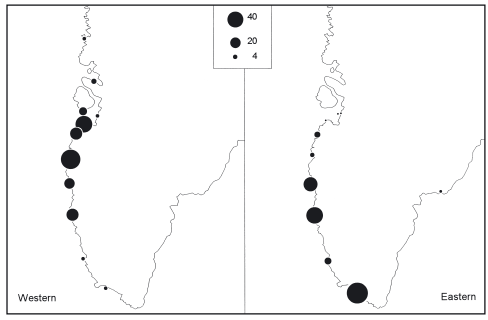


Map 63. Winter (Nov-Mar) recoveries of Brünnich's Guillemots ringed as chicks in W Greenland (n = 160) and recovered in their second winter or older (2W+).
Kort 63. Vintergenfund (nov-mar) af Polarlomvier mærket som unger i Vestgrønland og genfundet i deres anden vinter eller ældre (2W+).

of the 138 birds ringed as chicks were in their first winter (1W) when recovered. Of the 238 birds ringed in NW Baffin Bay, 181 were ringed at Cape Hay on Bylot Island (45 chicks, 136 ads; 171 ringed in 1957, 10 in 1978-1979), 50 on Coburg Island (46 chicks, 4 ads; ringed in 1979-1993) and 7 on Prince Leopold Island (4 chicks, 3 ads; ringed in 1976-1977). Of the 57 birds ringed in Hudson Strait, 37 were ringed on Coats Island (34 chicks ringed in 1981-1998, 3 ads ringed in 1953-1997), 18 on Digges Island (15 chicks, 3 ads ringed in 1955-1994) and 2 chicks on Hantzch Island in 1982. An unaged bird ringed on Nunarsuk Island in Labrador in 1953 was reported shot in UMA in Jun five years later.

The earliest 1C NW Baffin Bay bird was shot in ASI 15 Sep, thirty days after ringing. In early Oct 1C birds were recovered in UPV-SIS, the first birds reaching MAN in late Oct, NUU-PAA in early-mid Nov and QAT in late Dec (Table 99). Older (2Y+) Baffin Bay birds generally show the same temporal and spatial pattern, but the proportion of 1W birds drops significantly during winter, from 65% in Oct-Dec to 23% in Jan-Mar (Fisher's exact test, P = 0.006). During Nov-Mar, most birds (126 of 133) were recovered from the southern part of Disko Bay southward to NUU, with no difference in the spatial distribution of 1W and older (2W+) birds (χ_4^2 = 5.4, P = 0.25). However, a southward movement occurs during autumn and early winter. In Oct-Dec 66 of 118 (56%) recoveries are from north of SIS, while in Jan-Mar 17 of 45 (38%) were recovered in this area (Fisher's exact test, P = 0.0003). This southward movement does not extend farther south than NUU; only 6 birds have been recovered in PAA-QAT, 4 of these in early winter. Except one 1Y bird, all birds recovered in Apr-May were in their second year of life or older (2Y+). In May, birds on spring migration were recovered from KAN north to UPV with a concentration in Disko Bay (20 of 22 recoveries), where most (17) were taken between 13 and 22 May. Of 12 recoveries from Jun-Jul, 2 birds shot early Jun in ASI and UMA were ringed as ads on Bylot Island and supposedly still on spring migration. The remaining ten birds were ringed as chicks on Coburg Island and recovered in their first (1S; 4), second (2S; 3), third (3S; 1), fourth (4S; 1) and fifth summer (5S; 1) in UMA-AVA.

Birds ringed in Hudson Strait have been recovered from AVA south to NUU (Table 100). In autumn, the earliest birds were recovered in Disko Bay (6 Oct; 2W) and in NUU (mid Oct; 2W); the latest winter recovery is dated 9 Mar. During May-Aug birds were recovered from AVA to NUU. Of 15 birds recovered in Jun-Aug, 11 were in their first or second summer (1-2S), while a seven year old bird was shot in UPV 31 Jul and an eight year old bird in AVA 6 Aug. A chick ringed at Coats Island in 1989 was controlled breeding at Hakluyt Island (AVA) in late Jul 1997 (Kampp & Falk 1998) and again in 1998 (K. Kampp pers. comm.). When dividing W Greenland into a southwestern area (QAT-NUU), a central (MAN-SIS) and a northwestern (KAN-Disko Bay) no difference between the spatial distribution of birds from Hudson Strait and NW Baffin Bay could be found, neither during Nov-Mar (χ_2^2 = 5.3, P = 0.07) nor during Apr-Sep (χ_2^2 = 1.03, P = 0.60). During the latter period an equal number of birds from the two areas were also recovered in UMA-AVA (14/14). When looking at the temporal and age distribution of the recoveries of birds from Hudson Strait versus birds from NW Baffin Bay, several differences do, however, become apparent. For example, no 1W bird from Hudson Bay has been recovered in Greenland, while 62% of the birds ringed as chicks from NW Baffin Bay were recovered in their first winter (Table 101). A higher proportion of the Hudson Strait birds were recovered as older imms (2-3Y) than among birds from NW Baffin Bay (28 of 39 versus 14 of 85; Fisher's exact test, P < 0.0001). Furthermore, 63% of the Hudson Strait birds were recovered in Apr-Sep compared with



Map 64. Recoveries in Sep-Apr of Brünnich's Guillemots ringed west and east of Greenland (western birds (n = 213) are from NW Baffin Bay (193) and Hudson Strait (20); eastern birds (n = 203) from Iceland (9), Jan Mayen (1), Spitsbergen (158), Bear Island (14), Norway (1) and Russia (20)). The recoveries are plotted using the totals and mean coordinates within each district.
Kort 64. Genfund i Sep-Apr af Polarlomvier ringmærket hhv. vest og øst for Grønland (vestlige fugle er fra NV Baffin Bugt og Hudson Stræde, østlige fugle fra Island, Jan Mayen, Spitsbergen, Bjørnøya, Norge og Rusland). Genfundene er plottet ved at bruge totaler og gennemsnitskoordinat for hvert distrikt.

Table 99. Temporal and spatial distribution of Brünnich's Guillemots (all ages) ringed in NW Baffin Bay (Canada) and recovered in Greenland. An additional 17 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Polarlomvier (alle aldre) ringmærket i NV Baffin Bay, Canada, og genmeldt i Grønland.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
AVA										1	2		3
UPV	1	2							1		3		7
UMA		5	1							2	4		12
QEQ	3	5		1		1			2				12
ILU						1	1	1	2				5
ASI	1	13	14	7	1	2	4		15	1			58
KAN	1	1	9	6		5	2		1				25
SIS		13	11	8	11	4	3	5					55
MAN		1	3	3	4	2	4						17
NUU		3	3	2	9	1	4	1					22
PAA			2			1							3
QAT				2		1							3
Total	6	43	43	29	25	18	18	7	21	4	9		222

Table 100. Temporal and spatial distribution of Brünnich's Guillemots (all ages) ringed in Hudson Strait (Canada) and recovered in Greenland. An additional 13 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Polarlomvier (alle aldre) ringmærket i Hudson Strait, Canada, og genmeldt i Grønland.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
AVA												1	1
UPV									2		2	1	5
UMA									1	4	4		9
QEQ									1				1
ILU													
ASI		2	1		1				6	3			13
KAN					1								1
SIS			1						1				2
MAN		1			2	1							4
NUU			1	2	1	1	2		1				8
PAA													
QAT													
Total		3	3	2	5	2	2		12	7	6	2	44

Table 101. Age at recovery of Brünnich's Guillemots ringed as chicks in Canada and recovered in W Greenland.
Genfundsalder hos Polarlomvier ringmærket som unger i Canada og genmeldt i V Grønland.

Recovery age	Hudson Strait	NW Baffin Bay
1W		56
1S	10	4
2W	6	3
2S	7	4
3W	3	1
3S	5	3
4W+	8	15
4S+	6	5
Total	45	91

20% of the NW Baffin Bay birds (Fisher's exact test, $P < 0.0001$).

Eastern birds: Birds ringed in Russia, Norway, Spitsbergen, Bear Island, Jan Mayen and Iceland have been recovered in E Greenland (4) and in W Greenland northwards to UMA (242; see Table 102); of 194 birds ringed as chicks 140 (72%) were in their first winter (1W) when recovered. Ten birds ringed as ads in NW Iceland (all after 1985) have been recovered in SW Greenland during Sep-Apr. From farther afield, 24 birds ringed on Bear Island (5 ringed as ad. 1988-91, 19 ringed as chicks 1995 and 1999) have been recovered in Greenland. Two of these were recovered on the E coast (AMM, both ringed as ad.), the remaining 22 on

Table 102. Temporal and spatial distribution of eastern Brünnich's Guillemots (all ages; Russia, Norway, Svalbard, Iceland) recovered in Greenland. An additional 26 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Østlige Polarlomvier (alle aldre; Rusland, Norge, Svalbard, Island) genmeldt i Grønland.

	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
AVA													
UPV													
UMA										1		1	2
QEQ	1												1
ILU				1									1
ASI					1						1		2
KAN				3	4		1	1				1	10
SIS			5	3	1								9
MAN		1	10	9	7	4	2	2		1			36
NUU	1	2	17	17	5	9	4	2		1			58
PAA		1	8	2	3								14
QAT	1	4	25	14	25	8	5		1				83
AMM		1	1		1	1							4
Total	3	9	66	49	47	22	12	5	1	3	1	2	220

Table 104. Age and spatial distribution of Brünnich's Guillemots ringed in Greenland, Canada and the E Atlantic combined and recovered in W Greenland during Nov-Mar.
Alders- og geografisk fordeling af Polarlomvier ringmærket i Grønland, Canada samt den østlige del af Nordatlanten og genmeldt i V Grønland i nov-mar.

	Nov - Dec			Jan - Mar		
Recovered	1W	2W+	2W+ %	1W	2W+	2W+ %
QAT-PAA	51	11	18	34	17	33
NUU-MAN	69	27	28	26	61	70
SIS-KAN	54	18	25	19	16	46
Disko Bay	39	15	28	15	10	40
Total	213	71		94	104	

the SW Coast (QAT 6 (1 ad.), PAA 3, NUU 11 (2 ads), MAN 1, SIS 1) during Oct-Feb. A total of 186 birds ringed in Spitsbergen in 1938-97 was recovered in Greenland, primarily in QAT-MAN (158) during Nov-Mar; of 158 birds ringed as chicks 114 (72%) were recovered in their first winter. North of MAN there are recoveries from SIS (7), KAN (13) and Disko Bay (6), but only half of these are from winter. A single bird ringed as a chick on Jan Mayen in 1999 was recovered in KAN on the W coast in Mar 2000. Of 24 birds ringed in Russia, six (2 ads, 4 chicks) were ringed on Novaya Zemlya in 1948-1950 and recovered in QAT-SIS mid Dec – mid Feb (5) and UMA in Aug (1). Eighteen (6 ads, 12 chicks) were ringed on Seven Island in 1949-1984 and recovered in QAT-MAN during Oct-Mar, in UMA (1S bird in Jun) and AMM on the E coast (ad. in Nov). An ad. bird ringed in N Norway in 1983 was shot off Nuuk town in Nov eleven years later.

Apart from 4 birds shot in AMM (ringed on Bear Isl. (2 ads), Seven Isl. (1 ad.) and Spitsbergen (1 chick) and recovered during Oct-Feb), the majority were found in SW Greenland during Nov-Mar (QAT-MAN; Table 102, Map 61). In autumn, the first eastern birds arrive in late Oct (earliest recovery 21 Oct), but the majority in Nov. Apparently the wintering birds disperse rapidly along the SW coast after arrival, reaching MAN in early Nov and SIS in mid Nov. When comparing the spatial distribution of recoveries during Nov-Dec and Jan-Mar in QAT, PAA-NUU and MAN-SIS, no difference could be found ($\chi_2^2 = 3.76$, P = 0.15). During Nov-Mar, most of both young (1W; 80 of 92) and older birds (2W+; 44 of 45) originating from Spitsbergen were recovered in QAT-MAN. The proportion of Spitsbergen 1W birds was significantly higher in QAT-PAA than in NUU-MAN (Fisher's exact test, P = 0.0002). Nine of ten recoveries north of SIS (Table 102) were of

1W birds from Spitsbergen shot in Dec-Jan, the only indication of a northward movement during winter. Most eastern birds seem to leave SW Greenland in Mar-Apr. The few birds recovered in May-Sep either have dubious recovery dates or may be of wounded birds; perhaps a few imm. birds remain to summer.

MOVEMENTS

Apart from the Little Auk, the Brünnich's Guillemot is the most numerous seabird in Greenland. Large colonies are found in AVA and in northern UPV, while a number of smaller colonies exist in W and SW Greenland south to Kitsissut Avalliit/ Ydre Kitsissut (QAT); in E Greenland there are two colonies at the mouth of Kangertittivaq/ Scoresby Sund (ITT). In the late 1980s, the total breeding population was estimated at roughly 400 000 pairs of which 53% were found in AVA, 30% in northern UPV, 10% in W Greenland from southern UPV to QAT and 7% in E Greenland (Kampp et al. 1994). The Greenland breeding population has, however, declined dramatically during the 20th century. In UMA, for example, the entire breeding population is now extirpated. Bertelsen (1921) thought that Salleq, formerly the largest colony in UMA, held in the order of half a million pairs. In 1949 Salomonsen (1950a) roughly estimated 150 000 birds to breed at Salleq, but local residents informed him that the colony was only half the size of what it had been at the start of the century. When revisiting Salleq in 1975, Salomonsen found only 4500 birds and in 1984 no birds were seen on the cliffs (Kampp et al. 1994). Although Salleq is the only large colony that is so far known to have been exterminated, major declines have occurred in many other areas in SW and W Greenland, especially in southern UPV and ILU. Overall, the Greenland breeding population is suspected to have declined by 50% before 1990 (Evans & Kampp 1991, Kampp et al. 1994, Falk & Kampp 1997), and in several colonies this decline continues (e.g. Boertmann et al. 1996, Falk et al. 1997b). The decline is caused by human overexploitation, with summer hunting in Greenland as the single most important factor (e.g. Kampp 1991, Kampp et al. 1994, Falk & Kampp 2001). Outside the breeding season, large numbers of Brünnich's Guillemots are being shot in Canada (mainly Newfoundland) and W Greenland. In the 1980s an estimated 600 000 – 900 000 birds were shot annually in Newfoundland during the open season from Sep to Mar (Elliot 1991, Elliot et al. 1991); in 1993 hunting restrictions were introduced, including a shortened season, daily bag

Table 103. Brünnich's Guillemot. Population estimates, ringing activity and number of recoveries in W Greenland from different regions.
Polarlomvie. Estimater af bestandsstørrelser, ringmærkningsaktivitet og antal genfund i Vestgrønland fra forskellige områder.

Area	Estimated population (pairs)	Source	Ad. ringed	Chicks ringed	Ringing period	Source	Recovered in W Greenland (ad./chick)	Recovery percentage (ad./chick)
Iceland	580 000	a, b	1082	73	1921-1996	c, e	10 / 0	0.9 / 0
Jan Mayen	55 000-110 000[2]	d	?	?	**	e, f	0 / 1	0 / ?
Spitsbergen	870 000[2]	g	c. 1853	c. 3833	1938-1993	e	27 / 156	1.45 / 4.1
Bear Isl.	105 000	h	4631	440	1986-1999	e	3 / 19	0.06 / 4.3
Frans Josef Land	50 000	h	0	0		e, f	0 / 0	0 / 0
Novaya Zemlya	1 000 000	h	21 194	22 508	1948-1950	h	2 / 4	0.009 / 0.02
Murmansk coast1	3000	i	2620*	1533*	1936-1994	h	5 / 12	0.19 / 0.78
Norway	1000-2000	j	791	64	1949-1995	h	1 / 0	0.13 / 0
E Greenland	10 800-13 500	k	0	1533	1970	l	0 / 2	0 / 0.13
NW Baffin Bay	406 000	m	>1607	7852	1957-2000	e	142 / 94	8.8 / 1.2
Reid Bay	100 000-166 000	n	17	35	1985	o	0 / 0	0 / 0
Hudson Strait	730 000-830 000	p	5364	c. 55 760	1953-2000	e	6 / 51	0.11 / 0.09

* plus an additional 36 273 unidentified chicks and 1227 unidentified ad.
** 40-50 birds ringed 1999.
[1] Seven Isl.
[2] calculated from the number of individuals, using a k-factor of 0.75 (Kampp et al. 1994)
a Gardarsson 1995, b Petersen 1998, c Petersen & Gudmundsson 1998, d Van Franeker et al. 1986, e K. Kampp in litt., f V. Bakken in litt., g Mehlum & Bakken 1994, h Nikolaeva et al. 1996, i Anker-Nielssen et al. 2000, j Barrett 1994, k Falk et al. 1997b, l Kamp 1988, m Gaston & Nettleship 1981, n Gaston & Smith 1987, o Donaldson et al. 1997, p Gaston 1991.

limits and possession limits (Donaldson et al. 1997). The W Greenland winter hunt in the late 1980s was estimated at 280 000 – 390 000 birds annually (Falk & Durinck 1992). In 1988 the open season was shortened (15 Oct – 15 Mar from KAN and southwards, and 1 Jun – 31 Aug from Disko Bay to UPV). However, the effect of Greenland regulations has hitherto been slight (Kampp et al. 1994), and apparently the hunting regulations in Greenland and Canada have had less influence on the distribution of recoveries shown in this study than for example ice conditions and local hunting traditions.

The movements of Brünnich's Guillemots in Greenland have been analysed by Kampp (1988), while Donaldson et al. (1997) analysed the winter distribution of Canadian and Greenland birds around Newfoundland. As only 128 recoveries (3%) of Greenland birds, mostly of UPV origin, have been added to the material since Kampp's (1988) analysis, the amount of new information regarding the W Greenland populations is small. The number of recoveries of birds ringed abroad have, however, doubled since then, providing new information. Generally, birds originating from W Greenland colonies (UPV, UMA, ILU) winter partly in the Open Water Region as far north as ice conditions allow, partly off eastern Canada from Newfoundland south to Nova Scotia (Map 62 and 63); in Canada, 94% of all recoveries are from Newfoundland. The few recoveries of birds from QAT suggest that this population moves north to winter off NUU-SIS as well as off Newfoundland. Almost nothing is known about the movements of the large AVA population (two recoveries). Although it seems reasonable to assume that the migration system of this population may correspond to that of the neighbouring populations (NW Baffin Bay and UPV; i.e. wintering partly in Canada, partly in W Greenland), more information is needed. At least in some years, some young birds from the E Greenland population move south along the E coast to winter in W Greenland and Newfoundland, but it is not known whether this is a regular pattern, and nothing is known about the movements of ad. birds.

Perhaps as much as half the W Greenland population winters in Canada, but due to differences in recovery probabilities it is not possible to determine precisely how large a proportion that winters in each region. Brünnich's Guillemots from the UPV, UMA and ILU populations arrive in the Open Water Region during mid Sep – Nov, gradually moving southwards until Jan (Table 89). In general, older birds (2W+) arrive earlier than 1W birds; in Sep no young birds were recovered south of Disko Bay. During Sep-Nov most birds were recovered in UPV-MAN (394 of 405), during Dec-Mar in SIS-NUU (71 of 112). When comparing the spatial distribution of 1W and 2W+ birds in Dec-Mar, no difference is apparent (QAT-NUU versus MAN – Disko Bay; Fisher's exact test, P = 1.0), although relatively few birds move as far south as QAT-PAA. The number of recoveries drops gradually during late winter, most likely because the birds become less accessible to hunters owing to weather and ice conditions – at least nothing suggests that it is due to a progressive movement to Newfoundland (Kampp 1988). A total of 426 birds ringed in W Greenland has been recovered in Canada; of these 402 were taken in Newfoundland and 24 in Labrador (9; Nov 7, Apr 1, May 1), Quebec (4; Nov-Dec, May) and Nova Scotia (11; Jan-Mar). In Newfoundland, the earliest 1W bird was shot 8 Oct, but large numbers of young birds do not arrive until Nov (Fig. 24). Birds in their second and third winter (2-3W) were recovered from 10 Sep onwards, although in low numbers (15 in Sep-Nov); some of these may have summered in the area. Apart from an oiled individual in mid Oct, old birds (4W+) were reported from 1 Nov onwards. Only 22% of the 2W+ birds were recovered in Oct-Dec compared to 46% of the 1W birds (25 of 114 versus 90 of 195; Fisher's exact test, $P < 0.0001$). The same temporal recovery pattern is found in most of the Canadian populations occurring in Newfoundland during winter (Donaldson et al. 1997). Apparently a gradual southerly movement occurs, caused by the ice conditions in the northern parts of Newfoundland. During Oct-Dec 79% of the 1W birds were recovered north of 49ºN, compared with 26% in Jan-Mar (71 of 90 versus 27 of 105; Fisher's exact test, $P < 0.0001$). Older birds (2W+) show the same spatial distribution, with 72% recovered north of 49ºN in Oct-Dec and 24% in Jan-Mar (18 of 25 versus 20 of 84; Fisher's exact test, $P < 0.0001$). As ice conditions in the northern part of Newfoundland usually prevent hunting after Dec, this southerly movement can partly be an artifact. However, large numbers of Brünnich's Guillemots do not appear in the southern part until after Jan (Donaldson et al. 1997). Most Greenland birds apparently depart from Newfoundland during Mar – early May, but some imms seem to summer in the area; there are 9 recoveries of 1-2S birds in late May-Jul; cf. also the above-mentioned Sep recoveries.

Apart from birds of W Greenland origin, large

numbers of Canadian and East Atlantic Brünnich's Guillemots also winter in the Open Water Region of W Greenland. The autumn migration routes of NW Greenland/Canadian birds roughly follow the Labrador Current, while birds from the East Atlantic roughly follow the East Greenland Current (for details, see Kampp 1988). Little information exists on the size of the total Greenland wintering population, but it is thought to be in the order of millions (Boertmann 1994). Many Canadian birds originating from colonies in NW Baffin Bay reach W Greenland in mid Sep – early Oct, gradually moving south to reach NUU in Nov; they depart in Apr-May. Again, due to differing recovery probalities and some annual variation, determining how large a part of the NW Baffin Bay population that winters in W Greenland or in Newfoundland is not possible. Furthermore, there are some differences in the migration pattern of these colonies. For example, all birds from Prince Leopold Island (7), 77% of the birds from Cape Hay and 15% of the Coburg Island birds have been recovered in W Greenland (Donaldson et al. 1997, see also Kampp 1988). No recoveries are available from the large colony at Reid Bay, E Baffin Island, but circumstantial evidence suggests that these birds may, at least in part, winter in W Greenland (Kampp 1988). In Greenland, Canadian birds mostly winter in the northern part of the Open Water Region; only 28% have been recovered in QAT-MAN (see Map 61 and 64). The populations breeding in Hudson Strait and farther south normally winter in Canada; no 1C birds and only very few older birds have been recovered in W Greenland during Nov-Mar (Kampp 1988, Donaldson et al. 1997, this material; see Table 101).

East Atlantic Brünnich's Guillemots arrive in SW Greenland mainly during Nov and depart in Mar-Apr; after arrival they disperse rapidly north to about MAN. With 90% of the Sep-Apr recoveries in QAT-MAN, the spatial distribution differs significantly from that of Canadian birds (χ_3^2 = 165.0, $P < 0.0001$; see Map 61 and 64). Clearly, large numbers from the Spitsbergen population winter in W Greenland, including both ads and young birds (Table 103). Apparently many young birds (1W) from Bear Island also winter in W Greenland (19 recoveries of 440 ringed birds), whereas only few ad. birds seem to do so (3 recoveries of 4631 ringed birds). Apparently the ad. Bear Island birds mostly winter in the Greenland Sea and the western E Atlantic; apart from the three recoveries in W Greenland, there are two recoveries from E Greenland, four from Iceland, one from north of the Faeroe Islands and one from Canada (V. Bakken in litt.). Less than 50 birds have been ringed on Jan Mayen, a population that potentially might winter in W Greenland as suggested by the single recovery. Birds from E Greenland probably also winter in W Greenland, but lit-

Brünnich's Guillemots, northern Upernavik, W Greenland. Photo: P. Lyngs.

tle is known of the movements of this relatively small population. Only few birds have been ringed in Iceland and the relatively high recovery rate in W Greenland (Table 103) indicates that a large proportion of the Icelandic birds may winter here, as suggested by Petersen (1998). Two Icelandic birds have also been recovered in Newfoundland, but none in Iceland during winter. Apparently many of the Brünnich's Guillemots wintering around Iceland originate from Spitsbergen, Bear Island and perhaps Russia; nine birds from Spitsbergen and Bear Island have been recovered in Iceland (Petersen 1998). Although birds from the southern Barents Sea (Norway, Murmansk coast of Russia) also appears to winter in W Greenland, these populations are small (Table 103) and contribute little to the number of wintering birds. From the large population in the eastern Barents Sea (Novaya Zemlya), only six birds have been recovered in W Greenland (all as older imms or ads) despite the very high number of Brünnich's Guillemots ringed here in the late 1940s, suggesting that this population is insignificant in a Greenland context. The majority of these birds apparently winter in the Barents and Norwegian Seas (Nikolaeva et al. 1996). Nothing is known of the movements of the birds breeding in Franz Josef Land, where virtually no ringing has been done.

In conclusion, the vast majority of the E Atlantic birds wintering in W Greenland originates from Svalbard, Iceland and probably Jan Mayen. The Canadian birds originate mainly from NW Baffin Bay and perhaps Reid Bay. During winter these populations are partly segregated, but all along the W coast they are mixed up with birds of Greenland origin. More than half of the birds recovered in QAT and PAA originated from the E Atlantic, while in Disko Bay, KAN and SIS almost half of the recoveries were of Canadian birds (Map 61). In NUU and MAN the proportions from the three regions were almost equal. The highest proportion of 1W birds from the three regions combined was found in QAT-PAA throughout winter ($\chi_3^2 = 20.4$, P = 0.0001; Table 104). In all districts, the proportion of older birds (2W+) was about twice as high in Jan-Mar as in Nov-Dec. This age/time distribution is in accordance with the distributions found among shot birds in W Greenland (Falk & Durinck 1992, Frich 1997a, 1997b) and in Newfoundland (Elliot et al. 1991, Donaldson et al. 1997).

Considering the large number of foreign Brünnich's Guillemots wintering in W Greenland, some immigration could be expected. However, only one case has yet been recorded – a chick ringed at Coats Island and found breeding at Hakluyt Island in AVA (Kampp & Falk 1998) – although a few breeding-age birds ringed as chicks in NW Baffin Bay and Hudson Strait have been shot in W Greenland during summer and could have immigrated. Intercolony movements within Greenland also appears to be infrequent. Among 303 birds ringed as chicks in W Greenland and recovered as 6S+ in areas with colonies during Jun – 10 Aug, 199 (66%) were found less than 50 km from their natal colony, 73 (24%) 50-100 km away, 24 (8%) 100-150 km away, 1 (0.3%) 150-200 km away and 4 (1%) 200-365 km away. This distribution does not differ from that found among 93 birds ringed as ads and recovered one or more years later during the same period ($\chi_3^2 = 3.79$, P = 0.29); ad. birds generally do not shift colony once they have begun to breed. On the other hand, the spatial distribution of these recoveries fits well with potential feeding ranges of breeding birds fitted with data-loggers, as reported from Hakluyt Island in AVA and Coburg Island in NW Baffin Bay (Falk et al. 2000, Falk et al. 2002): mean 37-43 km, max. 62-138 km.

Razorbill *Alca torda*

RECOVERIES

11 GRC of birds ringed in Jul-Aug in 1946-1988, 2 FRC.

Upernavik: A chick-ringed bird was shot Oct in ASI (45 days later; 465 km S), while another was shot early Dec in MAN (144 days later; 935 km S). An unaged bird was shot 10 Dec one and a half year later off Placentia Bay, Newfoundland (2800 km S).

Uummannaq: Three birds ringed as chicks have subsequently been recovered: One was shot early autumn in UMA eight years later, 1 was shot near Appat/Ritenbenk (ILU; 115 km S) in Jul two years later, and 1 was shot 20 Apr three years later off Long Point, Labrador (2185 km S).

Ilulissat: An unaged bird was shot Oct 59 days later in ASI (150 km WSW).

Aasiaat: A bird ringed as ad. was killed in the colony in Jul two years later.

Kangaatsiaq: A bird ringed as ad. was shot during "summer" somewhere in UMA four years later.

Nuuk: A bird ringed as ad. was shot near the colony in Jul five years later.

Qaqortoq: An ad. bird ringed 1 Aug 1985 on Kitsissut Avalliit/Ydre Kitsissut was controlled in the same place 14 years later.

Foreign recoveries: Two birds ringed as chicks

abroad have been recovered: A bird ringed at Great Saltee, Ireland in Jul 1986 was shot 19 Dec 1986 off Atammik, MAN (2970 km WNW), and a bird ringed in Onega Bay, White Sea, Russia in Jul 1960 was shot off Narsaq, QAT in Jan 1961 (4130 km W).

MOVEMENTS

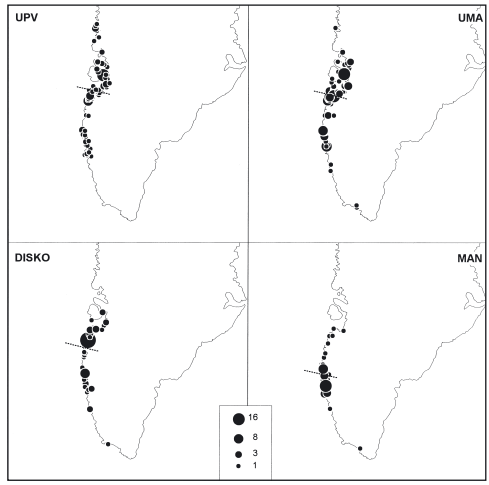
Razorbills breed along the W coast from QAT to AVA, but only occur on the E coast as rare summer visitors. The breeding population is tentatively estimated at 2000-5000 pairs, mostly occurring in NUU-UPV (Boertmann et al. 1996). The few recoveries provide little information on migration routes and wintering areas. They do, however, suggest that the migratory system of the Razorbill in Greenland is similar to that of Brünnich's Guillemot, i.e. that the population partly winters along the Canadian coast, partly in the Open Water Region. As the British/Irish population winters from the North Sea south to the Iberian Peninsula and the Russian in the North Sea (Lloyd 1974, Brown 1985), the two foreign recoveries should be considered accidental. Apparently very few Razorbills from other populations winter in Greenland waters. Birds from the very large Icelandic population winter around Iceland or move east to the Faeroes and the North Sea (Petersen 1998), while the relatively small North American population winters off Newfoundland south to Connecticut (Chapdelaine 1997).

Black Guillemot *Cepphus grylle*

RECOVERIES

1337 GRC of birds ringed in May-Sep in 1946-1979 (Table 105), 13 FRC. Of 774 chicks ringed and recovered in Greenland, 467 (60%) were in their first calendar-year (1C), 133 in their second (2C), 52 in their third (3C) and 122 were older (4C+) when recovered. Eleven of the latter were more than 10 years, the oldest 17 years.

Upernavik: A total of 128 birds was recovered within UPV 7 Jun – 7 Dec 0-125 (mean 35) km from the ringing site 2 days – 13 years later, while 162 were recovered elsewhere in Greenland (Table 106 and Map 65; see also Fig. 25). During autumn and winter most of the latter were found in Disko Bay and KAN, with a single recovery as far south as PAA (1150 km S). The first birds were recovered in KAN in late Sep (earliest 5 Sep) and MAN in late Oct, but apparently most birds do not reach Disko Bay before mid-late Oct. Two birds ringed as chicks were shot off Cape Dorset, Baffin Island, Canada (c. 1280 km WSW) 15 May one year later and 10 Mar three years later (Map 66).



Map 65. Recoveries in Nov-Mar of Black Guillemots ringed in UPV (n = 102), UMA (n = 152), Disko Bay (DISKO; n = 51) and MAN (n = 86). The dotted line on each map denotes the mean latitude of the recoveries (UPV 68º38'N, UMA 68º14'N, DISKO 67º07'N, MAN 64º17'N).

Kort 65. Genfund i perioden nov-mar af Tejster ringmærket i hhv. UPV, UMA, Disko Bugt (DISKO) og MAN. Den stiplede linie på hvert kort angiver den gennemsnitlige breddegrad for genfundene.

Uummannaq: A total of 319 birds was recovered within UMA. Excluding a few, probably incorrectly dated, birds from Jan-Mar the recoveries are from 15 May – 30 Dec (80% 20 Jun – 16 Oct) 0-158 (mean 39) km from the ringing site 1 day – 22 years later. Outside UMA, 280 birds were recovered elsewhere in Greenland (Table 107 and Map 65). During autumn and winter the majority was found in Disko Bay and KAN, with 3 recoveries as far south as QAT (1180 km S). The first birds were recovered in KAN in mid Sep and MAN in mid Oct; apparently most birds reach Disko Bay in mid-late Oct.

Qeqertarsuaq: Five birds were recovered within QEQ in Jul (4) and Oct 2-56 (mean 15) km from the ringing site 78 days – 3 years later. Ten birds ringed as chicks were recovered elsewhere in Greenland: A bird was shot in UMA (146 km NNE) in Sep the same year, 2 were shot in KAN (c. 165 km S) in Oct-Nov the same year, 3 were recovered in SIS (c. 285 km S) in Sep-Mar 55-244 days later, 3 in MAN (c. 430 km S) Oct-Jan 79-526 days later and 1 in NUU (600 km S) in Jan 170 days later.

Ilulissat: A total of 45 birds was recovered in ILU 23 May – 18 Jan 0-127 (mean 48) km from the

Table 105. Ringing details of recovered Black Guillemots, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Tejst, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV	208	17	67	292	2
UMA	372	39	188	599	
QEQ	14	1		15	
ILU	101	1	5	107	
ASI	39	6	6	51	
KAN	3		2	5	
SIS	2			2	
MAN	116	9	77	202	
NUU	21	6	16	43	
PAA		1	1	2	
QAT	13	4	2	19	
Total	889	84	364	1337	2

Table 106. Temporal and spatial distribution of Black Guillemots (all ages) ringed in UPV and recovered in Greenland. An additional 40 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Tejster (alle aldre) ringmærket i UPV og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV						15	21	43	18	9	3	3	112
UMA	2					2	4			10	5	2	25
QEQ		1			1				1		1	3	7
ILU	8				1	1	1			7	14	8	40
ASI	4		1	1						2	3	2	13
KAN	5	7		2	2				2	5	8	2	33
SIS				1						1		1	3
MAN	3	2	1	2						1		1	10
NUU	1	1									2	2	6
PAA										1			1
QAT													
Total	23	11	2	6	4	18	26	43	21	36	36	24	250

Table 107. Temporal and spatial distribution of Black Guillemots (all ages) ringed in UMA and recovered in Greenland. An additional 71 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Tejster (alle aldre) ringmærket i UMA og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV						1	1	2	1	3	1		9
UMA		2	1		9	39	34	70	63	63	6	2	289
QEQ						1	1			8	5	2	17
ILU	4	1	1		4	1			4	34	20	8	77
ASI	5	4	2	1	1		2			10	8	7	40
KAN	10	9	6	3				1	1	9	11	6	56
SIS	2					1				1	1	2	7
MAN	5	1	3					1		2	9	6	27
NUU	1			1								1	3
PAA							1						1
QAT	1							1					2
Total	28	17	13	5	14	43	39	75	69	130	61	34	528

Table 108. Temporal and spatial distribution of Black Guillemots (all ages) ringed in ILU and recovered in Greenland. An additional 8 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Tejster (alle aldre) ringmærket i ILU og genmeldt i Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV													
UMA					1				2	1			4
QEQ					3	1			2			1	7
ILU	2				3	7	1	3	18	6	2	1	43
ASI	2								5	2	1	2	12
KAN	2	1								3	11		17
SIS											1	1	2
MAN	1	1			1	1				1	3	1	9
NUU											2	1	3
PAA													
QAT										1		1	2
Total	7	2			8	9	1	3	27	14	20	8	99

Table 109. Temporal and spatial distribution of Black Guillemots (all ages) ringed in MAN and recovered in Greenland. An additional 11 birds with incomplete recovery data are excluded.
Tidsmæssig og geografisk fordeling af Tejster (alle aldre) ringmærket i MAN og genmeldt i Grønland.

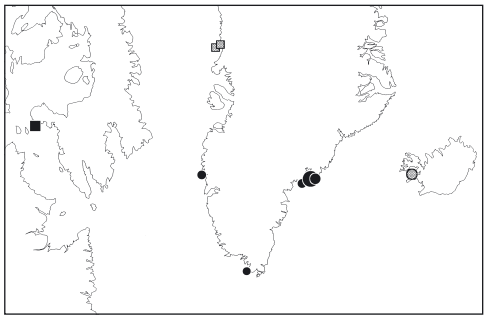
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
UPV													
UMA													
QEQ													
ILU													
ASI	1							1		3		1	6
KAN					1					1	1	1	4
SIS									1	3	1	1	6
MAN	4	14	5	1	4	12	3	13	21	36	25	19	157
NUU	2	2					1		1	2	3	5	16
PAA										1			1
QAT		1											1
Total	7	17	5	1	5	12	4	14	23	46	30	27	191

Table 110. Spatial distribution of Black Guillemots (all ages) ringed in UPV, UMA, Disko Bay and MAN and recovered in Greenland during Nov-Mar.
Geografisk fordeling af Tejster (alle aldre) ringmærket i UPV, UMA, Disko Bugt samt MAN og genfundet i Grønland i nov-mar.

	Recovered				
Ringed	UPV	UMA	DISKO	MAN	Total
UPV	6	1			7
UMA	9	11			20
DISKO	44	66	15	2	127
KAN	22	42	16	2	82
SIS	1	5	4	2	12
MAN	14	24	9	67	114
NUU	6	2	6	12	26
PAA					0
QAT		1	1	1	3
Total	102	152	51	86	391

Table 111. Temporal and spatial distribution of Black Guillemots (all ages) ringed in UPV, UMA and Disko Bay combined and recovered during Nov-Mar in W Greenland.
Tidsmæssig og geografisk fordeling af Tejster ringmærket i UPV, UMA og Disko Bugt og genmeldt i nov-mar i V Grønland.

	QAT-PAA	NUU-MAN	SIS-KAN	Disko Bay	UMA-UPV	Total
Nov		22	33	56	15	126
Dec	1	16	13	34	7	71
Jan	1	13	20	25	2	61
Feb		6	17	6	2	31
Mar		4	7	4	1	16
Total	2	61	90	125	27	305



Map 66. Black Guillemots ringed in Iceland and recovered in Greenland (filled circles; n = 13), and recoveries abroad of birds ringed in Greenland (UPV, filled squares; n = 2). Shaded symbols denote ringing sites, filled symbols recovery sites.
Kort 66. Genfund af Tejster ringmærket i Island og genmeldt i Grønland (fyldte cirkler), og genfund i udlandet af fugle mærket i Grønland (UPV; fyldte firkanter). Gråtonede symboler viser mærkningssteder, fyldte symboler genfundssteder.

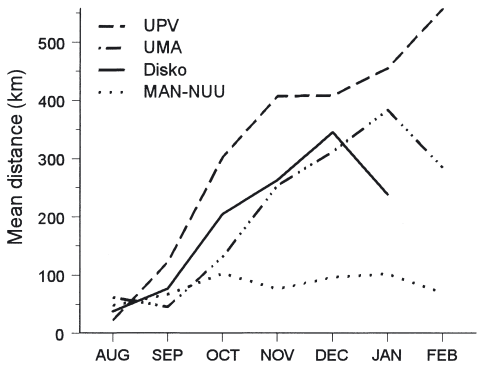


Fig. 25. Mean recovery distance of Black Guillemots ringed in UPV (n = 200), UMA (n = 415), Disko Bay (n = 125) and MAN-NUU (n = 197), and recovered during Aug-Feb. Each point represents 8-131 recoveries; there were too few recoveries (3) of Disko Bay birds in Feb for this month to be included.
Gennemsnitlig genfundsafstand hos Tejster ringmærket i hhv. UPV, UMA, Disko Bugt samt MAN-NUU genmeldt i august-februar. Hvert punkt repræsenterer 8-131 genfund; der var for få genfund (3) af Disko Bugt fugle i feb til at medtage disse.

ringing site 10 days – 9 years later, while 62 were recovered elsewhere in Greenland (Table 108). During autumn and winter the majority of the latter was found in Disko Bay – MAN, with 2 recoveries as far south as QAT (1065 km S). Apparently most birds do not reach KAN before early-mid Oct.
Aasiaat: Twenty-nine birds were recovered within ASI in Aug-Jan (24) and May-Jun (5) 0-72 (mean 28) km from the ringing site 6 days – 6 years later. Twenty-two birds were recovered elsewhere in Greenland: A chick-ringed bird was shot in UMA (210 km N) 29 Sep the same year, 8 (7 chick-ringed) were recovered in ILU (c. 95 km NE) Jun-Oct 24-70 days (5), one year (2) and 3 years later (1), 3 were recovered in KAN (c. 87 km SSW) Jun-Jan 9-331 days later, 2 were recovered in SIS (c. 290 km S) Oct-Nov the same year, 5 were recovered in MAN (c. 380 km S) Oct-Jan 52 days – 10 years later and 3 were recovered in NUU (c. 525 km S) Nov-Mar 1-3 years later.

Kangaatsiaq: Two birds were recovered locally 44-73 days later, 1 ringed as chick was shot in ASI (50 km N) Oct three years later and 2 (1 chick, 1 unaged) were shot in ILU (c. 130 km NNE) in Sep two months later.
Sisimiut: Two birds ringed as chicks were shot south of the district in Oct-Nov the same year: One in MAN (120 km S) and 1 in NUU (440 km SSE).
Maniitsoq: A total of 162 birds was recovered in MAN in all months 0-287 (mean 48) km from the ringing site 7 days – 11 years later, while 40 were recovered elsewhere in Greenland (Table 109 and Map 65). During autumn and winter most of the latter were found in SIS and NUU, with recoveries south to QAT (610 km SE) and north to ASI (415 km N); a bird with no finding date was reported from UPV.

The pagophilous Black Guillemot. Photo: A. Mosbech.

Nuuk: Twenty-six birds were recovered within NUU in Jun-Dec and Mar (1) 0-198 (mean 38) km from the ringing site 22 days – 11 years later. Fifteen birds were recovered in MAN Aug-Jan 52-366 (mean 135) km from the ringing site 15 days – 6 years later. One did not have any finding data and a chick ringed in Jul 1965 was shot in KAN (610 km NNW) in Oct the same year.

Paamiut: Two birds were recovered locally in Oct and Dec 1-11 years later.

Qaqortoq: Sixteen birds were recovered within QAT in Apr-Oct 0-167 (mean 45) km from the ringing site 5 days – 17 years later. Three birds were recovered outside the district: Two in NUU (400-720 km N) Oct the same year and 1 in PAA (150 km WNW) in Oct one and a half year later.

Foreign recoveries: Thirteen birds ringed as chicks on Flatey in W Iceland in 1975-1992 were recovered as follows (Map 66): 11 were shot in the Kulusuk-Tasiilaq/Ammassalik-area (c. 660 km W) between 26 Sep and 26 Feb 68-223 days after ringing (Sep 1, Oct 7, Nov 2, Feb 1), 1 was shot in QAT (1270 km SW) in late autumn the same year and 1 was shot in MAN (1390 km W) 10 Oct one year later.

MOVEMENTS

The Black Guillemot is the most widespread auk in Greenland (Salomonsen 1967b, Boertmann 1994, Boertmann et al. 1996). On the W coast, it has been found breeding as far north as Washington Land at c. 84ºN. On the E coast, only few birds breed north of southern Liverpool Land (ITT, c. 71ºN); there is a colony at Hvalros Ø off Wollaston Forland and probably a few pairs at Holm Land. Boertmann et al. (1996) assessed the breeding population in W Greenland to be in the range of 25 000 – 100 000 pairs noting that significant parts of the population were probably not included; no estimates exist for the smaller E Greenland population. Two subspecies of Black Guillemots breed in Greenland, the high-arctic *mandtii* and the low-arctic *arcticus*.

Gaston & McLaren (1990) described the Black Guillemot as "pagophilic", and this love of ice – related to its feeding habits – is the key to understanding the movements of arctic populations. Black Guillemots may winter in almost any area where there is some open water, in small cracks in landfast ice, in leads, polynyas and in offshore pack ice (e.g. Salomonsen 1967b, Bradstreet 1979,

Renaud & Bradstreet 1980, Gaston & McLaren 1990, Durinck & Falk 1996). In Greenland, small numbers of wintering Black Guillemots have been recorded as far north as AVA on the W coast and Wollaston Forland on the E coast (Knudsen 1933, Vibe 1950, Salomonsen 1967b). Apart from the fact that most birds leave AVA at the onset of winter, nothing is known about the migration of birds from this region. Very little is also known about the movements of the population breeding in E Greenland. Probably most of the population winters off E Greenland, perhaps with a few birds dispersing to Iceland and SW Greenland. Judging from the number of Black Guillemots recovered near Tasiilaq/Ammasalik some Icelandic birds also winter off this coast, at least until the ice cover becomes too dense in Jan-Feb.

More than 10 000 Black Guillemots have been ringed in W Greenland, and the recoveries provide some insight into the movements of these populations. Overall, the Black Guillemots in this region are short-distance migrants or residents. There is apparently no age-related segregation during winter, whereas many imm. birds remain some distance away from their natal area during summer. Comparing the median recovery distances during Nov-Mar of 1W birds (n = 191, median 233 km) with that of older birds (2W+; n = 77, median 299 km) no difference could be found (U = 6489, P = 0.13, Mann-Whitney U-test). During Jun-Aug, imm. birds (1-2S; n = 53, median 49 km) were recovered significantly farther away from the ringing site than older (3S+; n = 77, median 10 km; U = 956, P < 0.0001, Mann-Whitney U-test); the median recovery distance for 23 birds ringed as ads and recovered in the same period one or more years later was 18 km. In all populations some postbreeding dispersal occurs during early autumn. Of 231 birds ringed in UPV, UMA and Disko Bay and recovered more than 50 km away from the ringing site during Aug-Oct, 40 (17%) were recovered to the north. Both young (1C) and ad. birds participate in the northward dispersal; of 44 ad. birds 5 (11%) were recovered north of the ringing site. In these populations southward dispersal cannot be be distinguished from regular movements toward the wintering area. Of 48 birds ringed in MAN and recovered more than 50 km away from the ringing site during Aug-Oct, 45 (94%) were recovered to the north; the three birds recovered to the south were young (1C). Thus, in the MAN population northward dispersal cannot be be distinguished from regular short-distance movements.

Black Guillemots, Upernavik, W Greenland. Photo: K. Kampp.

Birds from UPV and UMA generally winter from Disko Bay south to NUU. Some birds remain north of this area, and others move even farther south reaching QAT, while still others (at least birds from UPV; Map 66) move west to winter on the Canadian coast; the large number of recoveries in Greenland suggests, however, that the majority of these populations remains here all year. The birds depart from UPV in mid Sep – mid Oct and from UMA in late Sep – late Oct (Table 110 and 111, Fig. 25), reaching Disko Bay in mid-late Oct; the breeders return in Apr-May, depending on ice conditions. Birds from Disko Bay winter in practically the same area as the UPV and UMA populations, but are on average recovered further south (Map 65, Table 110). When comparing the spatial distribution of UPV versus UMA birds recovered in Nov-Mar no difference is found (U = 6746, P = 0.080, Mann-Whitney U-test), whereas the distribution of birds ringed in Disko Bay differs significantly from that of UPV-UMA birds pooled (U = 3362, P < 0.0001, Mann-Whitney U-test). There is a weak tendency to a southward movement during winter among the populations breeding in UPV, UMA and Disko Bay (see Table 106-108 and 110). When comparing the winter distribution in NUU to UPV (Table 111) of these populations, there is a just significant difference (χ_{12}^2 = 21.98, P = 0.038), but, for example, just one recovery less in KAN in Feb would have rendered the result non

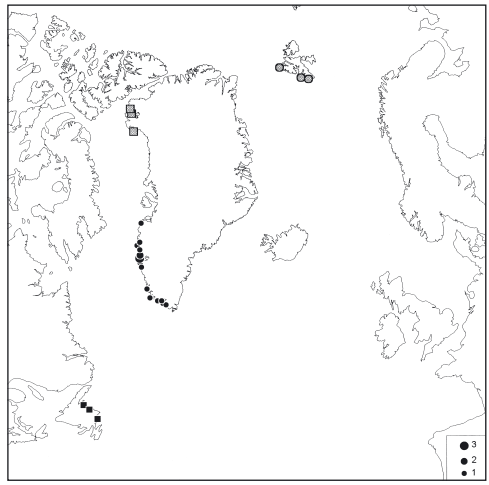
significant (P = 0.55). However, the drop from Jan to Feb in the number of recoveries (e.g. Table 111) suggests that the birds become less accessible to hunters at this time of the year. Probably many W Greenland birds stay offshore in the ice at least in Feb and Mar. Falk & Durinck (1996) recorded large numbers of Black Guillemots off Nuuk town in Feb 1989, mostly in 70-90% ice cover, while Gaston & McLaren (1990) recorded many in areas with 0-25% ice cover within 50 km of the coast from south of Kangaatsiaq town to the mouth of Kangerlussuaq/Søndre Strømfjord in Mar 1981; farther north and west in the Davis Strait most birds occurred in areas where the ice cover exceeded 90%. Few Black Guillemots have been ringed in KAN and SIS; apparently birds from this region essentially winter locally, i.e. from southern Disko Bay south to NUU. Birds from the populations in MAN and NUU are resident, on average wintering less than 100 km from their breeding site (see Fig. 25). Birds from PAA are seemingly also resident, while at least some birds from QAT move north to winter in PAA-NUU.

Apparently, few birds from foreign populations winter in W Greenland. While some young (1W) Icelandic Black Guillemots (of the subspecies *islandicus*) disperse westward to SE Greenland in autumn, very few seem to reach SW and W Greenland. Of the c. 14 300 Black Guillemots ringed in Iceland up to 1995 (Petersen & Gudmundsson 1998) only two have been recovered in W Greenland, although the recovery probability here is much higher than in E Greenland due to a larger human population and higher hunting pressure. Whether some birds from high-arctic Canada occur in W Greenland is still an open question.

Little Auk *Alle alle*

RECOVERIES

597 GRC of birds ringed Jun-Aug in 1946-1980 (Table 112), 18 FRC of birds ringed in Svalbard in Jun-Aug 1962-1964 (14; 13 ads or full-growns, 1 chick) and 1978-1994 (4; 3 ads, 1 chick).



Map 67. Recoveries of Little Auks ringed in AVA (filled squares; n = 3) and abroad (filled circles; n = 18). Shaded symbols denote ringing sites, filled symbols recovery sites. *Kort 67. Genfund af Søkonger ringmærket i AVA (fyldte firkanter) og i udlandet (fyldte cirkler). Gråtonede symboler viser mærkningssteder, fyldte symboler genfundssteder.*

Avanersuaq: A total of 588 birds ringed 1947-1980 has been recovered in AVA, but the data relating to ringing and recovery circumstances is generally rather imprecise and little information can be drawn from the material. Of the about 10 000 birds ringed in AVA only 3 have been recovered elsewhere, all ringed as full-grown and recovered in Newfoundland (c. 3100 km SSE) 15 Oct – 30 Dec 151-901 days later (Map 67).

Qeqertarsuaq: A bird ringed in Jul was shot near the colony in Jun one year later.

Aasiaat: Five birds ringed Jun-Jul were recovered near or in the colony 2-8 years later.

Foreign recoveries: Eighteen birds ringed in Svalbard have been recovered in W Greenland (c. 2775 km SW; Map 67). Two of these were ringed as chicks and recovered in NUU and MAN during winter (Dec and "winter") 116 – c. 500 days later.

Table 112. Ringing details of recovered Little Auks, broken down according to age and ringing district. *Ringmærkningsdata for genfund af Søkonge, opdelt efter mærkningsalder og -distrikt.*

	Ringed as				Recovered
Ringed	Chick	Older	Unknown	Total	abroad
AVA	7	309	275	591	3
QEQ		1		1	
ASI		5		5	
Total	7	315	275	597	3

The remaining 16 were ringed as ads or full-grown. Fifteen of these were recovered 20 Nov – 28 Feb (Nov 4, Dec 6, Jan 4, Feb 1) in QAT-KAN (60º30'N–68º00'N) 116-2700 days later, while 1 was recovered in PAA in Jul (probably wrongly dated, or sick bird).

MOVEMENTS

The Little Auk breeds in huge colonies in AVA (NW Greenland) and at the mouth of Kangertittivaq/Scoresby Sund (ITT, E Greenland); much smaller colonies are found in UPV and Disko Bay, and small numbers may breed in SW and NE Greenland. Boertmann & Mosbech (1998) crudely estimated the population in AVA at 20 million pairs while Kampp et al. (1987) estimated the population in ITT at a minimum of 3.5 million pairs; less than 10 000 pairs breed in UPV and Disko Bay combined. The vast majority of the global breeding population are found in Greenland (Nettleship & Evans 1985, Kampp et al. 1987, Boertmann et al. 1996); other large populations breed in Svalbard, Jan Mayen and arctic islands of Russia.

In AVA, the Little Auks arrive at the breeding colonies during May (the earliest around 5 May) and depart during late Aug (Salomonsen 1967b). After departing they undertake a rapid moult including remiges (Bédard 1985). Though detailed information about the autumn migration is lacking, it appears that the majority first follow the W Greenland Current, drifting around the northern end of Baffin Bay and then move southward following the Canadian Current along Baffin Island. They leave the northern parts of Baffin Bay during Sep and by early Oct the first birds reach Newfoundland when many still remain in the Davis Strait and the Labrador Sea (Brown 1985, Stenhouse & Montevecchi 1996). On the Greenland side of the Davis Strait, large numbers have been recorded during Sep from at least off Disko Bay south to about Maniitsoq town (Christensen & Lear 1977, Durinck & Falk 1996). In Nov-Dec, birds reach Nova Scotia and Georges Bank off Massachusetts; stragglers have been recorded as far south as Florida (Stenhouse & Montevecchi 1996). The majority winter on the Grand Banks off Newfoundland and to a lesser extent off Nova Scotia (Tuck 1971, Brown 1985, 1986, 1988, Stenhouse & Montevecchi 1996). Whether some NW Greenland birds winter off W Greenland is unknown, but the lack of recoveries of AVA-birds suggests that this may not be the case. During Mar-Apr the Little Auks depart from Nova Scotia and Newfoundland (Tuck 1971), passing through the Davis Strait in late Apr – early May and NW Baffin Bay in mid-late May; the first breeding birds reaching AVA in early May, the latest in late May – early Jun (Salomonsen 1967b, Renaud et al. 1982, Brown 1985, Stenhouse & Montevecchi 1996). Probably some 1S birds return to the breeding area, while others remain farther south, e.g. in the pack-ice zone off Baffin Island (Brown 1985, Stenhouse & Montevecchi 1996).

In ITT, the birds arrive at the breeding colonies in early May and depart during Aug (Meltofte 1976a). The migratory system of this population is unknown, but Salomonsen (1967b) speculated that the birds winter in the pack-ice zone off SE Greenland and off SW Greenland, which may well be the case. They are then wintering with birds from Svalbard and perhaps Jan Mayen. More than 15 000 birds have been ringed in Svalbard, resulting in 19 wintertime recoveries: the 17 in W Greenland mentioned above and two in Iceland in Jan and Mar, respectively (Norderhaug 1967, 1989, Isaksen & Bakken 1996). Numbers of Little Auks occur off AMM, SE Greenland, during autumn and early winter, i.e. until ice covers these waters (Salomonsen 1967b). The Little Auk is usually referred to as numerous off SW Greenland during winter (Salomonsen 1967b, Boertmann 1994), but actual knowledge of distribution, numbers involved and annual variations is sparse. Apparently, most birds arrive here during Oct (Boertmann 1994, Durinck & Falk 1996) and depart in Mar-Apr. Isaksen & Bakken (1996) suggested that the drop in the number of recoveries from Jan to Feb could indicate that most Little Auks of Svalbard origin have left SW Greenland in Feb. However, as a similar drop is found in the recoveries of related species such as Black Guillemot and Brünnich's Guillemot known to winter off SW Greenland in large numbers during Feb and Mar, it may well be an artefact caused by reduced accessibility to hunters due to ice and weather conditions. Brown (1984) found low densities of Little Auks in the NW Greenland Sea during late Feb and mid Mar, and suggested that the bulk of the population was no farther north than Iceland at this time. The main arrival to Svalbard takes place during the first half of Apr (Norderhaug 1989), so probably most birds leave SW and SE Greenland waters by late Mar and early Apr. Large numbers of Little Auks also winter in the E Atlantic (Isaksen & Bakken 1996 and references therein), e.g. an estimated 800 000 birds in the northern North Sea (Skov et al. 1995). Most of these are probably of Russian origin (cf. Norderhaug et al. 1977), but as even less is known about the size and movements of these

Table 113. Recoveries of Atlantic Puffins ringed abroad.
Genfund af Lunde ringmærket i udlandet.

	Ringed as				Recovered in		
	Chick	Older	Unknown	Total	District	Month	Time
Norway	2		1	3	QAT	Nov-Jan	133-166 d
Shetland	1			1	QAT	Nov	136 d
Wales		1		1	NUU	winter	4 yrs?
Faeroe Isl.		1		1	SW Greenl.	summer	7 yrs?
Vestmanna, Iceland	1			1	QAT	Nov	62 d
Flatey, Iceland		1		1	MAN	Dec	18 yrs

populations, it cannot at present be excluded that part of the Svalbard and/or E Greenland population also winter in the E Atlantic. Although rather unlikely, it even cannot be excluded that some Svalbard/E Greenland birds winter off N America – there is still much to be learned about the migratory system of the most numerous seabird in the North Atlantic.

Atlantic Puffin *Fratercula arctica*

RECOVERIES

8 GRC of birds ringed Jul-Aug 1946-1969, 8 FRC of birds ringed Jun-Sep 1957-1979 (Table 113, Map 68).

Upernavik: A bird ringed as ad. was shot near the colony one year later.

Aasiaat: An unaged and an ad. bird were shot near the colonies five years later.

Nuuk: Five birds have been recovered: Four were shot near the colony in summer 3-12 years later and 1, a bird ringed as a chick in Jul, was shot 3 Dec the same year in Conception Bay, Newfoundland (1850 km S).

Foreign recoveries: Eight birds ringed abroad (Iceland, Norway, Faeroes and Great Britain) have been recovered in SW Greenland, primarily during winter (Nov-Jan; 1957 1, 1958 2, 1968 2, 1979 2, 1993 1; Table 113, Map 68).

MOVEMENTS

The Atlantic Puffin breeds on the W coast from QAT to AVA; a few may also breed in the Kangertittivaq/Scoresby Sund area on the E coast. On the W coast most colonies are found in NUU, Disko Bay and UPV; the total breeding population is tentatively estimated at 5000-8000 pairs (Boertmann 1994, Boertmann et al. 1996). During winter, the Atlantic Puffin is usually rare in the Open Water Region but can be numerous some years (Boertmann 1994).

Puffins normally winter far offshore and their movements are still poorly understood. European and Icelandic populations mostly winter in the E Atlantic (roughly between 67º and 40ºN), while the North American populations primarily winter off Newfoundland (Harris 1984, Brown 1985, Gaston & Jones 1998, Petersen 1998). However, many – especially young – birds from Europe and Iceland move westward to winter in the NW Atlantic off Newfoundland and at least some years off SW Greenland (Tuck 1971, Brown 1985, Petersen 1998). As suggested by the recoveries in Greenland some ad. European birds also participate in this movement. The Grenlandic population probably also winters in the NW Atlantic, perhaps from the Labrador Sea south to Nova Scotia.

Map 68. Recoveries (filled circles) of Atlantic Puffins ringed abroad (n = 8); stars denote ringing sites.
Kort 68. Genfund af Lunder ringmærket i udlandet. Stjerner viser mærkningssteder.

Northern Wheatear *Oenanthe oenanthe*

RECOVERIES

35 GRC (Table 114) of birds ringed in Apr-Sep 1947-1989.

Uummannaq: Five birds were recovered locally after 2-55 days. Two birds ringed as chicks were recovered abroad as 2C (Map 69): One was trapped 1 May 1955 near Ruiselede, Belgium (3680 km SE), another was controlled 8 May 1959 in Devonshire, Britain (3250 km SE).

Table 114. Ringing details of recovered Northern Wheatears, broken down according to age and ringing district. *Ringmærkningsdata for genfund af Stenpikker, opdelt efter mærkningsalder og -distrikt.*

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA	6		1	7	2
QEQ	2			2	
ILU	2		1	3	2
ASI			1	1	1
MAN	2			2	
NUU	3	5		8	5
QAT	5	3	2	10	4
AMM		2		2	
Total	20	10	5	35	14

Qeqertarsuaq: Two birds were recovered locally after 22-183 days, respectively. The latter was found mummified in Jan.

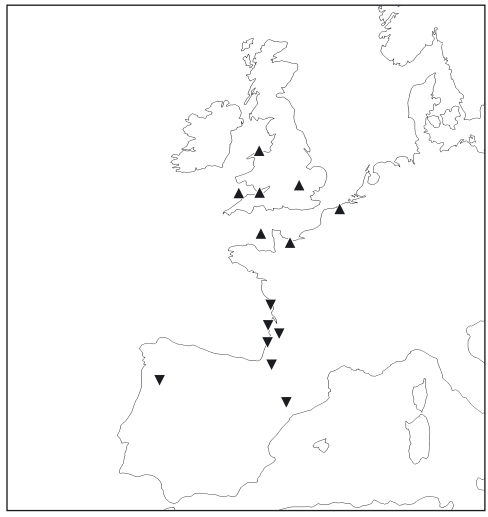
Ilulissat: One bird was recovered locally after 20 days. Two birds ringed as chicks were recovered abroad (Map 69): One was recovered as a 1C near Chaves in northern Portugal 18 Oct 1947 (4100 km SE), another was recovered as a 2C 25 May 1949 in Hertfordshire, Britain (3350 km SE).

Aasiaat: A bird ringed 24 Jun 1952 was recovered 5 Sep the same year in Gironde, France (3965 km SE; Map 69).

Maniitsoq: Two birds were recovered locally after 13-46 days.

Nuuk: Three birds were recovered locally after 1-31 days. Five birds were recovered abroad (Map 69): A bird ringed as full-grown 19 Aug 1976 was recovered 6 Oct the same year in Landes, France (4010 km SE), 1 ringed as ad. 13 Sep 1966 was recovered in early Oct four years later in Gironde, France (3850 km SE), 1 ringed as chick 29 Aug 1966 was recovered 15 Oct the same year in Charente-Maritime, France (3725 km ESE), 1 ringed as ad. in Jun 1966 was recovered in late Apr two years later on Guernsey, Channel Islands (3370 km ESE), and 1 ringed as ad. 13 Sep 1966 was recovered 12 May three years later in Wales (3165 km ESE).

Qaqortoq: Six birds were recovered locally, 5 after 10-40 days, 1 one year later. Four birds were recovered abroad (Map 69): A bird ringed as chick 6 Aug 1956 was recovered early Oct the same year in Vendée, France (3450 km ESE), 1 ringed as full-grown 11 Aug 1980 was recovered 3 Oct the same year in Lérida, Spain (3750 km ESE), 1 ringed as full-grown 14 Aug 1979 was recovered 6 May 1980 in Calvados, France (3210 km ESE), and 1 ringed as full-grown in Aug 1980 was recovered 15 May one year later in Wales (2610 km ESE).



Map 69. Northern Wheatears ringed in Greenland and recovered abroad (n = 14). Triangles pointing downwards denote recoveries in Sep-Oct, triangles pointing upwards recoveries in Apr-May.
Kort 69. Stenpikkere ringmærket i Grønland og genfundet i udlandet. Nedadvendte trekanter angiver fund i sep-okt, opadvendte trekanter fund i apr-maj.

Ammassalik: Two birds were recovered locally after 1-2 days.

MOVEMENTS

Northern Wheatears are abundant breeders in most of western and eastern Greenland, on the W coast occurring as far north as Avanarliit/Inglefield Land, on the E coast north to Dove Bugt and occasionally Hertugen af Orleans Land (i.e. at 78-79ºN); they are scarce in the northern parts of the breeding range (Boertmann 1994). The Greenland breeding population belongs to the subspecies *leucorhoa*, which also breeds in NE Canada and Iceland; it winters in tropical west Africa, supposed-

ly from Senegal and Sierra Leone east to Mali (Cramp 1998). Main spring arrival in Greenland takes place from late Apr through late May while autumn departure occurs from Aug to late Sep; a few birds may remain until late Oct and even early Nov (Salomonsen 1967b, Boertmann 1994). Boertmann (1979 and in litt.) recorded large concentrations of Wheatears at Kangerlussuaq/Søndre Strømfjord in late Jul/early Aug (but very few in Sep) and near Qaqortoq, SW Greenland, in late Aug. Before starting their autumn migration, the Greenland Northern Wheatears store large fat reserves. Based on studies of Northern Wheatears in captivity, Ottosson et al. (1990) found that the relative increase in the premigratory body mass of Greenland birds was almost twice as high as that of Northern Wheatears breeding in Scandinavia.

Seven birds on autumn migration have been recovered outside Greenland (Map 69), all in western Europe from France (46ºN) to northern Portugal (42ºN); the median recovery distance is 3846 km SE. Apart from an unaged bird recovered 5 Sep, the recoveries are dated early-mid Oct (1-18 Oct; two unaged, one ad. and three 1C). Another seven birds have been recovered during spring migration in Europe, from northern France (49ºN) to northern Wales (53ºN) during late Apr – late May (28 Apr – 25 May; five during the first two weeks of May). In spring, the centre of gravity for the recoveries falls about 800 km farther north than in autumn ($U = 8.51$, $P < 0.001$, Mann-Whitney *U*-test).

The autumn recoveries in western Europe suggest that the Greenland Northern Wheatears embark on a nonstop crossing of the Atlantic, reaching the European coast south of the British Isles. After replenishing their fuel reserves they then migrate SSW or SW to reach their African winter quarter in perhaps one or two nonstop flights (Salomonsen 1967b). However, there are indications that Greenlandic birds may migrate directly to western Africa. Based on the occurrence of *leucorhoa* Northern Wheatears on the Selvagems between Madeira and the Canary Islands in early and mid Sep, Thorup et al. (in press) argued that some Nearctic Northern Wheatears fly to W Africa in a single nonstop flight over the Atlantic. The Northern Wheatears on the Selvagems had low weights and their arrival was not correlated with the occurrence of other grounded European land birds. Theoretically, the Northern Wheatears should be able to cover the about 4400 km from southern Greenland to the W African coast in a single flight, especially when utilizing tail-winds (Alerstam 1996, Thorup et al. in press). Furthermore, the European recoveries (six of seven in Oct) are rather late in autumn and suggest that the birds could have been forced to follow a more northerly course by adverse weather, rather than their normal migration route; the chance of getting recoveries from birds migrating directly to western Africa is of course almost nil. Normally, most Northern Wheatears have left Greenland before mid-late Sep, and migrating Northern Wheatears have been recorded on ships in the Atlantic from mid Aug to mid Oct with most of the records during the first three weeks of Sep (Snow 1953, Luttik & Wattel 1979). Large landfalls of *leucorhoa* Northern Wheatears have been recorded on the British Isles, even as late as mid Oct (Thorpe & Spencer 1992, Cramp 1998). Though the origin of the autumn birds recorded in Britain is not clear (many probably come from Iceland), the exceptionally late and large fall recorded on the Isle of Man 18 Oct 1986 by Thorpe & Spencer (1992) is interesting. It occurred during a strong WNW airstream coming directly from Greenland after a long period of adverse weather over the northern Atlantic, which may have forced many Northern Wheatears to postpone their migration.

In spring, the recoveries in western Europe suggest that the Greenland Northern Wheatears arrive to areas around the English Channel (i.e. farther north than in autumn) during late Apr – mid May. The lack of recoveries south of northern France could indicate that the birds arrive after long direct flights, perhaps from stopover sites in the western Mediterranean (northwestern Africa/southwestern Europe). Numbers of *leucorhoa* Northern Wheatears pass through the British Isles in spring (Cramp 1998) and though many of these probably are of Icelandic origin, the recoveries show that Greenland birds are also involved in this passage. Few details are known about the last stages of the spring migration. Many probably stage in Iceland, where Northern Wheatear numbers peak in mid May (Petersen 1998), before crossing the inland-ice en route to W Greenland (Salomonsen 1967b, Alerstam et al. 1986). Salomonsen (1967b) suggested that the Northern Wheatears' transoceanic migration, following more northern latitudes in spring than in autumn, has evolved as an adaption to the prevailing weather systems, i.e. the depressions regularly moving eastwards south of Iceland. By passing behind and south of the depressions in autumn the birds will enjoy assisting tailwinds, as they will by migrating north of the approaching depressions in spring.

Common Raven *Corvus corax*

RECOVERIES

85 GRC (Table 115) of birds ringed in May-Nov 1947-1994. See also Table 116 and Map 70. Most of the unaged birds from May-Jul were probably ringed as nestlings and are treated as such here.

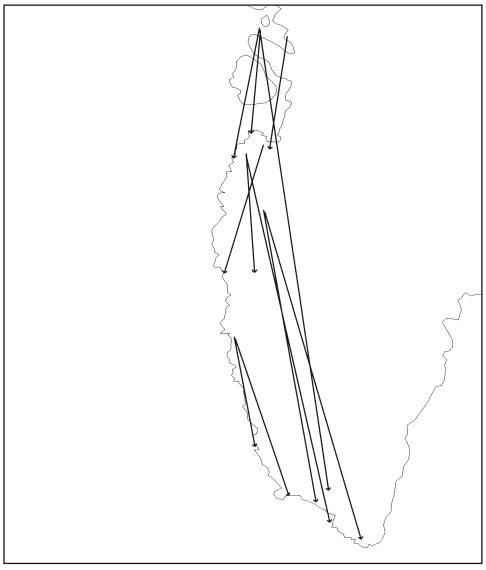
Upernavik: A bird ringed in Nov was shot within the district (125 km SE) two years later.

Uummannaq: Nine birds ringed in Jun-Jul have been recovered. One of these was found within the district (90 km ESE) in Dec the same year. Three were shot in QEQ 81-170 km S-SSE (2 in Dec-Jan one and two years later, 1 in Jun almost 9 years later). One was taken by dogs in ILU (110 km SE) in May the following year, 2 were shot in ASI (230 km S) in May two years later and in Nov the same year, 1 was shot in KAN (275 km S) in Dec the same year, and 1 was found recently dead in QAT (1130 km SSE) in Apr/May the following year.

Qeqertarsuaq: Three birds ringed as chicks were recovered: One in UMA (no other finding data), 1 locally after 92 days, and 1 in KAN (110 km S) in Feb three years later.

Ilulissat: A bird ringed as a chick in Jul was shot in Aug one year later 40 km to the west, 1 ringed in May was shot in KAN (190 km SSW) in mid Sep the same year and 1 ringed in Jul was shot in ASI (151 km SSW) in early Nov the same year.

Aasiaat: Six birds ringed in Jun were recovered: Two were found within the district in Jul and Nov one year later (less than 50 km from the ringing site). Three were recovered in KAN (60-105 km SSW) in May four years later and in Aug (2; the same year), and 1 was shot in MAN (365 km S) in Jan 16 months later.



Map 70. Movements of Common Ravens recovered more than 200 km from the site of ringing.
Kort 70. Trækbevægelser hos Ravne genmeldt mere end 200 km fra ringmærkningsstedet.

Ravens, Nuuk, W Greenland. Photo: K. Falk.

Table 115. Ringing details of recovered Common Ravens, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Ravn, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UPV			1	1	
UMA	2		7	9	
QEQ	3			3	
ILU	1		2	3	
ASI			6	6	
KAN	2		2	4	
SIS	2			2	
MAN	8	32	5	45	
NUU	3		1	4	
PAA	2			2	
QAT	4		2	6	
Total	27	32	26	85	

Kangaatsiaq: Four birds ringed in Jun were recovered: Two were recovered locally four months after ringing, 1 was recovered sometime somewhere in "western Greenland", and 1 ringed as chick was shot in QAT (970 km SSE) in Mar almost 4 years later.
Sisimiut: Two birds ringed as chicks were recovered in SIS the same year ("winter") and in QAT six years later ("spring").
Maniitsoq: Forty-five birds ringed in Jun-Aug were recovered. The majority were ringed at the Kangerlussuaq/Søndre Strømfjord landfill during a Common Raven study initiated in 1992 (Restani et al. 1996). Twenty were shot at or near the dump in Sisimiut town (SIS) c. 125 km W during Sep-Mar (15 in Oct-Nov) 87-882 days later. The remaining birds were recovered as follows: Thirteen were found locally after 16-2647 days, 10 were recovered elsewhere 85-318 km away after 15-1208 days, and 2 (ringed as 1C and 2Y+) were recovered in QAT (760 and 810 km SSE) in Nov the same year.
Nuuk: Four birds ringed in Jun were recovered: One was found locally after 129 days, 1 was shot within the district 110 km from the ringing site some 4 years later, 1 was caught in a fox-trap in PAA (230 km SSE) in Feb almost 11 years later, and 1 was shot in QAT (425 km SSE) in Dec two and a half years later.
Paamiut: Two siblings were recovered: One was found dead 49 km from the nest in early Aug one year later, the other was shot in NUU (105 km NNW) in Sep the same year.
Qaqortoq: Six birds ringed in Jun-Jul were recovered: Four were found locally after 24-79 days and 2 were shot in the district 60-75 km from the nest after 88-330 days.

MOVEMENTS

The Common Raven is a widespread and common breeder in Greenland, on the W coast occurring as far north as Avanarliit/Inglefield Land, on the E coast north to Ymer Ø and occasionally even farther north, e.g. Hochstetter Forland at c. 75ºN (Boertmann 1994). The breeding population belongs to the Nearctic subspecies *principalis.*

During winter, Common Ravens can be seen in most of their breeding range, even in the high Arctic (Salomonsen 1967b, Boertmann 1994). Dispersal of young W Greenland birds takes place from Aug-Sep (Table 117) and, as exemplified by birds ringed in UMA and MAN and reported from QAT respectively 809 and 1130 km to the south, some may move considerable distances during their first winter. Older birds may also move quite long distances: a 2C+ bird ringed in MAN was shot mid Nov in QAT 757 km to the south while a bird ringed as nestling in KAN was shot in QAT in early Mar almost four years later 972 km to the south. The latter may have emigrated, but four recoveries during May-Sep of birds older than three years were all reported less than 110 km (mean 65 km) from the ringing site, suggesting that long distance emigration is not common.

Generally, Common Ravens born north of the Open Water Region seem to disperse farther than birds from central W Greenland, while the birds from southern Greenland appear to be mainly resident (Table 116). Nothing is known about the movements of birds from eastern Greenland. Much of the movements of the Common Ravens is associated with the search for food. For example, in early autumn many birds – both ads and imms – move 130 km from the Kangerlussuaq/Søndre Strømfjord area to feed at the dump at Sisimiut

(Restani et al. 2001). In their search for food, Common Ravens often occur in the drift ice far off the coast (Boertmann 1994, Falk & Durinck 1996). In a study of marked birds in Switzerland, Huber (1991) showed that flocking imm. birds moved around in an area as large as 10 000 km^2.

Mealy Redpoll

Carduelis flammea

RECOVERIES

31 GRC (Table 118) of birds ringed in May-Sep 1936-1995.

Uummannaq: One local recovery after 2 days.

Maniitsoq: One local recovery after 5 days and 10 local recaptures after 55 days (1), 2 years (7) and 3 years (2). More interestingly, an ad. female ringed 18 Jul 1995 was controlled 16 Mar 1996 near Houghton, Michigan, USA (47º00'N 88º52'W), close to the Canadian border (3100 km WSW).

Nuuk: Three local recoveries: A bird ringed in May was found dead one day later, a bird ringed in early Sep was recovered 23 days later, and a breeding bird ringed in Jul was caught one year later.

Qaqortoq: One local recovery after 7 days.

Ammassalik: Fourteen birds ringed in Tasiilaq/Ammassalik in May 1983 were found dead 5-20 days later after a spell of bad weather.

MOVEMENTS

The Mealy Redpoll is a widespread and common breeder in Greenland, on the W coast occurring as far north as UPV and recently AVA, on the E coast north to Kong Oscars Fjord in NEA (Boertmann 1994). The Greenland breeding population belongs to the subspecies *rostrata*, also breeding in NE Canada. Though small numbers winter from Nuuk and southwards, most of the Greenland population is migratory, leaving the country in late Aug-Oct or even later in the case of the SE Greenland population (Salomonsen 1967b, Boertmann 1994). Return passage occurs during late Apr-May.

Salomonsen (1967b) stated that the W Greenland population migrates to SE Canada and the E Greenland population to Iceland, some reaching the British Isles. Actual knowledge about the migration of the Greenland Mealy Redpoll is, however, sparse. The recovery from Michigan shows that some birds from W Greenland at least in some years may migrate considerable distances and suggests that the wintering areas may extend into the northern USA. Most of the W Greenland population undoubtedly migrates to North America, but the movements of the E Greenland population are largely unknown. Mealy Redpolls of probable Greenlandic origin (i.e. *rostrata*) do occur on the British Isles, primarily NW Scotland, in varying but generally low numbers (Williamson 1953, 1963, Cramp 1998). The birds usually arrive here in Sep – early Oct, but in years with higher numbers the first birds occur during the last days of Aug (Williamson 1953). Very little is known about the occurrence of the Greenland Mealy Redpoll in Iceland, mainly because the Icelandic birds (subspecies *islandica*) vary much both in plumage characters and in numbers, making it difficult to differentiate the two populations (Petersen 1998, Æ. Petersen in litt.). Perhaps most of the E Greenland population migrates to North America like the Lapland Buntings and the Snow Buntings breeding in southern E Greenland. If so, the occurrence of Greenland birds on the British Isles and maybe even in Iceland could be a result of the birds' response to wind and weather conditions during their migration.

Lapland Bunting

Calcarius lapponicus

RECOVERIES

119 GRC (Table 119) of birds ringed in late Apr – mid Sep 1946-1995.

Uummannaq: Eighteen local recoveries after 0-6 years: 11 after 0-32 days, 4 one year later, 2 two years later, and 1 six years later.

Qeqertarsuaq: Eleven local recoveries after 0-5

Table 118. Ringing details of recovered Mealy Redpolls, broken down according to age and ringing districts.
Ringmærkningsdata for genfund af Gråsisken, opdelt efter mærkningsalder og ringmærknings distrikter.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA			1	1	
MAN		2		2	1
NUU		2	1	3	
QAT			1	1	
AMM		13	1	14	
Total		17	4	21	1

Table 119. Ringing details of recovered Lapland Buntings, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Laplandsværling, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
UMA	15		3	18	
QEQ	3	4	5	12	
ILU	3	2	3	8	1
ASI	1		1	2	
MAN	2	5		7	
NUU	1	49	4	54	1
PAA			1	1	
QAT	3	2		5	
AMM		12		12	2
Total	28	74	17	119	4

years: 7 after 0-95 days, 3 one year later, and 1 five years later. One bird ringed as a chick was recovered in UMA (160 km NNW) in Jul one year later.
Ilulissat: Seven local recoveries after 0-2 years: 3 after 15-35 days, 3 one year later, and 1 two years later. A bird ringed in mid Jul 1955 was caught 1 Oct 1955 at Berens River, Ontario, Canada (52º02'N 95º22'W, 3000 km WSW; Map 71).
Aasiaat: Two local recoveries after 1 and 2 years, respectively.
Maniitsoq: Two local recoveries after 14 and 20 days, the latter found in a Peregrine Falcon nest, and 5 local recaptures after 2 years (3) and 3 years (2).
Nuuk: Fifty-three local recoveries/controls (involving 44 birds) after 0-5 years. Of these, 51 were controlled/recovered after 1-23 days, the latest 23 Sep. An ad. male was controlled one year later, while a bird ringed as a chick was found newly dead 5 years later. A male ringed in early Jul 1977 was found dead in spring 1979 in Iowa, USA (42º37'N 94º09'W, 3600 km WSW; Map 71).
Paamiut: A bird ringed in late Jul was recovered in early Aug in NUU (360 km NNW) three years later.
Qaqortoq: Five local recoveries after 1 or 2 years.
Ammassalik: Seven local recoveries after 2-114 days. Three other birds were recovered in AMM: 2 after 14 days 14-20 km WNW, and 1 a year later 67 km ENE. Two birds, both ringed as full-grown females, were recovered abroad (Map 71): One ringed in Aug 1975 was recovered in Dec the same year in Quebec, Canada (53º50'N 79º01'W, 2600 km SW) while another ringed in Aug 1977 was recovered in spring 1979 in Minnesota, USA (48º51'N 95º46'W, 3900 km SW).

MOVEMENTS

The Lapland Bunting is a widespread and common breeder in W Greenland, occurring as far north as central AVA. In E Greenland it breeds more or less continuously northwards to Kangertiitivaq/ Sco-

Map 71. Lapland Buntings ringed in Greenland and recovered abroad (n = 4).
Kort 71. Laplandsværlinger ringmærket i Grønland og genmeldt i udlandet.

Lapland Bunting, SW Greenland. Photo: K. Falk.

resby Sund and Jameson Land, but it is, at least in the northern part of the breeding range, less common than in western Greenland (Boertmann 1994). Though small numbers may winter in the southern parts of western Greenland, the Lapland Bunting is migratory, mainly wintering in North America (Salomonsen 1967b). The birds depart from Greenland during mid Aug – early Oct and return in late Apr – May (Boertmann 1994).

Most Lapland Buntings seem to have left Greenland by mid-late Sep; none have been recovered after 23 Sep (Salomonsen 1967b, Fox et al. 1992b, this material). During Aug-Sep, few W Greenland birds have been recovered south of the ringing site, suggesting that the birds quickly cross the Davis Strait towards Canada. Of 26 W Greenland birds recovered the same autumn as they were ringed, only three were recovered away from the ringing site (75 km S (2) and 65 km NE, respectively); of seven birds ringed in E Greenland, two were recovered 14-20 km to the north. Fox et al. (1992b) found that the body mass of birds caught at Kangerlussuaq/Søndre Strømfjord, W Greenland reached a maximum in early Sep (1C birds increasing their mass by 17-22%) and argued that the accumulated fat reserves were sufficient to fuel a nonstop flight to the Labrador coast or northern Quebec in Canada, a distance of 1000-1100 km.

On the basis of one recovery in central Canada of a W Greenland bird and observations of Lapland Buntings crossing the Davis Strait in spring and autumn, Salomonsen (1967b) stated that the Greenland population wintered in North America, i.e. southern Canada and the northern-mid USA. Since then, another W Greenland and two E Greenland birds have been recovered in North America. These recoveries show that the Greenland population indeed winters on the plains of North America from southern Canada south to Iowa in the USA. Several authors have argued that small numbers of (E) Greenlandic Lapland Buntings reach NW Europe, occurring from SW Norway south to NW France, including the British Isles and Iceland (e.g. Williamson & Davis 1956, Jacobsen 1963, Yésou 1983, Schekkerman 1989, Francis et al. 1991, Fox et al. 1992b). The Lapland Bunting does not breed in Iceland but occurs annually in low numbers during spring and autumn (Fox et al. 1992b, Petersen 1998), and biometrics suggest that most have a Greenland provenance (Fox et al. 1992b; Greenland birds are on average larger than Scandinavian, Francis et al. 1991). Similarly, large Lapland Buntings whose biometrics suggest a Greenland origin have been recorded in Britain and the Netherlands (Francis et al. 1991, Schekkerman 1989), particularly in early autumn. Thus, a fraction of the E Greenland population may reach western Europe each year. Fox et al. (1992b) speculated that energetically it would make sense for Lapland Buntings breeding as far north as Tasiilaq/Ammassalik to migrate to North America either via the inland-ice and stopover sites in W Greenland or along the SE coast to S Greenland. In contrast, for the small population breeding farther north, e.g. in the Scorebysund area, the route to Iceland and farther would be more advantageous. This migration pattern, however, remains to be clarified. Perhaps some of the Lapland Buntings from E Greenland simply use the route to Europe in some years and the route to North America in other years depending on weather conditions – as could be the case for the Snow Bunting.

In spring, the Lapland Buntings arrive in Greenland from late Apr (earliest recovery 2 May), males before females. Males newly arrived to W Greenland had very low weights (Fox et al. 1992b), suggesting long distance migration before arrival. Like Snow Buntings, many E Greenland Lapland Buntings probably cross the inland-ice on their return journey from North America, but the relative importance of coastal migration via S Greenland versus transglacial migration is not known (Alerstam et al. 1986). Of 25 birds recovered in W Greenland one or more years after ringing, only two were recovered more than 30 km away (158-355 km NW), suggesting that site fidelity is high.

Snow Bunting

Plectrophenax nivalis

RECOVERIES

1168 GRC (Table 120) of birds ringed in Apr-Oct 1926-1989, the majority (76%) in 1966-1977, 6 FRC of birds ringed 1931-1992.

Avanersuaq: Four local recoveries: Two after 4-23 days, 1 a year later and 1 two years later (both in Jul).

Upernavik: Forty-nine birds ringed in Upernavik town in May-Oct (15 May – 16 Oct) were controlled locally 59 times in subsequent years during May-Aug (6 May – 21 Aug). Forty birds were controlled one year, 8 two years and 1 three years later. The majority were controlled in May (41) as males (37), some perhaps still on migration. An ad. female ringed in Jun was found injured in Quebec, Canada (3100 km SSW), in mid Apr the following year.

Table 120. Ringing details of recovered Snow Buntings, broken down according to age and ringing district.
Ringmærkningsdata for genfund af Snespurv, opdelt efter mærkningsalder og -distrikt.

	Ringed as				
Ringed	Chick	Older	Unknown	Total	Recovered abroad
AVA	3	1		4	
UPV		43	17	60	1
UMA	15		38	53	2
QEQ	3	1	8	12	
ILU	23	9	15	47	11
ASI	3		5	8	
KAN		1		1	
SIS	1			1	
MAN	25	2	6	33	
NUU	69	731	96	896	28
PAA	1	1		2	
QAT	1		5	6	
AMM	3	21	1	25	4
NEA	1	17	2	20	13
Total	148	827	193	1168*	59

* incl. 922 controls

Table 121. Temporal and spatial distribution of recoveries of Snow Buntings ringed in W and SE Greenland. One recovery from Quebec in 'spring' and controls in Greenland are excluded. The bird recovered in Iceland was ringed in SE Greenland.
Tidsmæssig og geografisk fordeling af genfund af Snespurv ringmærket i V og SØ Grønland. Et genfund fra Quebec om 'foråret' samt kontroller i Grønland er udeladt. Fuglen genmeldt i Island blev mærket i SØ Grønland.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Labrador, Canada	1			5	2								8
Newfoundland, Canada	1			6						1			8
Quebec, Canada		2	3	12						1			18
New Brunswick, Canada		1		1									2
Nova Scotia, Canada											1		1
Ontario, Canada	1	2	1										4
Michigan, USA		1											1
New York, USA			2										2
Iceland				1									1
W & SE Greenland	2		1	9	29	25	36	47	21	9		1	180
Total	5	6	7	34	31	25	36	47	21	11	1	1	225

Uummannaq: Forty-two birds ringed in Jun-Aug in eight settlements were controlled 51 times. One was found 102 km SSE two years later. All others were controlled locally after 2-61 days (24 birds) or one (13), two (5), three (1) and four (1) years later. All birds were controlled 27 Apr – 5 Oct, the majority (35) in Jun-Aug. Two birds ringed in Jul were recovered abroad: One in Quebec, Canada (2800 km SSW), in Apr four years later and 1 in Minnesota, USA (3400 km WSW), in Feb three years later.

Qeqertarsuaq: Eleven birds were recovered locally during May-Sep (11 May – 17 Sep) after 6-74 days (7), one year later (3) and four years later (1). A bird ringed as a chick in 1961 was shot in late Jan 1963 in PAA (970 km SSE).

Ilulissat: Thirty-one birds were recovered locally during Apr-Dec (26 Apr – 11 Dec) after 2-80 days (9), or one year (10), two years (6), three years (3), seven years (1) and ten years (2) later; the latter two perhaps erroneously dated. Only 1 bird recovered within the district was found away from the ringing site: 25 km E in Jul one year later. Four birds were recovered elsewhere in Greenland: A young bird ringed in Jul was killed in MAN (580 km S) in late Jun two years later, a young bird ringed in mid Aug was killed in UMA (85 km NNW) in early Jun three years later, a bird ringed in late Apr was killed in UMA (150 km NNW) four days later and a bird ringed in late Jul was

caught in NUU (590 km S) in late May or early Jun two years later. Eleven birds were recovered abroad after 257-1390 days: Five in Quebec (Canada; 4 in Apr, 1 in Oct, c. 2500 km SSW), 1 in Labrador (Canada; May, 1650 km SSW), 2 in New Brunswick (Canada; Feb, Apr, c. 2650 km SSW), 1 in Newfoundland (Canada; Apr, 2150 km S), 1 in Ontario (Canada; Feb, 3000 km SSW) and 1 in New York (USA; Mar, 3400 km SSW); see Table 121 and Map 72.

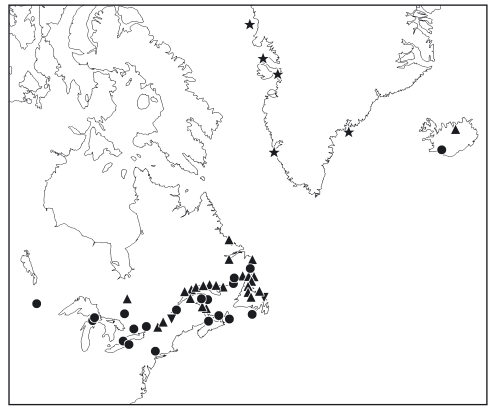
Aasiaat: Seven birds were recovered locally during Jul-Sep (11 Jul – 20 Sep) after 2-75 days (5) and one year later (2). A young bird ringed in mid Aug was killed in MAN (425 km S) in late Sep the same year.

Kangaatsiaq: A bird ringed in Aug was found dead near the ringing site 27 days later.

Sisimiut: A chick ringed in Jul was found dead near the ringing site in early autumn the same year.

Maniitsoq: All 33 recoveries are from within the district. Six do not have any other finding data, the remaining were recovered locally during Apr-Oct (20 Apr – 15 Oct) after 0-57 days (19) or one year (4) and two years (4) later.

Nuuk: Large numbers of Snow Buntings have been ringed in Nuuk town, especially during Apr-May and Aug-Sep 1966-73. A total of 470 birds was subsequently controlled locally 1-16 times (845 controls) after 0-164 days (384), or one year (273), two years (118), three years (40), four years (18), five years (9) and seven years (1) later. The birds recovered or controlled one or more years later were reported during the period 25 Mar – 22 Oct; the earliest female 28 Apr. Of the birds controlled the same year as ringed, 69% were controlled within a week after ringing, 15% 1-2 weeks later and 8% 2-3 weeks later; 11 (2%) were controlled more than 100 days later. Only 2 birds recovered within the district were found away from the ringing site: One ringed in early May was controlled exactly one year later 130 km SSE, another ringed in mid May was found recently dead in mid May four years later 80 km N. Twenty-one birds were recovered elsewhere in Greenland. Twenty of these were recovered in MAN 71-221 (mean 128) km NNW; 7 3-36 days later (1 in Oct, 6 in late Apr – early Jun), the remaining during Apr-Oct (12 Apr – 15 Oct) and Jan (2) one or more years later. One ringed in early May was recovered in PAA (260 km SSE) in summer some years later. Twenty-eight birds were recovered abroad after 37-2186 days, all but one in Canada: Eleven in Quebec (Feb 1, Mar 2, Apr 7, spring 1; c. 1800 km SSW), 7 in Labrador (Apr 6, May 1; c. 1375 km SSW), 5 in Newfoundland (Apr 4, Oct 1; c. 1575 km S), 3 in Ontario (Jan, Mar, Apr; c. 2750 km WSW), 1 in Nova Scotia (Nov, 2050 km SSW) and 1 near Kingston in New York (USA; Mar, 2850 km SSW); see Table 121 and Map 72.



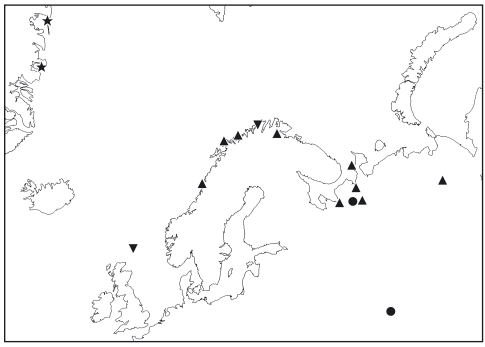
Map 72. Snow Buntings ringed in W and SE Greenland and recovered abroad (n = 51; 4 birds ringed in USA and 1 in Iceland included). Stars denote ringing sites for Greenland birds, triangles pointing downwards recoveries in autumn (Sep-Oct), circles recoveries in winter (Nov-Mar) and triangles pointing upwards recoveries in spring (Apr-May).
Kort 72. Snespurve ringmærket i V og SØ Grønland og genmeldt i udlandet (4 fugle mærket i USA og 1 i Island inkluderet). Nedadvendte trekanter angiver fund i sep-okt, cirkler fund i nov-mar, opadvendte trekanter fund i apr-maj.

Paamiut: A bird was recovered locally after a month, another ringed in mid Apr was caught in KAN (670 km NNW) 27 days later.

Qaqortoq: Six birds were recovered locally after 14-32 days (5) and one year later (1).

Ammassalik: All birds were ringed in Tasiilaq town (65º35'N). Eleven birds were recovered locally after 0-33 days, while 8 were recovered locally after one year (5) and two years (3) 23 Apr – 14 Jun. A bird ringed in late Apr was recovered 24 days later 65 km ENE. A bird ringed in mid Apr 1973 was controlled in NUU (680 km SW) in mid Apr two years later. Four birds were recovered abroad after 267-1448 days: One in Quebec (Canada; Feb, 2500 km WSW), 2 in Newfoundland (Canada; Jan and Apr, c. 2100 km SSW), and an ad. male in northern Iceland (Apr, 900 km E); see Table 121 and Map 72.

Northeast Greenland: The birds were ringed at Mestervig (1; 72º11'N), Daneborg (8; 74º19'N) and Danmarkshavn (11; 76º45'N). Seven birds were recovered locally during 10 May – 29 Jul one year (5), three years (1) and four years (1) later.



Map 73. Snow Buntings ringed in northeastern Greenland and recovered abroad (n = 13). Stars denote ringing sites, triangles pointing downwards recoveries in autumn (Sep-Oct), circles recoveries in winter (Nov-Mar), and triangles pointing upwards recoveries in spring (Apr-May).
Kort 73. Snespurve ringmærket i NØ Grønland og genmeldt i udlandet. Nedadvendte trekanter angiver fund i sep-okt, cirkler fund i nov-mar, opadvendte trekanter fund i apr-maj.

Thirteen birds were recovered abroad (Map 73) after 136-1450 days: One off Shetland (Great Britain; Sep, 1750 km SSE), 2 in Finnmark (Norway; Oct, Apr, 1600 km ESE), 1 in Nordland (Norway; Apr, 1600 km SE), 2 in Troms (Norway; Apr, 1400 km SE), 5 in Archangelsk (Russia; 4 in Apr, 1 in Dec, c. 2500 km ESE), 1 in Komi (Russia; Apr, 3150 km ESE) and 1 in Kuybyshevsk (Russia; Dec, 4050 km SE).

Foreign recoveries: Six birds ringed abroad were recovered in Greenland. A male ringed in Dec in SW Iceland was controlled in AMM (800 km WNW) in mid May the following year. Four birds ringed in Michigan, USA, in Dec and Feb were recovered as follows: One in UPV (3200 km NNE) in May the following year, 1 in KAN (3100 km NE) in Aug three years later, 1 in PAA (2900 km NE) in Aug three years later, and 1 in QAT (3100 km ENE) in Apr the same year. Finally, the remains of an ad. male ringed near Troms in northern Norway 18 Apr 1992 was found in a Gyrfalcons nest in NE Greenland in Jul 1998.

MOVEMENTS

Snow Buntings are abundant or common breeders in practically all of Greenland. The breeding birds belong to the subspecies *nivalis* also breeding in North America and northern Eurasia; the subspecies *insulae* breeds in Iceland. In Greenland, Snow Buntings may winter near human settlements in the southern parts of the country and wintering birds have been recorded as far north as Illulisat/Jakobshavn on the W coast and Tasiilaq/Ammasalik on the E coast (Boertmann 1994); most of the wintering birds are males (Meltofte 1983). However, the majority of the population is migratory, generally leaving Greenland in Sep-Oct and returning in late Mar through May, males 2-4 weeks before females (Meltofte 1983, Boertmann 1994). W and SE Greenland birds winter in North America, while high-arctic NE Greenland birds migrate via northern Norway to winter in Russia. The exact position of the migratory divide is unknown, but Meltofte (1983) suggested that the northerly divide is situated somewhere between AVA and Peary Land, the southerly a little south of Kangertiitivaq/Scoresby Sund. Apparently, a small proportion of the E Greenland birds also winters regularly in Iceland and western Europe.

Western and Southeastern Greenland. The recoveries of Snow Buntings ringed in W and SE Greenland (Table 121) show that the vast majority winter in North America in a large area apparently stretching from about 52ºN in eastern Canada south to 42ºN in the USA and west from about 56º to 96ºW. Within this area, most of the Greenland Snow Buntings probably winters east of the Great Lakes (cf. Map 72). During the North American winter, Snow Buntings mostly occur on plains, agricultural regions and shores (Lyon & Montgomerie 1995).

Few details are known about the actual migration routes. When embarking on their autumn migration in Sep-Oct, most W Greenland Snow Buntings probably cross the Baffin Bay/Davis Strait directly without an initial southward movement within Greenland. After following the Canadian coast south to the Gulf of St. Lawrence, some head west while others remain to winter. Apparently, spring migration follows the same routes. Of 11 recoveries of birds ringed in NW Greenland (i.e. north of KAN) and recovered in Greenland during Sep-Oct, only one was not local (425 km S) while only 3 of 14 birds ringed in NUU were not reported locally (71-147 km NW). Likewise, in spring none of the birds ringed in NW Greenland have been recovered in SW Greenland and none of the birds ringed in SW Greenland have been recovered in NW Greenland. Thus, the birds of northern and southern W Greenland appear to be segregated on the initial and final stages of spring and autumn migration – but not necessarily in the wintering areas, as suggested by the widely scattered recoveries within Greenland (from UPV to QAT) of four Snow Buntings ringed in Michigan, USA, during winter. Apparently, many Greenland

Snow Bunting, NW Greenland. Photo: K. Kampp.

Trapping of Snow Buntings for ringing, Danmarkshavn, NE Greenland. Photo: H. Meltofte.

Snow Buntings use spring staging sites around the Gulf of St. Lawrence (cf. Map 72 and Table 121) although the large number of recoveries in Quebec is biassed due to (former) trapping of Snow Buntings for human consumption (Salomonsen 1979a, Lyon & Montgomerie 1995). Whether birds from SE Greenland migrate along the E coast or across the inland-ice to and from staging sites in W Greenland is not known. The control of a SE Greenland bird in Nuuk (in mid Apr) and several observations of Snow Buntings on the inland-ice (Alerstam et al. 1986) suggest that at least some SE Greenland birds perform a transglacial migration.

Among 96 W Greenland Snow Buntings reported in Jun-Aug one or more years after ringing, 86 (90%) were found locally, five less than 50 km away and five 85-588 km away, suggesting a rather high degree of breeding site fidelity. All of 28 birds ringed as ads were reported locally, as were 22 of 27 (81%) birds ringed as nestlings. In contrast, Canadian studies have reported low ad. breeding site fidelity (Lyon & Montgomerie 1995). A British study found relatively high breeding site fidelity, but low natal site fidelity (Cramp 1998).

Northeastern Greenland. Snow Buntings breeding in NE Greenland winter in Russia (Map 73), probably mostly on the steppe west of Ural and north of the Caspian Sea as suggested by a Dec recovery near Bogatoye (53º04'N 51º22'E; but note that another Dec recovery was as far north as 65º50'N 44º17'E). The recoveries provide little information about the autumn migration (one recovery in North Norway in Oct, one in Shetland in Sep), but do offer some details about the spring migration. A total of 10 birds was reported from Apr of which five were reported from northern Russia (Arkhangelsk and Komi, dated 8-14 Apr (4) and 20 Apr (1)), four from northern Norway (dated 6 Apr (1) and 17-25 Apr (3)) and one from Danmarkshavn (12 Apr, male). The temporal and spatial distribution suggests that many birds use stopover sites mainly in the Arkhangelsk province during early Apr before migrating about 1000 km to the final spring stopover sites in coastal northern Norway. Large numbers of Snow Buntings stage in northern Norway during spring, with up to 10000 birds recorded on e.g. Bodø and Andøya (Meltofte 1983, Bentz 1990). On Andøya 1982-84, the first Snow Buntings arrived in early Apr (Bentz 1990). Numbers peaked in late Apr and by mid May most of the birds had departed; in 1982, many birds departed in the evening of 21 Apr, migrating towards northwest and thus probably starting their about 1400 km long journey to NE Greenland. Generally, old males arrived and left earlier than old females and young males which in turn arrived and left earlier than young females. Bentz (1990) calculated the mean staging time to be 10 days, during which the birds on average increased their weight by 2 g/day. Two colour-dyed birds were subsequently resighted in NE Greenland; one at Danmarkshavn in 1982 and one in Jameson Land in 1984. The phenology on Andøy is in close accordance with that in NE Greenland. Here the first old males arrive during the first and second week of Apr; at Danmarkshavn and Daneborg, the main influx of males takes place in late Apr and of females in early-mid May (Meltofte 1983, which see for a detailed account on arrival and pre-nesting period). The first Snow Buntings consistently arrive at Tasiilaq/Ammassalik around mid Mar, i.e.

earlier than in NE Greenland and as early as in W Greenland (Tinbergen 1939, Salomonsen 1967b, Meltofte 1983). Meltofte (1983) argued that the early arrival here could be caused by migrants to Iceland over-shooting their goal. An alternative explanation is that the birds have wintered in Iceland (see below).

Movements to western Europe: It is possible that a small part of the Snow Bunting population from eastern Greenland regularly winters in Iceland and to a lesser extent in western Europe, mainly the British Isles, cf. the recoveries to/from Iceland and off Shetland mentioned above. Also, a bird ringed in New York has been recovered in Iceland (Petersen 1998) and a bird ringed in Shetland in Apr has been recovered in Newfoundland one year later (Tuck 1971). These two birds could belong to the SE Greenland population normally wintering in North America. Apart from the fact that birds of the subspecies *nivalis* do occur regularly in Iceland, very little is known about the numbers involved (Petersen 1998, Æ. Petersen in litt.). The Iceland breeding population (*insulae*) is mainly resident, but some (mostly females) regularly migrate to the British Isles (Banks et al. 1991) and to e.g. the Netherlands (Jukema & Fokkema 1992). Some 10 000 – 15 000 Snow Buntings winter in the British Isles, primarily in Scotland and along the E coast of England (Lack 1986). In northern Scotland, Banks et al. (1991, see also Banks et al. 1989) found that 70-85% of the wintering birds belonged to the Icelandic subspecies *insulae*, the remaining to the subspecies *nivalis* (Greenland or Eurasia) and tentatively suggested that only a comparatively small percentage of the latter actually came from Greenland. A possible explanation for the occurrence of E Greenland Snow Buntings in Iceland and western Europe could be that some birds may alternate between different wintering areas from year to year (e.g. Iceland and North America in the case of birds from SE Greenland), perhaps as a response to weather conditions during the initial stage of autumn migration. The occurrence of Greenlandic Mealy Redpolls and Lapland Buntings in western Europe may perhaps be interpreted in a similar way.

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Peter Lyngs, Guldbergsgade 22, 5. tv, 2200 Copenhagen N, Denmark (email: lynx@danbbs.dk).

Trækforhold og vinteropholdssteder for fugle i Grønland

I 1967 udgav Finn Salomonsen værket *Fuglene i Grønland*. Mange af oplysningerne i bogen var baseret på de daværende 6700 genfund af fugle ringmærket i Grønland. Siden er antallet af genfund mere end fordoblet, og vores viden om de grønlandske fugles trækforhold forøget betragteligt. Denne artikel analyserer det nuværende grønlandske genfundsmateriale, som pr 31. december 2001 bestod af 15 498 genfund af grønlandske fugle og 1947 genfund i Grønland af fugle ringmærket i udlandet.

Før Anden Verdenskrig var der ringmærket små 1000 fugle i Grønland, men efter krigen etablerede Salomonsen en formel grønlandsk ringmærkningsafdeling på Zoologisk Museum i København. Fra 1946 og frem til 1984 fik ringmærkerne, som langt overvejende var lokale grønlændere, udbetalt et beskedent beløb pr ringmærket fugl. Denne ordning medførte, at der blev ringmærket store mængder fugle i Grønland, især i 1960erne og 1970erne (Fig. 1). Størsteparten af fuglene var kolonirugende havfugle, og en meget stor del blev ringmærket fra Disko Bugt op til Upernavik, dels fordi der er mange havfugle her, dels fordi folk i disse områder havde færre penge end i den sydvestlige del af Grønland. Efter 1984, hvor antallet af ringmærkede fugle var faldet drastisk fordi det økonomiske incitament var forsvundet (se Kampp 1999), er de fleste fugle blevet ringmærket af videnskabelige ekspeditioner og af personalet på vejrstationer. Siden 1946 er der blevet betalt en mindre dusør ved indlevering af ringe, og denne ordning fungerer i det store hele endnu.

Der er ringmærket 283 651 fugle af 53 arter i Grønland, hvilket har resulteret i nævnte 15 498 genfund/kontroller af 43 arter (Tabel 1, Fig. 1-2). Omkring 14% af genfundene er af fugle ringmærket i Østgrønland, 86% af fugle ringmærket i Vestgrønland; af disse er 52% ringmærket alene i Upernavik og Uummannaq tilsammen. Hovedparten (79%) af alle genfundene er af kolonirugende havfugle (især alkefugle, ederfugle og måger). I alt 13 857 af genfundene er gjort i Grønland, 1628 i udlandet. Blandt fuglene genmeldt i Vestgrønland fra Nanortalik til Upernavik blev hovedparten (78%) rapporteret som dræbt af mennesker (primært skudt), 1% som fanget i fiskeredskaber, 8% var uden genfundsårsag og for de resterende 13% blev der givet et utal af forskellige genfundsårsager (de fleste dog kontrolleret af ringmærkere, men bl.a. også to fugle kørt over af biler). Blandt 9315 genfund af havfugle (Mallemukker, Skarver, dykænder, alkefugle og måger) fra Vestgrønland blev 90% rapporteret som dræbt af mennesker, 1% som fanget i fiskeredskaber og sælgarn, 1% af andre årsager, mens der for 8% ikke blev opgivet en genfundsårsag. En liste over aldersrekorder hos grønlandske fugle findes i appendix 1.

Endvidere er 1947 fugle af 45 arter ringmærket i udlandet genmeldt i Grønland (Tabel 1, Fig. 2). Af disse var 92% ringmærket i Storbritannien, Canada, Island, Rusland og Norge tilsammen, de øvrige i 17 andre lande. Hovedparten af de udenlandske fugle var havfugle (især Polarlomvie og Ride), andefugle og vadefugle, mens kun 6 var spurvefugle. Omkring 85% af fuglene blev rapporteret som skudt i Vestgrønland.

Hovedparten af alle genfundene af skudte fugle er fra før generelle jagtfredninger blev indført i januar 1978. Før 1978 fandtes der forskellige lokale jagtfredninger og fredninger af enkeltarter (fx blev Lunden totalfredet i 1960 og Havørnen i 1973), men først med jagtbestemmelserne af 1978 blev der indført egentlige fredningstider for langt de fleste arter (se Tabel 4), dog kun i Vestgrønland mod nord til og med Upernavik. Generelt fik de fleste fuglearter en fredningstid fra 15. juni til 15. august, men med flere undtagelser. Bl.a. måtte flokke på over fem ungfugle beskydes for en del arters vedkommende, fx Rider og ederfugle nord for Nassuttooq/Nordre Strømfjord, og Polarlomvier truffet mere end 5 km fra kolonier måtte skydes hele sommeren i Uummannaq og Upernavik. I maj 1988 blev der indført en ny bekendtgørelse som omfattede hele Grønland. Yderligere 7 fuglearter blev totalfredet, fredningstiden blev forlænget for en række arter, og de fleste af de undtagelser, som fandtes i de tidligere regler, blev fjernet. Fra Disko Bugt til og med Upernavik blev Polarlomvien nu fredet i perioden 1. juni til 31. august, men i Upernavik blev der dog regelmæssigt givet dispensationer til at fortsætte jagten ind i juni. Generelt har fredningsbekendtgørelserne fra 1978 og 1988 dog haft beskeden indflydelse på genfundenes tidsmæssige og geografiske fordeling i Grønland, dels fordi de fleste genfund er fra før bekendtgørelsernes indførelse, dels fordi den konkrete virkning af fredningerne ikke var umiddelbar. I det store hele synes lokale jagttraditioner og fuglenes tilgængelighed som følge af isforhold m.v. at have haft større indflydelse på genfunds-fordelingerne.

I teksten refererer forkortelsen GRC til genfund af fugle ringmærket i Grønland, forkortelsen FRC til fugle ringmærket i udlandet og genfundet i Grønland. Inddelingen af Grønland (Kort 1) følger i det store hele kommunegrænserne, men små kommuner er dog slået sammen, for eksempel Narsaq, Nanortalik og Qaqortoq (Tabel 3). I den engelske tekst er områderne navngivet med tre-bogstavsforkortelser i versaler (fx UPV = Upernavik), mens navnene er skrevet fuldt ud i dette danske resumé. I nedenstående artsgennemgang kaldes den overvejende isfri kyst mellem Nanortalik og den sydlige del af Disko Bugt (dvs. mellem 60ºN og 69ºN) generelt for Åbentvandsområdet, et område af meget stor betydning for overvintrende havfugle.

Artsgennemgang

Nedenfor følger en artsvis gennemgang af trækforholdene hos alle de grønlandske fuglearter som der findes genfund af. Deres trækforhold kan opsummeres som følger: Ravn, Rype, Havørn og til dels Jagtfalk bliver i Grønland året rundt, men kan dog foretage betydelige trækbevægelser inden for landets grænser. Et stort antal hav- og vandfugle fra Vest- og Nordvestgrønland overvintrer i Åbentvandsområdet i Sydvest- og Vestgrønland: Skarv, Gråand, Ederfugl, måger, Polarlomvie, Tejst, Alk og Sortgrå Ryle. Inden for dette område overvintrer de nordligst ynglende

fugle generelt længst mod nord. Måske op mod halvdelen af den vestgrønlandske bestand af Polarlomvier overvintrer dog ved Newfoundland og Nova Scotia i Canada. Samtidig overvintrer mange canadiske Polarlomvier fra den nordvestlige del af Baffin Bugten i det grønlandske Åbentvandsområde, især i den nordlige del, mens store mængder Polarlomvier fra især Island, Svalbard og Jan Mayen overvintrer i Åbentvandsområdets sydlige del. Dertil kommer et stort antal Søkonger fra Svalbard og måske Østgrønland samt mindre antal af Havlitter og Gråmåger fra hhv. Island og Svalbard. Hovedparten af de canadiske Ederfugle som yngler fra Hudson Strait og nordpå overvintrer også i Åbentvandsområdet, mens store mængder canadiske Kongeederfugle fælder og overvintrer i Vestgrønland. En stor del af de nordgrønlandske Ismåger overvintrer langs iskanten i Davisstrædet og Labradorhavet.

Mange udenlandske fugle optræder i Grønland om sommeren. Storskråper fra Sydatlanten fælder ud for Sydvest- og Sydøstgrønlands kyster i varierende, men i nogle år store antal. Samtidig når nogle få Sydpolarkjover fra Antarktis til Vestgrønland, sammen med en del Storkjover fra de Britiske Øer og Island. Store mængder af hovedsagelig yngre Rider fra hele det vesteuropæiske yngleområde tilbringer sommeren og det tidlige efterår langs Vest- og Sydøstgrønlands kyster, og det samme gør Mallemukker fra den østlige del af Nordatlanten og fra canadisk arktis. Desuden fælder mange Kortnæbbede Gæs fra Island i Nordøstgrønland. Endvidere passerer mange vadefugle og Knortegæs fra Nordøstcanada Grønland på deres træk til og fra vinterkvarterene i Europa og Afrika. De fleste af disse canadiske fugle krydser indlandisen under trækket, men ret få raster dog normalt i Grønland.

De fugle, som forlader Grønland om vinteren, overvintrer i store dele af verden, fra Antarktis i syd til Island i nord og fra USA i vest til de russiske stepper i øst. Mallemukker og Rider overvintrer i den vestlige del af Nordatlanten, hvor farvandene ved Newfoundland er vigtige områder, især for grønlandske ungfugle forår og efterår. De grønlandske Havterner overvintrer ved Antarktis og foretager dermed den længste rejse af alle grønlandske fugle. En del østgrønlandske fugle overvintrer i Island, først og fremmest hele den nordøstgrønlandske bestand af Ederfugl. Her overvintrer desuden en del Hvidvingede Måger, Jagtfalke og Sortgrå Ryler. En håndfuld arter overvintrer udelukkende i Vesteuropa: Rødstrubet Lom, Kortnæbbet Gås, Blisgås, Bramgås, Knortegås og Islandsk Ryle. To arter – Sandløber og Stenvender – overvintrer både i Vesteuropa og Vestafrika, mens tre arter – Stor Præstekrave, Almindelig Ryle og Stenpikker – udelukkende overvintrer i Vestafrika. De fleste af disse arter raster i større eller mindre udstrækning på Island og/eller de Britiske Øer under både forårs- og efterårstrækket, og generelt foregår trækket mellem vinterkvarter, en eller to rastepladser og yngleområdet. En del grønlandske fuglearter overvintrer i Nordamerika: Canadagås overvintrer i det nordøstlige USA, mens den store bestand af nordvestgrønlandske Søkonger overvintrer omkring Newfoundland. Op mod halvdelen af den vestgrønlandske bestand af Polarlomvier og Alke overvintrer også her. Endvidere overvintrer de vest- og sydøstgrønlandske Snepurve, Gråsiskener og Laplandsværlinger i det sydlige Canada og nordlige USA. Snespurvene fra Nordøstgrønland overvintrer derimod på de russiske stepper. Hannerne hos de vestgrønlandske Vandrefalke overvintrer i Sydamerika, mens hunnerne hovedsagelig overvintrer i Caribien.

Rødstrubet Lom *Gavia stellata*

15 GRC (Tabel 5, Kort 2). Rødstrubet Lom er en ret almindelig ynglefugl i det meste af Grønland. Ynglefuglene ankommer i maj eller begyndelsen af juni og trækker bort i august-september. Hovedparten af den grønlandske bestand synes at overvintre i vesteuropæiske farvande, fra Nordsøen til Biscayen; enkelte kan dog overvintre i Åbentvandsområdet. Tilsyneladende raster nogle østgrønlandske fugle ud for det nordvestlige Island under forårstrækket.

Mallemuk *Fulmarus glacialis*

713 GRC (Tabel 6, se også Tabel 7-9, Fig. 3-4 og Kort 4), 28 FRC (Tabel 7, Kort 3) af fugle ringmærket i hhv. Davisstrædet/Labradorhavet (15), Svalbard (1), Færøerne (1), Island (4) og Skotland (7). Hovedparten af de grønlandske fugle er ringmærket ved de store mallemukfjelde i Uummannaq. De fugle der er ringmærket i Davisstrædet/Labradorhavet har formentlig overvejende været af grønlandsk oprindelse, mens genfundene af fugle fra andre lande viser at et ukendt, men formentlig ret stort antal af overvejende ikke-ynglende Mallemukker fra Nordatlanten og muligvis også Baffin Island også optræder i de grønlandske farvande.

Mallemukken er lokalt en talrig ynglefugl i Grønland. På vestkysten yngler hovedparten i Qeqertarsuaq, Uummannaq og det sydlige Upernavik; der findes yderligere nogle små kolonier syd for Disko Bugt og en stor i Avanersuaq. Bestanden på vestkysten tæller mindst 80 000 par, måske langt flere. På østkysten findes der omkring 20 små kolonier fra Kangertittivaq/Scoresby Sund mod nord til Amdrup Land på 81ºN; bestanden tæller her i størrelsesordenen 4000 par.

Trækforholdene hos bestanden på østkysten er meget dårligt kendt. Selv i højarktis ankommer fuglene til ynglepladserne fra slutningen af april til begyndelsen af maj og trækker bort igen i begyndelsen af september. Formentlig overvintrer ynglefuglene i Nordatlanten, mens i hvert fald nogle yngre fugle synes at nå Labrador og Newfoundland.

De vestgrønlandske ungfugles trækforhold er noget bedre kendt, hovedsagelig på grund af ringmærkningerne i Uummannaq. Som på østkysten ankommer ynglefuglene til kolonierne i april-maj og trækker bort i september; i slutningen af oktober har praktisk talt alle Mallemukker forladt de kystnære farvande. Efter at være blevet flyvefærdige i august-september trækker ungfuglene mod syd. Nogle følger den grønlandske vestkyst helt ned til Qaqortoq, andre krydser Baffin Bugt/Davisstrædet på deres vej mod Labrador og videre sydpå til bankerne ud for Newfoundland og Nova Scotia, hvortil de første ankommer i

begyndelsen af oktober. Muligvis trækker en del grønlandske ungfugle videre ud i Atlanten i november-december: To er genmeldt i Vesteuropa, men har formentlig været stormdrevne. Hvis de gør, vender de tilbage til Newfoundland/Nova Scotia i det tidlige forår og bliver til hen i maj-juni. På dette tidspunkt trækker en del yngre fugle mod nord, og genfundene i Uummannaq viser, at mange 1-4-årige fugle opholder sig nær kolonierne i juli-september. Hovedparten af de fugle, som er født i Uummannaq, synes i øvrigt at vende tilbage og yngle her, når de i en alder af 8-12 år bliver kønsmodne. De ældre vestgrønlandske Mallemukkers trækforhold er dårligt kendt. Nogle adulte bevæger sig tilsyneladende langt ud i Atlanten (et genfund i Frankrig), men hovedparten bliver, som det er typisk for adulte Mallemukker, sandsynligvis tættere på kolonierne, i områder med åbent vand ud for Sydvestgrønland og i Davisstrædet.

Storskråpe *Puffinus gravis*
Tre Storskråper ringmærket på Tristan da Cunha i Sydatlanten (omkring 12 000 km syd for Grønland) er i august måned genmeldt fra Vestgrønland, ligesom en fugl mærket ved Newfoundland i juni. Fra ynglepladserne trækker Storskråperne mod nord og når den nordamerikanske atlanterhavskyst i maj-juni. Herfra fortsætter de til Labradorhavet/Davisstrædet, hvor de største antal optræder i begyndelsen af august. På dette tidspunkt er Storskråpen som regel en talrig gæst langs Grønlands vestkyst mod nord til Sisimiut/Holsteinsborg, men antallet af fugle varierer fra år til år. Der kan også træffes en del Storskråper langs østkysten mod nord til Tasiilaq/Ammassalik. Efter at have fældet trækker Storskråperne hurtigt mod ynglepladserne, hvor de fleste adulte fugle ankommer i første halvdel af september.

Alm. Skråpe *Puffinus puffinus*
Almindelig Skråpe er en sjælden gæst i grønlandske farvande. En fugl ringmærket som unge i Skotland og skudt i Qaqortoq 11 år senere udgør kun det andet fund i Grønland.

Sule *Sula bassana*
Årligt ses et beskedent antal Suler sommer og efterår ud for det sydlige Grønlands kyster. En fugl ringmærket som unge i Island og skudt i Qeqertarsuaq tre år senere viser oprindelsen for nogle af disse Suler.

Skarv *Phalacrocorax carbo*
289 GRC (Tabel 10, se også Tabel 11-14, Kort 5-6 og Fig. 5). Skarven yngler langs den grønlandske vestkyst fra Nuuk til det nordlige Upernavik; ynglebestanden er anslået til 2000-3000 par. Hele bestanden overvintrer i Åbentvandsområdet, og har tilsyneladende meget lidt kontakt med bestandene i Island og Nordamerika.

Efterårstrækket indledes i slutningen af august og i september. Gamle og unge fugle fra de enkelte bestande overvintrer i de samme områder. Generelt overvintrer fugle fra den nordlige del af udbredelsesområdet nordligere end fugle fra den sydlige del; for eksempel overvintrer de fugle som yngler i Upernavik og Qeqertarsuaq i gennemsnit nordligere end fugle fra Ilulissat og Kangaatsiaq (Kort 6). Skønt der er et betydeligt overlap, overvintrer fugle fra Upernavik således hovedsagelig fra den sydlige del af Disko Bugt ned til Nuuk, mens fugle fra Kangaatsiaq overvintrer fra Sisimiut ned til Qaqortoq. Mange fugle fra de nordlige bestande forlader Disko Bugt hen i november-december, mens andre bliver her hele vinteren, hvis isforholdene tillader det. I december-februar findes der Skarver i alle dele af Åbentvandsområdet, men en stor del af den grønlandske bestand synes på dette tidspunkt at opholde sig i Maniitsoq-Nuuk. Forårstrækket starter i marts, og fuglene ankommer til ynglepladserne i april-maj.

Kortnæbbet Gås *Anser brachyrhynchus*
15 GRC (Tabel 15, Kort 7), 39 FRC af fugle ringmærket i Island og de Britiske Øer (Kort 8). Der findes to adskilte bestande af Kortnæbbet Gås i det atlantiske område; én som yngler på Svalbard og overvintrer i Danmark-Holland, og én som yngler i Østgrønland og Island og overvintrer på de Britiske Øer. Den grønlandsk-islandske vinterbestand er vokset fra omkring 30 000 fugle i 1950 til 200 000 – 250 000 i midten af 1990erne. Hovedparten af bestanden yngler i det indre Island. I Østgrønland yngler omkring 5000 par, hovedsagelig mellem Sulussuutikajik/Steward Ø og Hochstetter Forland (dvs. mellem 72º og 75º30'N). Dertil kommer, at mere end 30 000 ikkeynglende fugle fælder i Østgrønland, primært mellem 70º og 78ºN.

I den sidste halvdel af juni trækker mange ikkeynglende Kortnæbbede Gæs fra Island til Østgrønland for at fælde. Når fældningen er overstået, bliver gæssene i Grønland indtil slutningen af august – midten af september, hvor de og ynglefuglene atter trækker til Island. Herfra trækker de til de Britiske Øer, hvor de tidligste fugle ses i første halvdel af september, men hovedparten ankommer i den første halvdel af oktober til rastepladser især i Skotland. I løbet af oktober-november trækker mange mod syd for at overvintre i det østlige England, mens andre bliver i Skotland. Fra januar begynder de fugle, som har overvintret i England, at bevæge sig nordpå til rastepladser i Skotland, hvor antallet topper i april. Forårstrækket starter i midten af april, og i begyndelsen af maj har de fleste fugle forladt de Britiske Øer. De tidligste gæs ankommer til Island omkring 18-20. april, og de fleste i de første dage af maj. Her raster fuglene i lavlandet indtil de i midten af maj fortsætter til ynglepladserne i hhv. det indre Island og i Østgrønland, hvortil de normalt ankommer omkring 20. maj.

Blisgås *Anser albifrons*
416 GRC (Tabel 16-17, Kort 9-11, se også Fig. 6-7 og Tabel 18-19), 18 FRC af fugle ringmærket i Irland (16), Island og Norge. Blisgæs af underarten *flavirostris* yngler kun i Vestgrønland, hvor ynglеområdet strækker sig fra Nuuk (64ºN) mod nord til det sydlige Upernavik (73ºN); de største tætheder findes mellem 66-69ºN. Hele bestanden overvintrer i Storbritannien og Irland. Både forår

og efterår raster bestanden 3-4 uger i Island, idet den krydser indlandsisen på vej til og fra Vestgrønland. Vinterbestanden talte 17 500 – 23 000 fugle i 1950erne, omkring 14 000 i slutningen af 1970erne og 33 000 i slutningen af 1990erne; stigningen skyldes sandsynligvis jagtfredninger i Storbritannien, Irland og Grønland.

Efter at have fældet trækker Bligæssene fra slutningen af august til begyndelsen af oktober over indlandsisen til Island, hvor de raster i lavlandet på den sydlige og vestlige del af øen. Her kulminerer antallet i slutningen af september – begyndelsen af oktober, og i slutningen af oktober er praktisk talt alle fuglene trukket videre til Storbritannien og Irland. I 1990erne overvintrede omkring en tredjedel af den grønlandske bestand i Wexford (sydøstlige Irland), en tredjedel på Islay (Indre Hebrider i det vestlige Skotland) og den sidste tredjedel i 34 flokke i Irland og 32 flokke i Skotland. De enkelte individer udnytter i høj grad de samme vinterkvarterer fra år til, og de samme rastepladser i Island. De grønlandske delbestande fordeler sig heller ikke helt tilfældigt i vinterkvarterene og på rastepladserne, og der er en generel tendens til at nordligt ynglende fugle overvintrer længere mod syd end sydligt ynglende, ligesom de raster nordligere i Island end sydligt ynglende fugle.

Om foråret trækker hovedparten bort fra de Britiske Øer i løbet af den anden uge af april, og næsten alle er væk i begyndelsen af maj. Tilsyneladende trækker langt de fleste af fuglene direkte fra deres vinterkvarter til Island, hvor de ligesom om efteråret hovedsagelig raster i det sydlige og vestlige lavland. Efter at have rastet 2-3 uger i Island ankommer hovedparten til deres forårsrastepladser i Vestgrønland omkring den første uge af maj. De fleste synes at trække over indlandsisen på en rute fra omkring Tasiilaq/Ammassalik på østkysten til Disko Bugt på vestkysten. De vigtigste grønlandske forårsrastepladser ligger mellem 66º og 69ºN; her tilbringer fuglene 1-2 uger, inden de flyver til ynglepladserne.

Canadagås *Branta canadensis*

76 GRC, 2 FRC (Kort 12) af fugle ringmærket i Canada og USA. Før 1970erne var Canadagåsen en sjælden ynglefugl i Vestgrønland. Siden da er arten ekspanderet meget, især i 1990erne, hvor ynglebestanden nåede op på omkring 2600 par. De fleste yngler fra Sisimiut mod nord til det sydlige Upernavik.

Genfund af fugle ringmærket i Sisimiut viser, at Canadagæssene her forlader Grønland i slutningen af september. De trækker over Davisstrædet og via Labrador, New Brunswick og Massachusetts til vinterkvarterer i det nordøstlige USA, især i Connecticut, New York og Pennsylvania, hvortil de ankommer omkring slutningen af oktober – begyndelsen af november. Forårstrækkets forløb er ikke kendt, men fuglene forlader vinterkvarteret omkring midten af marts og ankommer til Vestgrønland omkring midten af maj.

Bramgås *Branta leucopsis*

722 GRC af fugle ringmærket i Ittoqqortoormiit og Nordøstgrønland (Tabel 20, se også Tabel 21-23 og Kort 13-16), 23 FRC af fugle ringmærket i Irland (22) og på Svalbard (1). I Grønland yngler Bramgåsen kun i højarktisk Østgrønland fra Kangertittivaq/Scoresby Sund mod nord til Hertugen af Orléans Land, dvs. mellem 70-79º N. Den grønlandske bestand overvintrer i det vestlige Skotland og det vestlige Irland og raster både forår og efterår i Island. I 1959 talte vinterbestanden 8000 fugle, i 1997 40 000 – 45 000. Bestandsstigningen skyldes højere overlevelse om vinteren, dels pga. reduceret jagttryk i Skotland og Irland siden 1982, dels fordi fuglene nu mange steder søger føde på opdyrkede arealer, hvor der er mere mad end på de strandenge, hvor de før fouragerede.

Efter at have fældet trækker Bramgæssene i slutningen af august til Island, hvor stort set alle raster i Vestur-Skaftafellssýsla og Austur-Skaftafellssýsla på den sydøstlige del af øen (Kort 15). Omkring en måned senere fortsætter Bramgæssene til de Britiske Øer, hvortil de fleste normalt ankommer i begyndelsen af oktober. De grønlandske Bramgæs overvintrer på omkring 100 pladser i den vestlige del af de Britiske Øer, fra Orkney i Skotland til Kilkee i Irland. I 1990erne var de vigtigste overvintringssteder Islay på de indre Hebrider i Skotland, hvor der overvintrede 25 000 – 31 000 fugle (67-77% af hele bestanden), og Inishkeas Islands i Irland, hvor 2500-3000 fugle overvintrede. Bramgæssene udviser en høj grad af stedtrofasthed mod deres vinterkvarterer, selv på lokal skala. I midten-slutningen af april trækker Bramgæssene fra de Britiske Øer til Island, hvor hele bestanden raster i Austur-Húnavatnssýsla, Vestur-Húnavatnssýsla and Skagafjarðarsýsla på den nordlige del af øen. Tre til fire uger senere trækker fuglene videre til Østgrønland, hvortil de typisk ankommer omkring 20. maj.

Selvom nogle få fugle fra Svalbard-bestanden (der overvintrer på én lokalitet i det sydvestlige Skotland) af og til når Østgrønland, og nogle få grønlandske fugle når overvintringspladserne for den russisk-baltiske bestand i Vadehavet, sker der praktisk talt ingen udveksling mellem de tre bestande.

Knortegås *Branta bernicla*

12 FRC (Kort 17) af fugle ringmærket i Canada (10), Island (1) og Irland (1). Der forekommer to adskilte bestande af Lysbuget Knortegås (underarten *hrota*) i Grønland; én som yngler i højarktisk Nordøstcanada og én som yngler på Svalbard, Franz Josef land og i Kronprins Christian Land i Nordøstgrønland (her kaldet Svalbard-bestanden).

Praktisk talt alle Knortegæssene fra den canadiske bestand passerer Grønland og Island på vej til og fra deres vinterkvarterer i Irland. I 1985 talte bestanden omkring 25 000 fugle, i 1990erne kun 20 000. Hovedparten forlader de canadiske ynglepladser i slutningen af august – begyndelsen af september, og langt de fleste passerer tilsyneladende Grønland på et direkte træk til Island over indlandsisen. Hovedtrækruten til Østgrønland og videre til Island synes at gå via Disko Bugt. De fleste ankommer til det vestlige Island i den første halvdel af september og trækker videre 2-3 uger senere. Mange fugle ankommer til Irland omkring månedsskiftet september-oktober, og trækker til deres egentlige vinterkvarterer i oktober-

november. Forårstrækket starter i midten af april. Efter at have rastet 4-5 uger i det vestlige Island trækker fuglene videre omkring månedsskiftet maj-juni. Trækket foregår mere eller mindre direkte over indlandsisen til den grønlandske vestkyst omkring Disko Bugt og derfra videre til de canadiske ynglepladser, hvortil de første fugle normalt ankommer i de første dage af juni.

Svalbard-bestanden, der talte 4000-5800 fugle i 1990erne, overvintrer på 6-9 lokaliteter i Jylland og på Lindisfarne i Northumberland, England. Bestanden har formentlig været ti gange større, men gik drastisk tilbage i den første del af det 20. århundrede som følge af intensiv jagt i Danmark, ægsamling på Svalbard og en sygdom i det ålegræs, som udgjorde fuglenes vigtigste føde i vinterkvarteret. Tidligere var Knortegåsen en ret almindelig ynglefugl i Nord- og Nordøstgrønland, men forsvandt i begyndelsen af det 20. århundrede. I 1985 blev der i Nordøstgrønland fundet en lille aflægger af Svalbard-bestanden, som i 1993 omfattede ca 1000 individer. De fleste af de nordøstgrønlandske Knortegæs trækker bort i den sidste halvdel af august, og undervejs til vinterkvarteret raster en del af dem formentlig på Svalbard. Hovedparten ankommer til vinterkvarteret i løbet af september, og sidst på vinteren trækker de til forårsrastepladser som Agerø, Venø og Nissum Fjord. De forlader disse rastepladser i slutningen af maj – begyndelsen af juni og ankommer til Svalbard og Nordøstgrønland 4-5 dage senere efter et direkte træk på 3500 km. Et par forsynet med satellitsendere trak fra Agerø om morgenen den 30. maj 1997 og ankom til Peary Land i Nordøstgrønland lige efter midnat den 3. juni, 93 timer senere; på nær et ti timers rast ud for Sydvestnorge trak de uafbrudt. Efter to dage i Peary Land trak de til Kilen, hvor de blev hele sommeren. De forlod Grønland den 22. august, ankom til Svalbard dagen efter og blev her i hvert fald til 8. september. Den 22-27. september rastede de i den nordlige del af det danske Vadehav, inden de trak til Lindisfarne, hvor de overvintrede.

Krikand *Anas crecca*
To Krikænder ringmærket som ællinger i Island er i maj og november skudt i Qaqortoq, hvor også en han ringmærket i USA blev skudt i juni. Den palæarktiske underart *crecca* er en årlig gæst i det meste af Grønland, mens den nearktiske *carolinensis* kun optræder som en sjælden gæst.

Gråand *Anas platyrhynchos*
60 GRC (Tabel 24, se også Tabel 25 og Kort 18-19). Gråanden er en almindelig ynglefugl i Vestgrønland mod nord til det sydlige Upernavik; på østkysten yngler den mod nord til omkring 68ºN. Fuglene tilhører underarten *conboschas*, der, som genfundene antyder, er endemisk for Grønland.

Gråænder fra den nordlige del af det vestgrønlandske yngleområde trækker i august-oktober mod syd for at overvintre kystnært i Åbentvandsområdet mellem Kangaatsiaq og Qaqortoq; nordtrækket finder sted i april-maj. I området Kangaatsiaq-Maniitsoq er en del af bestanden standfugle, mens en anden del overvintrer længere sydpå. Ynglefuglene fra Nuuk og sydpå er overvejende standfugle.

Trækforholdene hos den sydøstgrønlandske bestand er dårligt kendt. Alerstam et al. (1986) fandt det sandsynligt, at Gråænder herfra overvintrer i Sydvestgrønland og trækker tilbage over indlandsisen, og Salomonsen (1979b) nævner en lille flok, der om foråret trak forbi DYE2-stationen (66ºN 47ºW) på indlandsisen. Overvintrende fugle er dog også rapporteret fra Ammassalik-området.

Spidsand *Anas acuta*
To Spidsænder, ringmærket i hhv. Canada og Island, er genfundet i Grønland, begge i Qaqortoq i april-maj. Arten optræder årligt i Grønland.

Halsbåndstroldand *Aythya collaris*
En adult han ringmærket i marts 1977 i Slimbridge, England blev skudt 22 måned senere nær Isertoq i Ammassalik; fuglen udgør det eneste fund af arten i Grønland.

Ederfugl *Somateria mollissima*
2134 GRC (Tabel 26, se også Tabel 27-34, Kort 20-25 og Fig. 8-9), 48 FRC (Kort 26) af fugle ringmærket i Canada (45) og Island (3). På Grønlands vestkyst yngler Ederfuglen mod nord til det vestlige Avannarliit/Inglefield Land og er blevet fundet så langt østpå i Nordvestgrønland som Hall Land. Ynglebestanden er gået tilbage fra antagelig mere end 100 000 par i 1820erne til omkring 12 000 – 15 000 par i slutningen af 1990erne; de største ynglebestande findes nu i Avanersuaq og Upernavik. I Sydøstgrønland er Ederfuglen sandsynligvis en ret udbredt ynglefugl, men bestanden er ikke særlig stor. I Nordøstgrønland er Ederfuglen en almindelig ynglefugl, men bestandsstørrelsen kendes ikke. Bestandene i Øst- og Vestgrønland synes at være helt adskilte, idet den østgrønlandske bestand altovervejende overvintrer i Island, mens den vestgrønlandske overvintrer i Åbentvandsområdet.

Bedømt ud fra genfundene i Vestgrønland overvintrer Ederfuglene fra Avanersuaq fra Disko Bugt mod syd til omkring Maniitsoq by. Fuglene fra Upernavik, Uummannaq, Qeqertarsuaq og Ilulissat overvintrer i praktisk talt samme område (sammenlign Kort 20 og 23), selvom nogle kan trække længere mod syd. I løbet af vinteren bevæger mange sig længere mod syd (se fx Kort 22), men fugle fra alle de ovennævnte områder kan overvintre så langt mod nord som isforholdene tillader. Ederfuglene fra Maniitsoq er hovedsagelig standfugle, og det samme gælder formentlig for de Ederfugle som yngler fra Nuuk og sydpå; der er dog kun få genfund af ynglefugle herfra. Forårstrækket indledes i april og kulminerer i maj, mens efterårstrækket begynder i september og kulminerer i oktober. I modsætning til Kongeederfuglen fælder de fleste nær ynglepladsen.

Gennem de sidste 50 år er der årligt skudt 80 000 – 150 000 Ederfugle i Vestgrønland, hvor vinterbestanden i 1999 blev anslået til at rumme i størrelsesordenen en halv million fugle. Vinterbestanden er således langt større end den vestgrønlandske ynglebestand. Genfund af Ederfugle ringmærket i Canada viser da også, at hovedparten af de Ederfugle, som yngler i den arktiske del af det østlige Canada (fra omkring Hudson Strait og nordefter), over-

vintrer i Vestgrønland. Disse fugle udgør langt den største del af vinterbestanden i Åbentvandsområdet. Udover fuglene fra arktisk Canada optræder nogle få Ederfugle af underarterne *v-nigrum* fra det nordvestlige Nordamerika og *dresseri* fra det sydøstlige Canada som sjældne gæster i Vestgrønland.

Ederfuglene i Nordøstgrønland er trækfugle, som overvintrer i Island; nogle få kan dog overvintre lokalt i våger og polynier ud for kysten. Forårstrækket starter i april og kulminerer i maj, hvor mange fugle passerer Ittoqqortoormiit/Scoresby Sund-området. Efter at have tilbragt en måneds tid ved yderkysten ankommer de første fugle til deres kolonier i den første halvdel af juni. Tilsyneladende fælder hannerne i Island, idet der i juli ses store flokke af hanner ved Nordøstgrønland, men ikke efter midten af august. På efterårstrækket synes hunner og ungfugle at trække direkte til Island, hvortil de første ankommer i begyndelsen af september. De yngre ikke-ynglende fugle oversomrer sandsynligvis i Island, da der kun ses få i Nordøstgrønland. Trækforholdene hos den lille sydøstgrønlandske bestand kendes ikke, men nogle kan overvintre i Ammassalik-området under gunstige isforhold. Formentlig trækker hovedparten til Island.

Kongeederfugl *Somateria spectabilis*
1475 GRC (Tabel 35, se også Tabel 36, Kort 27-32 og Fig. 10-11), 8 FRC af fugle ringmærket i Canada (7) og Alaska (1). Af de grønlandske genmeldinger er 1450 af fugle ringmærket i Upernavik. I Grønland yngler Kongeederfuglen kun i Avanersuaq og vestpå til Washington Land samt i Nordøstgrønland fra Peary Land mod syd til Kangertittivaq/Scoresby Sund. Bestandsstørrelsen i Nordvestgrønland er ukendt (men sandsynligvis ikke særlig stor), og i Nordøstgrønland yngler der højst nogle få tusind par.

Trækforholdene hos de grønlandske ynglefugle er stort set ukendt. Der ses fældende fugle i Avanersuaq, men det vides ikke om de er af grønlandsk eller canadisk oprindelse. Nogle af fuglene trækker mod syd for at fælde i Vestgrønland, og formentlig overvintrer hele bestanden i Åbentvandsområdet. Kongeederfuglene i Nordøstgrønland ankommer til kysten i midten af maj og til ynglepladserne i første halvdel af juni; i hvert fald nogle af fuglene fælder nær ynglepladsen. Nogle få kan overvintre så langt mod nord som Wollaston Forland, og en enkelt er blevet genmeldt i Island. Der ses dog kun 50-100 Kongeederfugle årligt i Island, og vinterkvarteret for de nordøstgrønlandske fugle er således ukendt.

Store mængder canadiske Kongeederfugle fælder og overvintrer i Vestgrønland. Disse fugle stammer fra et område der strækker sig fra Ellesmere Island i nord til Hudson Strait i syd og til Victoria Island i vest (se Kort 31). En enkelt fugl fra Alaska er også blevet genmeldt i Grønland; fuglene herfra overvintrer normalt i Beringshavet. Nogle Kongeederfugle fælder i Canada, men mange trækker fra først i juli til Vestgrønland for at fælde i et område, som strækker sig fra Upernavik til Disko Bugt; ankomsten kulminerer i midten af august. Ikke-ynglende ungfugle (som i nogle tilfælde oversomrer i Grønland) indleder fældningen før adulte hanner, og de adulte hunner, som først ankommer fra slutningen af august, fælder senest. Årsungerne (som ikke fælder), ankommer fra midten af september. Kongeederfugle vender generelt tilbage til de samme fældningsområder fra år til år, men da de er ekstremt sky under fældningen, kan forstyrrelser få dem til at opgive et område. For eksempel fandtes den største kendte koncentration af fældende fugle tidligere i Aqajarua/Mudderbugten i Disko Bugt, hvor der fældede op mod 30000 Kongeederfugle i 1940erne. I begyndelsen af 1990erne fandtes der pga. øget menneskelig aktivitet kun 300-500 fugle her. Generelt synes antallet af fældende Kongeederfugle at være gået tilbage i hele Vestgrønland.

Ud over de fugle som fælder i Vestgrønland, overvintrer der også en del fugle, som tilsyneladende har fældet i Canada. I 1980erne og begyndelsen af 1990erne blev vinterbestanden anslået til omkring 270000 fugle. Efter at fældningen er overstået, forlader Kongeederfuglene Upernavik i oktober-november og Qeqertarsuaq/Disko i november-december, tilsyneladende mere eller mindre tvunget sydpå af isen. De fugle, som har fældet i Upernavik, overvintrer primært fra Asiaat mod syd til Paamiut (Tabel 36), tilsyneladende samme sted som de fugle, der har fældet i Disko Bugt.

Kongeederfuglene overvintrer ofte i områder med dybere vand end Ederfuglen, og store mængder overvintrer for eksempel på Fyllas Banke ud for Nuuk og Store Hellefiskebanke ud for Kangaatsiaq. Mange overvintrer dog også mere kystnært og inde i fjordene. Forårstrækket indledes i april. Ved Qeqertarsuaq/ Disko ankommer de første fugle omkring midten af april, når isen går, og mange raster i Disko bugt i maj og begyndelsen af juni. I Upernavik foregår forårstrækket fra midten af maj til midten af juni. På samme tidspunkt trækker mange af de Kongeederfugle, som har overvintret i den sydlige del af Åbentvandsområdet, mod vest og nord gennem Hudson Strait og Foxe Basin i Canada.

Strømand *Histrionicus histrionicus*
2 GRC, 1 FRC af en fugl ringmærket i Canada. Strømanden er en fåtallig ynglefugl i Vestgrønland mod nord til Upernavik, og en sjælden ynglefugl i Sydøstgrønland. Den vestgrønlandske bestand overvintrer antagelig i Åbentvandsområdet; trækforholdene hos fuglene fra Sydøstgrønland er ikke kendt. Udover de lokale ynglefugle fælder en del canadiske hanner i Vestgrønland, hvortil de ankommer fra midten af juli til begyndelsen af august; det er anslået, at 5000 – 10000 hanner fælder i Åbentvandsområdet. I det mindste nogle af de candiske hanner overvintrer også her.

Havlit *Clangula hyemalis*
32 GRC (Tabel 37, se også Tabel 38 og Kort 33-34), 10 FRC af fugle mærket i Island (Kort 35). Havlitten er en udbredt ynglefugl i Grønland. Tilsyneladende overvintrer hovedparten af den vestgrønlandske bestand i Åbentvandsområdet syd for Kangaatsiaq, mens en mindre del overvintrer ved Island og Newfoundland; enkelte fugle, formentlig hanner på abmigration, er genmeldt så langt væk

som i Danmark og det østlige Canada. Den grønlandske vinterbestand er for nylig blevet estimeret til omkring 95 000 fugle. Man ved meget lidt om den østgrønlandske bestands trækforhold. Små antal kan overvintre ved østkysten, men hovedparten overvintrer formentlig ved Island og/eller i det sydvestgrønlandske Åbentvandsområde. Et ukendt antal islandske Havlitter overvintrer også i Sydvestgrønland. Om foråret bevæger disse fugle sig gradvist mod nord og når Disko Bugt i maj. Herfra trækker de formentlig over indlandsisen direkte til Island. Hvorvidt dele af den arktisk-canadiske bestand også overvinter i Sydvestgrønland er stadig et åbent spørgsmål.

Toppet Skallesluger *Mergus serrator*
5 GRC af fugle ringmærket i Upernavik (4) og Nuuk (1), 1 FRC af en fugl ringmærket i Island og skudt i Ammassalik. Toppet Skallesluger er en ret almindelig ynglefugl i Vestgrønland og Sydøstgrønland. Tilsyneladende overvintrer hele den vestgrønlandske bestand i Åbentvandsområdet. Trækforholdene hos den sydøstgrønlandske bestand er ukendt; Salomonsen (1967b) mente, at den overvintrede i Island og måske Storbritannien, mens Alerstam et al. (1986) foreslog, at nogle af fuglene overvintrede i Sydvestgrønland og trak over indlandsisen om foråret. Genfundet af den islandske fugl tyder på, at der faktisk er en vis forbindelse mellem de to bestande.

Havørn *Haliaeetus albicilla*
41 GRC (Tabel 39, Kort 36). Havørnen yngler udelukkende i Vestgrønland fra Ilulissat mod syd til Uummannarsuaq/Kap Farvel; ynglebestanden talte 150-170 par i 1980erne. Årets ungfugle fra det meste af yngleområdet bevæger sig sydpå mod Qaqortoq efter at have strejfet om i det tidlige efterår. Dette sydgående træk synes mindre udpræget hos ældre ungfugle; gamle fugle er formentlig altovervejende standfugle, i hvert fald i områder med gode føderessourcer.

Dværgfalk *Falco columbarius*
En fugl mærket som unge i Island blev i maj tre år senere fanget om bord på en fiskekutter i Danmarksstrædet; Dværgfalken er en sjælden gæst i Grønland.

Jagtfalk *Falco rusticolus*
14 GRC, hvoraf to er af sårede fugle plejet og sluppet fri i Nuuk by. Jagtfalken er en udbredt, men fåtallig ynglefugl i størstedelen af Grønland. Dens trækforhold er ikke særlig godt kendt, og de få genfund bidrager kun i beskeden grad med oplysninger herom. Jagtfalke fra de lavarktiske områder synes overvejende at være stand- eller strejffugle, mens de højarktiske Jagtfalke er trækfugle som forlader ynglepladsen i september og vender tilbage i maj. Vestgrønlandske fugle synes overvejende at overvintre fra Disko Bugt og sydpå, mens i hvert fald nogle fugle fra Avanersuaq overvintrer i Nordamerika. Østgrønlandske fugle overvintrer formentlig i Ammassalik og i Island.

Vandrefalk *Falco peregrinus*
393 GRC (Tabel 40-41, Kort 37-38), 21 FRC af fugle ringmærket i USA. Vandrefalken yngler hovedsagelig i den lavarktiske del af Grønland, hvor de største tætheder findes mellem Disko Bugt og Qaqortoq. Desuden yngler der også et mindre antal i Avanersuaq på nordvestkysten og i Ammassalik på østkysten; den samlede bestand er anslået til 500-1000 par.

De østgrønlandske Vandrefalke er trækfugle, men deres trækforhold er ukendt. Vandrefalkene fra Vestgrønland forlader landet i september og krydser Davisstrædet/Labradorhavet i en sydvestlig retning. I oktober følger de en rute enten gennem den centrale del af USA eller langs østkysten. Formentlig følger de fleste vestgrønlandske Vandrefalke ruten langs USAs østkyst. Unger fra samme kuld kan følge forskellige ruter, lige som magerne i et par. Under trækket tilbagelægger fuglene omkring 150-200 km om dagen

De vestgrønlandske Vandrefalke når deres vinterkvarter fra midten af oktober og til hen i november. Hunnerne overvintrer i et område der strækker sig fra 28ºN til 2ºS og som omfatter den Mexicanske Golf, Caribien, Mellemamerika og de nordligste dele af Sydamerika; nogle hunner kan dog overvintre på USAs østkyst så langt mod nord som 39ºN. Hannerne overvintrer derimod i Sydamerika i et område der strækker sig fra 2-26ºS; nogle når formentlig endnu længere mod syd, og en ikke-kønsbestemt fugl er genmeldt fra Uruguay på 34ºS. De to køn overvintrer således tydeligt adskilt, hannerne i gennemsnit 4000 km syd for hunnerne. I hvert fald nogle Vandrefalke overvintrer det samme sted fra år til år.

De fleste vestgrønlandske Vandrefalke ankommer til ynglepladsen fra midten af maj til begyndelsen af juni, men forårstrækket er ret dårlig kendt. Tilsyneladende benytter mange fugle en mere vestlig rute gennem USA end om efteråret. En hun, fanget på USAs østkyst i oktober og forsynet med en satellitsender, trak således, efter at have overvintret i Panama, mod nord gennem det centrale USA og syd om Hudson Bay før den ankom til Grønland i juni, efter en rejse på mindst 16 500 km siden den forlod ynglepladsen året før. Nogle af de hanner som overvintrer i den sydlige del af Sydamerika, tilbagelægger op mod 40 000 km om året, og Vandrefalken er således en af de længst trækkende grønlandske fugle.

Fjeldrype *Lagopus mutus*
26 GRC (Tabel 42, Kort 39). Fjeldrypen er en almindelig ynglefugl i hele Grønland. De nordligste bestande er trækfugle, som antagelig overvintrer i den sydlige del af landet. Disse fugle forlader yngleområdet i slutningen af september-oktober og vender tilbage fra februar, hannerne før hunnerne. Tiltræk fra Ellesmere Island til Grønland er set i september-oktober. I de sydlige dele af højarktis og i lavarktis er bestandene normalt standfugle, men trækker sydpå i de såkaldte "rypeår".

I rypeår, som finder sted omtrent hvert tiende år, trækker store mængder Fjeldryper mod syd. Sådanne år starter trækket omkring midten af oktober. På vestkysten overvintrer da store mængder i Nuuk-Qaqortoq i november-januar. I slutningen af januar begynder ryperne at trække nordpå, og de fleste er forsvundet i slutningen af

marts. I Disko Bugt-området varer forårstrækket fra slutningen af marts til midten af maj, og antallet af fugle kulminerer i slutningen af april. Som hos de nordlige bestande trækker hannerne nordpå før hunnerne, og tilsyneladende overvintrer hunner generelt sydligere end hanner.

Strandskade *Haematopus ostralegus*
3 FRC af fugle ringmærket om efteråret og vinteren i England og genfundet i Qaqortoq (2, forår) og Ittoqqortoormiit (1, august). Strandskaden er en sjælden gæst i Grønland; dens nærmeste yngleplads er Island.

Stor Præstekrave *Charadrius hiaticula*
12 GRC (Tabel 43, Kort 40), 12 FRC af fugle ringmærket hhv. på de Britiske Øer (7), Island (2), Belgien (1), Spanien (1) og Senegal (1). Stor Præstekrave er en lokalt almindelig ynglefugl i Vest- og Nordvestgrønland, meget almindelig i Nordøstgrønland og fåtallig i Sydøstgrønland. Bestanden er hovedsagelig højarktisk og tæller 30000 – 60000 par. Ynglefuglene i Nordøstgrønland ankommer fra slutningen af maj til begyndelsen af juni og trækker bort fra midten af juli (adulte) til slutningen af august (ungfugle); de lavarktiske ynglefugle ankommer nogle uger tidligere.

Hovedparten af de nearktiske Store Præstekraver (dvs. fugle fra Grønland og Canada) overvintrer i Vestafrika, hvor op mod halvdelen af de over 200000 overvintrende fugle findes på Banc d'Arguin i Mauritanien. Tilsyneladende går efterårstrækket af grønlandske Store Præstekraver over en bred front. Størstedelen trækker via rastepladser på de Britiske Øer mere eller mindre direkte til det nordvestlige Afrika eller måske endda til vinterkvarterene. På de Britiske Øer kulminerer antallet af rastende nearktiske præstekraver i slutningen af august og i september (adulte tre uger før ungfuglene), og fuglene opbygger betydelige fedtreserver, der i teorien skulle gøre dem i stand til at flyve non-stop til Vestafrika. En mindre del passerer det sydvestlige Norge og det vestlige Danmark for at raste i Vadehavet; undervejs raster nogle også i Island.

De fleste præstekraver forlader Vestafrika omkring slutningen af april. Tilsyneladende trækker hovedparten af de grønlandsk/canadiske fugle direkte til rastepladser i Storbritannien. Disse rastepladser er især beliggende omkring det Irske Hav, og her topper antallet af nearktiske præstekraver omkring den tredje uge af maj. Efter at have ædt sig fede, trækker de fleste grønlandske fugle derefter direkte til ynglepladserne. En lille del raster dog i Island, formentlig fugle fra det nordvestlige Grønland, som har behov for yderligere opfedning, inden de trækker til ynglepladserne ved at flyve over indlandsisen.

Islandsk Ryle *Calidris canutus*
4 GRC af fugle ringmærket som unger i Avanersuaq (2) og Nordøstgrønland (2), 137 FRC af fugle ringmærket især på de Britiske Øer (Tabel 44-47, Kort 41-42). I Grønland yngler Islandsk Ryle hovedsagelig nord for 72ºN. Bestanden er anslået til 15000 – 30000 par, svarende til en vinterbestand på 30000 – 90000 fugle. Den grønlandske bestand tilhører, sammen med de Islandske Ryler som yngler i højarktisk Nordøstcanada, underarten *islandica*, hvis samlede vinterbestand er estimeret til mindst 345000 fugle. Med andre ord yngler mere end halvdelen af *islandica*-bestanden i Canada.

Hele *islandica*-bestanden overvintrer i det vestlige Europa fra det tyske Vadehav mod syd til det nordvestlige Frankrig. Midt på vinteren raster mindst 70% af bestanden på de Britiske Øer, og resten af fuglene fortrinsvis i det hollandske Vadehav. Fra slutningen af februar trækker mange af fuglene til Vadehavet, hvor 60-80% eller mere af bestanden opholder sig omkring månedsskiftet april/maj. I løbet af den første halvdel af maj trækker fuglene direkte til rastepladser i Island og det nordlige Norge. I maj raster der omkring 270000 fugle i Island, hovedsagelig i den vestlige del. I det nordlige Norge raster 60000 – 80000 fugle ved Balsfjord nær Tromsø (69ºN) og Porsangerfjord (70ºN). Fuglene bliver i Island og Norge i op til tre uger, inden de i slutningen af maj trækker videre til ynglepladserne. Det er fristende at tro, at de fugle, som raster i Nordnorge, er fra det nordøstlige Grønland, men et genfund fra Uummannaq i Vestgrønland og en kontrol af en fugl ringmærket i Nordnorge og fanget i Island to uger senere tyder på, at også fugle fra Nordvestgrønland og Canada kan bruge de norske rastepladser. Fuglene fra de sidstnævnte områder trækker non-stop over indlandisen til det vestlige Grønland, og derefter direkte videre. Kun i dårligt vejr raster større tal i Vestgrønland. Det høje antal genfund i Avanersuaq i 1972 og 1974 (Tabel 46) skyldes sandsynligvis, at mange canadiske fugle trak tilbage hertil på grund af dårligt vejr på ynglepladserne. Normalt synes Avanersuaq at ligge uden for de canadiske fugles trækrute. Generelt ankommer de Islandske Ryler til ynglepladserne fra slutningen af maj til begyndelsen af juni. De et-årige fugle bliver i Vesteuropa sommeren over.

Efterårstrækket er dårligere kendt end forårstrækket. De adulte fugle trækker bort omkring midten af juli og næsten alle er væk efter 10. august, mens de fleste af ungfuglene trækker bort i slutningen af august. Der ses kun få Islandske Ryler i Sydvestgrønland om efteråret, så fuglene fra Nordøstcanada og Nordvestgrønland følger sandsynligvis den samme trækrute som om foråret, det vil sige over indlandsisen til rastepladser i Island eller direkte til de vesteuropæiske kyster. I Island ses adulte fugle fra midten af juli til midten af august, ungfugle fra midten af august til midten af september. Der raster tilsyneladende væsentlig færre Islandske Ryler i Island om efteråret end om foråret, og fuglene raster i kortere tid; udskiftningen kan dog være større end om foråret. Forklaringen på det lavere antal rastende fugle om efteråret kunne være, at en del af fuglene fra det nordlige Grønland og måske Ellesmere Island trækker direkte til Vadehavet eller de Britiske Øer, hvortil der ankommer fugle nogenlunde samtidig som til Island. En del af fuglene trækker via Sydvestnorge og det vestlige Danmark til Vadehavet, andre til de Britiske Øer. Mindst halvdelen af *islandica*-bestanden fælder i det sene efterår i Vadehavet. Efter fældningen trækker mange af fuglene til de Britiske Øer og andre europæiske vinterkvarterer.

Sandløber *Calidris alba*
4 GRC heraf to genfundet i Frankrig (Kort 43), 4 FRC af fugle ringmærket i Norge (3) og i Storbritannien (1). Herudover er der i teksten brugt 20 genfund af fugle mærket i Island (hvor der kun optræder grønlandske Sandløbere) og 15 af fugle farvemærket i Nordøstgrønland og set andre steder. I Grønland er Sandløberen en meget almindelig ynglefugl nord for Kangertiitivaq/Scoresby Sund, almindelig i Peary Land, men fåtallig i Nordvestgrønland; ynglebestanden tæller 25 000 – 50 000 par. Generelt ankommer ynglefuglene fra slutningen af maj til begyndelsen af juni og trækker bort fra midten af juli til slutningen af august, adulte tidligere end ungfugle.

Sandløberne fra Nordvestgrønland overvintrer sandsynligvis i Amerika mod syd til Chile, men deres trækforhold er meget dårligt kendt. Sandløberne fra Nordøstgrønland overvintrer langs kysterne af det østlige Atlanterhav fra de Britiske Øer mod syd til Ghana i Vestafrika, muligvis endda så langt mod syd som Sydafrika. De første nordøstgrønlandske Sandløbere dukker op i Island i midten af juli, på de Britiske Øer i slutningen af juli og i Frankrig i begyndelsen af august. I oktober er fuglene spredt udover et stort område, i hvert fald fra Skotland til Ghana. Mange Sandløbere fælder efter ankomsten til Nordvesteuropa, mens andre kun raster i nogle få uger før de fortsætter videre mod syd. Fuglene fra den første gruppe synes at være dem, der overvintrer i Europa, mens fuglene fra den anden gruppe overvintrer i Afrika. Hvor stor en del af de nordøstgrønlandske Sandløbere som overvintrer i Afrika er ukendt, men da størstedelen af de overvintrende Sandløbere fra den østatlantiske flywaybestand findes i Afrika, er dette formentlig også tilfældet for de grønlandske fugle.

Både på de Britiske Øer og i Vadehavet ankommer der en bølge af Sandløbere i marts-april og en anden i maj. Den første bølge består sandsynligvis af fugle, som har overvintret i Europa, mens den anden og større bølge sandsynligvis består af fugle, som har overvintret i Afrika. På de Britiske Øer kulminerer den sidste bølge i anden og tredje uge af maj; langt de fleste raster omkring det Irske Hav. Hovedparten af disse Sandløbere er formentlig fra Nordøstgrønland, mens de fleste af fuglene i Vadehavet formentlig er fra Sibirien. De fleste grønlandske Sandløbere trækker direkte fra disse forårsrastepladser til yngleområdet, men en del raster i det vestlige Island undervejs.

Sortgrå Ryle *Calidris maritima*
37 GRC af fugle udelukkende genfundet i Grønland (Tabel 48-49, Kort 44), 3 FRC af fugle ringmærket i Island (1) og England (2). Sortgrå Ryle er i Grønland en ret udbredt, hovedsagelig lavarktisk ynglefugl, som ankommer til yngleplads erne fra begyndelsen af april til slutningen af maj og forlader dem i august. De vestgrønlandske fugle, som yngler fra Kangaatsiaq og nordefter, overvintrer langs kysterne i Åbentvandsområdet, især i Maniitsoq-Nuuk, mens de, der yngler syd for Kangaatsiaq, overvejende synes at være standfugle. Der er dog kun ringmærket få Sortgrå Ryler i dette område. Trækforholdene hos den fåtallige højarktiske bestand eller hos bestanden i Sydøstgrønland er ukendt, bortset fra at sidstnævnte forlader kysten i oktober-november.

De tre udenlandske genfund antyder, at fugle fra Canada og Island dukker op i Grønland – og/eller at nogle vestgrønlandske fugle trækker til Island og de Britiske Øer. Træksystemet hos de canadiske-grønlandske-islandske Sortgrå Ryler er dog meget dårligt kendt og synes tilmed at være vidunderligt kompliceret. Sortgrå Ryler ringmærket uden for yngletiden i Island er genfundet i Newfoundland, Baffin Island, Grønland, Storbritannien, Holland og Spanien (Boere et al. 1984, Summers et al. 1988, Petersen 1998); der overvintrer mellem 10 000 og 100 000 Sortgrå Ryler i Island. Et ukendt antal canadiske fugle trækker til Island, og nogle af dem fortsætter til det europæiske fastland. Tilsyneladende er en del af de islandske Sortgrå Ryler standfugle, mens andre sandsynligvis overvintrer ved Newfoundland og måske i Vestgrønland. Endvidere menes nogle grønlandske fugle, formentlig især fra Sydøstgrønland, at overvintre i Island.

Alm. Ryle *Calidris alpina*
24 GRC (Tabel 50-51, Kort 45), 4 FRC af fugle ringmærket på de Britiske Øer (3) og i Frankrig (1). Af fuglene ringmærket i Grønland er 18 genmeldt i udlandet fra de Britiske Øer mod syd til Marokko. Alle genfundene er af underarten *arctica*, som kun yngler i Nordøstgrønland mellem 69º og 79ºN; hele bestanden overvintrer i det vestlige Afrika. Ynglebestanden er estimeret til 7000 – 15 000 par svarende til en vinterbestand på 20 000 – 45 000 fugle. De nordøstgrønlandske fugle udgør således kun en beskeden andel af de 2,2 mio. ryler, som følger den østatlantiske trækrute.

De nordøstgrønlandske ryler trækker bort fra slutningen af juli til slutningen af august, adulte fugle før unge. Genfundene antyder, at mange adulte trækker direkte til de Britiske Øer, hvortil de ankommer omkring slutningen af juli. Andre når på nogenlunde samme tidspunkt Frankrig og Portugal. Mange adulte synes at raste en måneds tid i Vesteuropa inden de trækker videre. Ungfuglene når Vesteuropa omkring midten af august, og nogle bliver her til hen i november. Hvordan resten af trækket til vinterkvarterene i Afrika forløber vides ikke. Tilsyneladende overvintrer størstedelen af bestanden på Banc d'Arguin i Mauritanien, mens en mindre del overvintrer i det nordvestlige Marokko. De fleste ryler trækker bort fra vinterkvarteret fra slutningen af april til begyndelsen af maj. Hovedparten trækker antagelig direkte til den vestlige del af de Britiske Øer, en strækning på små 4000 km. Når fuglene i slutningen af maj forlader de Britiske Øer, trækker hovedparten direkte til Nordøstgrønland, hvortil de første ankommer omkring 23. maj.

Stenvender *Arenaria interpres*
27 GRC (Tabel 52), 36 FRC (Tabel 53-55, Kort 46-47). Stenvenderen er en almindelig ynglefugl i det nordlige Grønland, hvor bestanden er anslået til 20 000 – 40 000 par. Desuden findes der en stor bestand i det nordøstligste Canada; ynglefuglene herfra passerer Grønland på deres

træk. Den grønlandske/canadiske bestand overvintrer langs kysterne af det østlige Atlanterhav, fra Norge til Mauritanien i Vestafrika; hovedparten overvintrer i Nordvesteuropa, hvor de Britiske Øer synes at udgøre det vigtigste overvintringsområde.

De grønlandske/canadiske fugle forlader ynglepladserne fra midten af juli til begyndelsen af september, adulte før ungfugle. Mange Stenvendere fra Nordvestgrønland og Nordøstcanada passerer sydvestgrønland om efteråret og trækker formentlig direkte til de Britiske Øer, mens andre krydser indlandsisen på vej til Island. En beskeden del af bestanden overvintrer i Island, mens andre trækker via Norge og Danmark til Vadehavet og videre mod syd. På de Britiske Øer ankommer de første fugle i midten af juli (sandsynligvis hunner fra Nordøstgrønland), mens hovedparten ankommer i løbet af august. De fleste synes at blive på de Britiske Øer, men andre fortsætter dog videre mod syd. Adulte Stenvendere udviser ret stor stedtrofasthed mod deres vinterkvarter, men kan i løbet af vinteren trække sydpå. Sådanne vinterbevægelser er endnu mere udprægede hos ungfugle.

På de Britiske Øer starter forårstrækket i midten af april og varer ved til slutningen af maj. De fugle, som trækker tidligst bort, raster i Island undervejs, mens de seneste trækker direkte til Nordøstgrønland. Mange af de grønlandske/canadiske fugle, som har overvintret syd for de Britiske Øer, raster tilsyneladende her inden de fortsætter. I Island kulminerer antallet af rastende Stenvendere i den sidste tredjedel af maj. Hovedparten er antagelig nordvestgrønlandske/canadiske fugle, som efter at have opbygget deres fedtreserver trækker over indlandsisen direkte til ynglepladserne. Her ankommer fuglene fra slutningen af maj til begyndelsen af juni. Stenvenderen yngler først, når den er to år gammel, og de fleste ungfugle forbliver syd for Grønland i deres første sommer.

Odinshane *Phalaropus lobatus*
To fugle ringmærket i Uummannaq blev skudt lokalt efter hhv. halvanden måned og et år. Odinshanen er en ret almindelig ynglefugl i Grønland, hovedsagelig i lavarktiske områder. Uden for yngletiden er den pelagisk; de nearktiske fugle overvintrer hovedsagelig ud for det vestlige Sydamerikas kyst syd for Ækvator, men de grønlandske fugles trækveje er ukendt.

Alm. Kjove *Stercorarius parasiticus*
22 GRC (Tabel 56) samt 6 FRC af fugle ringmærket i Island (1), Skotland (4) og Finland (1). På vestkysten er Alm. Kjove en lokalt almindelig ynglefugl op til det sydlige Upernavik, på østkysten yngler den mellem 70º og 74ºN. Generelt ankommer fuglene til ynglepladserne i slutningen af maj og begyndelsen af juni, og de trækker bort fra slutningen af august; enkelte kan ses i Sydvestgrønland frem til begyndelsen af november.

Et genfund fra Newfoundland 15. august er den eneste indikation af fuglenes trækrute mod vinterkvarteret, som sandsynligvis er beliggende ud for det sydlige Sydamerika og måske det sydlige Afrika. Genfundene i Grønland tyder på, at fuglene oftest vender tilbage og yngler i det område, de blev født i, og at et-årige fugle tilsyneladende forbliver syd for Grønland (Fig. 13). Den eneste et-årige fugl, der er genmeldt i Grønland, kom fra Skotland; de øvrige 5 udenlandske var alle to år gamle. Den Alm. Kjove yngler først i en alder af 3-7 år, og mange yngre fugle strejfer vidt omkring.

Lille Kjove *Stercorarius longicaudus*
To adulte fugle ringmærket i det nordøstlige Grønland blev genmeldt lokalt hhv. et og to år senere. Lille Kjove overvintrer generelt i de sydlige have mellem 30º og 55ºS.

Storkjove *Stercorarius skua*
82 FRC (Tabel 57). Hovedparten af disse fugle er ringmærket som unger i Island og på Shetlandsøerne, og genmeldt som yngre fugle (overvejende 2-3 år gamle, Fig. 14) om sommeren (Fig. 15) syd for 71º30'N (Kort 48). De fleste Storkjover er genmeldt i Vestgrønland, men det relativt høje antal genfund (14) nær de to østgrønlandske byer tyder på, at arten også er vidt udbredt langs østkysten.

Næsten alle et-årige Storkjover forbliver syd for yngleområderne, og alle aldersklasser overvintrer som regel syd for Storbritannien samt ved Newfoundland. En del ældre ungfugle strejfer derimod om sommeren mod nord til de arktiske områder, og det er disse fugle, som optræder ved Grønlands kyster. Sammenfaldende med en betydelig stigning i den nordatlantiske ynglebestand steg antallet af genmeldte Storkjover i Grønland frem til omkring 1980, men herefter er der kun genmeldt tre fugle. Da ynglebestanden ikke er gået tilbage, og da der er ringmærket en del fugle også efter 1980, kunne det lave antal genfund afspejle, at færre Storkjover besøgte Grønland i 1980erne og 1990erne end før (jf. Ride) – eller at der blev skudt færre.

Sydpolarkjove *Stercorarius maccormicki*
En fugl ringmærket som unge på den Antartiske Halvø i januar 1975 blev skudt 31. juli samme år i Nuup Kangerlua/Godthåb Fjord (Nuuk; 14370 km N). Dette genfund udgør det andet fund af Sydpolarkjove i Grønland. Tilsyneladende bliver adulte Sydpolarkjover nær Antarktis året rundt, mens i hvert fald en del af de yngre fugle er langdistance-trækfugle. Nogle af dem trækker til det nordlige Stillehav, andre til det nordvestlige Atlanterhav, hvor en del synes at overvintre ud for Newfoundland.

Hættemåge *Larus ridibundus*
Fem fugle mærket i Island er genmeldt i Grønland: En på østkysten (Ittoqqortoormiit) i maj og fire i Qaqortoq på sydvestkysten i juni-december. Hættemågen er en fåtallig, lokal ynglefugl i Sydvestgrønland; strejfgæster er set så langt mod nord som Disko Bugt på vestkysten og Danmarkshavn på østkysten.

Sildemåge *Larus fuscus*
En fugl ringmærket på Færøerne blev skudt i Nuuk, mens to fugle ringmærket i England blev skudt i Ammassalik. Sildemågen er nu en regelmæssig ynglefugl i Vestgrønland og sommergæst i det meste af det øvrige Grønland.

Sølvmåge *Larus argentatus*
En fugl ringmærket i Skotland blev skudt i Qaqortoq, mens to fugle ringmærket i Canada blev skudt i hhv. Uummannaq og Qaqortoq. Udover nogle få ynglepar i det sydvestlige Grønland er Sølvmågen en tilfældig gæst.

Hvidvinget Måge *Larus glaucoides*
641 GRC (Tabel 59, se også Kort 49-51, Tabel 60-67 og Fig. 16) heraf 6 i udlandet, 1 FRC af en fugl ringmærket i Island og genfundet på østkysten. Hvidvinget Måge er en almindelig ynglefugl i Grønland. På vestkysten, hvor bestanden er anslået til op imod 100 000 par, yngler den mod nord til Upernavik på 74ºN, hvortil kommer nogle få par i Avanersuaq. På østkysten yngler den mod nord til Tasiilaq/Ammassalik på 66ºN; bestandsstørrelsen her er ukendt, men meget mindre end på vestkysten. Den Hvidvingede Måge af underarten *glaucoides* yngler kun i Grønland; underarten *kumlieni*, som yngler på Baffin Island i Canada, forekommer fåtalligt men regelmæssigt i det vestlige Grønland.

Langt de fleste af Vestgrønlands Hvidvingede Måger overvintrer i Åbentvandsområdet, hvor vinterbestanden er anslået til 300 000 fugle. Ungfuglene forlader yngleområdet omkring midten af august, hvorefter de strejfer om, både mod nord og syd. Hos de nordligste bestande (Upernavik-Uummannaq) begynder det egentlige sydtræk i september-oktober, mens det først begynder i november-december hos mere sydlige bestande (fx Sisimiut). Fuglene fra Upernavik og Uummannaq overvintrer hovedsagelig i Disko Bugt og Kangaatsiaq. Mange fugle født i Ilulissat bliver i Disko Bugt hele efteråret, mens andre trækker sydpå og når Qaqortoq så tidligt som oktober. Fuglene fra Sisimiut overvintrer hovedsagelig fra den sydlige del af Disko Bugt mod syd til Maniitsoq. Således overvintrer fugle fra Upernavik-Uummannaq generelt længere nordpå end fugle fra Sisimiut, mens fugle fra Ilulissat overvintrer midt imellem (Kort 50-51). De ret få genfund (20) af fugle ringmærket i Sydvestgrønland tyder på, at også disse ungfugle foretager lange strejftog i det tidlige efterår, og nogle er blevet genmeldt på østkysten. Ældre fugles trækforhold ligner generelt ungfuglenes, bortset fra at de synes at forlade yngleområdet hurtigere. De fleste voksne Hvidvingede Måger er om sommeren genmeldt i nærheden af deres fødested og synes således at udvise en ret høj grad af stedtrofasthed. I modsætning til Gråmågen opholder mange ungfugle sig om sommeren nær deres fødested, men optræder ikke inde i selve kolonien før de er yngledygtige. Seks vestgrønlandske fugle er genmeldt i udlandet (Kort 49), hvilket illustrerer, at nogle unge Hvidvingede Måger strejfer vidt omkring: Hvidvinget Måge er en regelmæssig gæst på Færøerne og i Skotland, men er set så langt mod syd som i Middelhavet og på Azorerne; nogle når også den nordamerikanske Atlanterhavskyst. Undersøgelser af skudte fugle på Færøerne (Fjeldså & Jensen 1985) viser, at det langt overvejende er unge hunner som trækker så langt.

Der vides kun lidt om trækforholdene hos de østgrønlandske fugle, men i hvert fald en del af dem overvintrer i Island, hvortil der også trækker nogle vestgrønlandske ungfugle (1 genfund). I Island ankommer de Hvidvingede Måger i slutningen af september. Petersen (1998) estimerede vinterbestanden til 5000 – 10 000 fugle, dog med en betydelig årlig variation antagelig relateret til vejr- og isforhold. De adulte Hvidvingede Måger forlader Island i februar-marts, ungfuglene hovedsagelig i april-maj.

Gråmåge *Larus hyperboreus*
247 GRC (Tabel 68, se også Tabel 70, Fig. 17, Kort 52 og 54), 31 FRC af fugle ringmærket i Island, Jan Mayen og Svalbard (Tabel 69, Kort 54). Gråmågen yngler i hele Grønland på nær i de allernordligste egne. Ynglebestanden i det vestlige Grønland incl. Avanersuaq er groft estimeret til 30 000 – 100 000 par, flest fra Disko Bugt til Upernavik; bestandsstørrelsen i Østgrønland kendes ikke. På østkysten forsvinder Gråmågerne fra Ittoqqortoormiit/Scoresby Sund-området sent i oktober og fra Tasiilaq/Ammassalik-området i december-januar. Hvor fuglene overvintrer vides ikke, men en del af dem trækker muligvis til Island.

I Vestgrønland finder sydtræk sted i oktober-november og endda ind i december. Hovedparten af fuglene er genmeldt i deres første efterår, og oplysninger om ældre fugles trækforhold er begrænsede. Ingen grønlandske Gråmåger er blevet genmeldt i udlandet, og alle vestgrønlandske Gråmåger overvintrer sandsynligvis i Åbentvandsområdet, hvor vinterbestanden er estimeret til omkring 300 000 fugle. Selvom der et betragteligt overlap, synes Gråmåger født i Kangaatsiaq-Upernavik generelt at overvintre længere mod nord end Hvidvingede Måger fra samme område (Kort 54). For begge arter er de isfrie områder lige syd for Disko Bugt vigtige vinterkvarterer, men i modsætning til Hvidvinget Måge synes kun få Gråmåger fra disse nordlige bestande at trække længere sydpå end Kangaatsiaq. Som hos Hvidvinget Måge, vender de fleste adulte Gråmåger øjensynlig tilbage og yngler nær deres fødested. Mange et-årige Gråmåger bliver derimod syd for deres fødested om sommeren.

Et ukendt, men sandsynligvis beskedent antal af hovedsagelig unge Gråmåger fra Svalbard og Jan Mayen optræder i Grønland. Årsunger fra disse bestande dukker op på østkysten i september og forsvinder igen, når isen lukker til i november-december. Hvor de befinder sig de følgende måneder er ukendt, men fra juni til november dukker der et-årige fugle op på både øst- og vestkysten så langt mod nord som Upernavik. Tilsyneladende når nogle ældre fugle fra disse bestande også Grønland. Det ene genfund af en islandsk fugl viser at nogle ungfugle herfra også når Østgrønland, men de unge islandske Gråmåger trækker især mod øst, så det er antagelig kun få fugle, det drejer sig om. Hvorvidt Gråmåger fra Canada når Grønland vides ikke.

Svartbag *Larus marinus*
99 GRC (Tabel 71, se også Fig. 18 og Tabel 72-73), 4 FRC af fugle ringmærket i Island (2), Rusland og Danmark. Svartbagen yngler hovedsagelig i Vestgrønland mod nord til Upernavik. Den vestgrønlandske bestand er anslået til 3000-5000 par, hvortil kommer en lille bestand i Sydøstgrønland.

I Vestgrønland er Svartbagene fra Åbentvandsområdet, dvs. fra den sydlige del af Disko Bugt og sydpå, stand- eller strejffugle; et-årige fugle synes dog generelt at bevæge sig mod syd. Svartbage, som yngler nord herfor, trækker i oktober-november mod syd for at overvintre i Åbentvandsområdet; returtrækket sker i april. Trækforholdene hos den sydøstgrønlandske bestand er ukendt, men der ses Svartbage i Ammassalik om vinteren. Om vinteren optræder der nogle få islandske Svartbage i det sydlige Grønland, og strejfgæster fra andre bestande kan af og til dukke op. Langt hovedparten af de Svartbage, som overvintrer i Grønland, er dog af lokal oprindelse.

Ride *Rissa tridactyla*

811 GRC (Tabel 74, Kort 55, se også Fig. 19 og Tabel 76-77), 764 FRC hovedsagelig af fugle ringmærket som unger i Vesteuropa (Tabel 75, Kort 56, se også Fig. 20-21 og Tabel 78-81). Riden er en almindelig ynglefugl i Grønland, især på vestkysten. Med kolonier fra Avanersuaq i nord til Qaqortoq i syd er den vestgrønlandske ynglebestand estimeret til mindst 100 000 par. På østkysten findes der spredte ridekolonier mellem Kangerlussuatsiaq/Lindenow Fjord på 60º30'N mod nord til Mallemukfjeld på 80º16'N; bestandens størrelse er ukendt, men den er betydeligt mindre end på vestkysten; trækforholdene hos denne bestand er ligeledes ukendt.

Riden begynder at yngle, når den er 4-5 år gammel. I en britisk undersøgelse (Coulson & Nève de Mévergnies 1992) vendte omkring 36% af de unge Rider tilbage for at yngle i den koloni de var født i, mens 43% ynglede i andre kolonier inden for 100 km afstand af deres fødested. De sidste 21% udvandrede til kolonier beliggende 100-900 km væk. Når Rider først er begyndt at yngle et sted, flytter de ikke, medmindre de bliver voldsomt forstyrret. Efterhånden som de unge Rider bliver ældre, opholder de sig nærmere og nærmere en koloni, men optræder normalt ikke inde i kolonien før de bliver tre år gamle. Normalt fouragerer ynglefuglene inden for 50 km afstand af kolonien. De grønlandske genfund passer generelt godt til disse mønstre og viser således, at de grønlandske fugle også har en høj grad af stedtrofasthed (de fleste fugle synes at yngle inden for 100 km afstand af deres fødested), mens nogle få udvandrer til kolonier, der ligger meget længere væk.

Uden for ynglетiden er Riden pelagisk. De voksne Rider forlader de vestgrønlandske farvande i slutningen af juli og i august, og vender tilbage til deres kolonier i april-maj. Kun to er genmeldt i de egentlige vintermåneder, begge stormdrevne fugle fundet i Vesteuropa i 1957. Unge Rider, især årsungerne, forlader Vestgrønland i september-oktober. Efter nogen omstrejfen i august trækker mange mod syd langs vestkysten og derefter formentlig mod Canada, mens andre trækker direkte til den canadiske kyst. Disse fugle når Labrador hen i oktober og Newfoundland i begyndelsen af november. Mange ungfugle bliver tilsyneladende omkring Newfoundland i hvert fald gennem den første del af vinteren, mens andre trækker ud i Nordatlanten og kan nå de vesteuropæiske kyster så tidligt som slutningen af november. Forholdsvis få et-årige Rider vender tilbage til Grønland (se Fig. 21); de fleste forbliver formentlig ved Newfoundland/Labrador og i det sydlige Davisstræde. De ældre ungfugle vender tilbage til Grønland i maj-juni. Generelt ligner trækforholdene hos de vestgrønlandske Rider meget Mallemukkens, og de to arter overvintrer sandsynligvis i de samme områder, dvs. Nordatlanten mellem 40º og 65ºN. For begge arter er farvandene ud for Nova Scotia, Newfoundland og Labrador vigtige, især for ungfuglene.

Mange Rider, hovedsagelig ældre ungfugle, fra hele det europæiske udbredelsesområde opholder sig i de grønlandske farvande om sommeren og i det tidlige efterår (se Kort 56, Tabel 78 og Fig. 19). Mindst 2 mio. par yngler i Europa, hvilket giver en vinterbestand i størrelsesordenen 6-8 mio. fugle. Genfund af europæiske Rider viser, at mange adulte bliver i de østlige dele af Nordatlanten, mens mange yngre fugle trækker til den vestlige del, dvs. til Grønland og Canada. Selvom det faktiske antal europæiske Rider i Grønland er ukendt og givetvis varierer fra år til år, drejer det sig sandsynligvis om mindst nogle hundredtusinder. Tilsyneladende trækker kun meget få canadiske Rider til Grønland. De forskellige aldersklasser af europæiske Rider ankommer forskudt til de grønlandske farvande: de et-årige ankommer i maj-juni, de to-årige i juni-juli, mens årets unger og de adulte ankommer i slutningen af juli og august. I slutningen af oktober er de fleste trukket bort, men nogle få bliver vinteren over. De europæiske Rider optræder både på østkysten og på vestkysten mod nord til Uummannaq, men de fleste er genmeldt på sydvestkysten mod nord til og med Maniitsoq. På vestkysten er årsungerne næsten udelukkende genmeldt syd for Maniitsoq, mens de et-årige fugle er meget mere jævnt fordelt langs kysten. Ældre fugle er hovedsagelig genmeldt syd for Maniitsoq. Selvom der er et betydeligt overlap, optræder Rider fra den nordlige del af Europa (Nordnorge, Svalbard, Rusland) generelt længere mod nord langs den grønlandske vestkyst end fugle fra den øvrige del.

Ismåge *Pagophila eburnea*

61 GRC af fugle ringmærket på Station Nord i Nordøstgrønland (Kort 57), 29 FRC af fugle ringmærket i Labradorhavet (10, ringmærket i april) og i det nordøstlige Canada (19, Seymour og Ellesmere Island). Ismågen yngler fra højarktisk Canada mod øst til arktisk Rusland. I Grønland findes de fleste kendte kolonier nord for 80ºN, men der findes også tre kolonier på nunatakker i Sydøstgrønland (66-68ºN). Verdensbestanden er estimeret til 15 000 – 30 000 par, men den grønlandske bestands størrelse kendes ikke. De grønlandske ynglefugle ankommer til kolonierne i begyndelsen af juni og trækker bort i august. Uden for de kendte yngleområder ses der regelmæssigt Ismåger om sommeren i det nordlige Upernavik, Avanersuaq og de nordlige dele af Østgrønland. Om vinteren er Ismågen en sjælden gæst i Åbentvandsområdet, mens en del fugle kan ses i maj fra Disko Bugt og nordefter.

Trækforholdene hos Ismågen er dårligt kendt. Efter ynglesæsonen trækker fuglene ud til fourageringsområder på det åbne hav. Senere trækker de forskellige bestande

først mod øst eller vest, dernæst mod syd. De canadiske bestande trækker generelt ud i Baffin Bugten og senere sydpå til Davisstrædet. Nogle fugle fra de russiske bestande trækker mod øst til Beringshavet, andre mod vest til Barentshavet og Grønlandshavet, enten for at overvintre langs iskanten her eller for at fortsætte så langt mod vest som til Davisstrædet. Tilsyneladende overvintrer nogle Ismåger fra det østlige Nordgrønland i Grønlandshavet (3 vintergenfund), andre i Labradorhavet/Davisstrædet (3 forårsgenfund).

Omkring 35000 Ismåger overvintrer langs den 2000 km lange iskant fra Labradorhavet til Davisstrædet mellem Canada og Grønland, især i nærheden af de store yngleområder for sæler. Dette høje antal Ismåger tyder, sammen med genfundene, på at fugle fra både Canada, det østlige Nordgrønland og arktisk Europa samles her. Måske trækker de Ismåger fra det nordøstlige Grønland, som overvintrer her, tilbage til yngleområderne ved at flyve op i Baffin Bugten (2 genfund i Upernavik og Qeqertarsuaq i maj) og dernæst mod øst, enten langs Nordgrønlands kyst eller over indlandsisen. Hvis det er tilfældet, er Ismågen den eneste fugl, som trækker rundt om Grønland.

Havterne *Sterna paradisaea*
523 GRC (Tabel 83-84, Kort 58), 1 FRC af en fugl ringmærket som unge i Rusland og skudt i Asiaat to år senere. Blandt genfundene af grønlandske fugle er 29 fra udlandet, hovedparten ungfugle genfundet i september-januar langs kysten af det vestlige Atlanterhav fra de Britiske Øer til Sydafrika. Havternen er en udbredt ynglefugl i det meste af Grønland, med de største bestande i Nuuk, Disko Bugt, Uummannaq og Upernavik; bestanden på vestkysten er estimeret til 30000 – 60000 fugle. Generelt ankommer ynglefuglene i slutningen af maj og begyndelsen af juni og trækker bort i august-september. Genfundene i Grønland viser, at de fleste Havterner vender tilbage for at yngle i det område de er født i, men enkelte kan flytte ret langt væk. Selvom de først begynder at yngle, når de er omkring 4 år gamle, vender mange et-årige Havterner tilbage til Grønland, hvor de som regel optræder i nærheden af hvor de blev født; andre et-årige fugle forbliver tilsyneladende syd for Grønland.

Med vinterkvarter i den antarktiske pakis er Havternen den grønlandske fugl, der trækker længst, og dens årlige rejse kan strække sig over mere end 40000 km. Efter at have forladt kolonierne strejfer de grønlandske Havterner om en lille måneds tid, inden de trækker mod syd. I denne periode opbygger de fedtreserver til den første etape af deres lange rejse. Efterårstrækket indledes med et hurtigt sydgående træk over havet, først langs Grønlands kyst, dernæst mod de nordvesteuropæiske og afrikanske kyster. De første grønlandske terner dukker op i Nordvesteuropa i begyndelsen af september, og i oktober har de første ungfugle allerede nået Sydafrika. I november har langt de fleste forladt Europa og krydset Ækvator, og i december har de fleste også forladt Sydafrika; enkelte kan dog overvintre i det sydlige Afrika. De gamle fugles træk følger formentlig den samme rute, men trækket foregår sandsynligvis længere fra kysten. Alerstam (1985) foreslog, at efterårstrækket former sig som lange direkte træk mellem føderige områder, for eksempel Grønland – Nordvesteuropa – Vestafrika – Ækvatorialafrika – Sydafrika – Antarktis, svarende til et træk på op mod 4000 km ad gangen.

Da ingen grønlandske Havterner er blevet genmeldt i den sene vinter, og kun tre under forårstrækket (2 adulte i den nordlige del af Sydamerika, 1 et-årig i Canada), er resten af det årlige træk dårligt kendt. Sandsynligvis foregår trækket nogenlunde som følger: Efter at have forladt Sydafrika bliver Havternerne mere eller mindre blæst østpå af de stærke vestenvinde, der hersker i de "brølende fyrrere" og de "hylende halvtredsere", hvorved de når det antarktiske pakisbælte mellem 30º og 110ºØ. I oktober-marts opholder fuglene sig ud for Østantarktis, Amundsenhavet, Rosshavet og Weddellhavet. I marts er pakisen reduceret til et minimum, og iskanten er inden for den kontinentale zone af østlige vinde. Mange Havterner trækker da vestpå til Weddellhavet, hvorfra de starter på deres nordtræk. Andre, måske overvejende ungfugle, trækker tilsyneladende hele vejen rundt om det Antartiske kontinent.

De fleste Havterner synes at forlade vinterkvarteret i marts og begyndelsen af april. Forløbet af forårstrækket er dårlig kendt, men formentlig trækker mange af fuglene over en bred front op gennem Atlanten. Andre, fx fugle som har trukket rundt om det Antartiske kontinent, kan følge en nordgående rute i Stillehavet op langs Sydamerika. De to grønlandske Havterner genfundet i det nordlige Sydamerika gør det fristende at tro, at nogle grønlandske fugle følger en sådan Stillehavs-rute og på et tidspunkt krydser ind over land for at nå ud i Atlanten; det er velkendt at Havterner kan foretage højtgående træk over land. De sidste stadier af de grønlandske Havterners træk kendes ikke. Alerstam et al. (1986) foreslog, at Havternerne i Vest- og Nordvestgrønland bruger det Irske Hav som rasteplads inden de via Island trækker over indlandsisen til Disko Bugt. Denne rute er dog ikke bekræftet, og der er stadig meget at lære om Havternernes imponerende træk.

Lomvie *Uria aalge*
21 GRC, 3 (diskutable) FRC af fugle ringmærket i Canada og Rusland. Lomvien er en fåtallig ynglefugl i Vestgrønland. Bestanden, der i begyndelsen af 1990erne næppe oversteg 3000 fugle, yngler mellem Polarlomvier i 4-5 kolonier beliggende fra Disko Bugt mod syd til Qaqortoq. De få genfund antyder, at bestanden hovedsagelig overvintrer i Åbentvandsområdet, formentlig især mellem Nuuk og Sisimiut. Tilsyneladende overvintrer der ingen eller meget få Lomvier fra andre lande i Grønland.

Polarlomvie *Uria lomvia*
3142 GRC (Tabel 85 og Kort 59, se også Tabel 87-98, Fig. 22-24, Kort 60 og 62-63), 535 FRC (Tabel 86 og Kort 59, se også Tabel 99-104, Kort 61 og 64). Hovedparten (2200) af genfundene er af fugle ringmærket i Upernavik, og langt de fleste er rapporteret som skudt (Tabel 90). Der kan ikke påvises nogen forskel i genfundsfordelingen om vinteren for fugle ringmærket i Upernavik, Uummannaq og Ilulis-

sat (Tabel 87-89). Bortset fra Søkongen er Polarlomvien den talrigeste alkefugl i Grønland. I slutningen af 1980-erne blev den samlede grønlandske ynglebestand estimeret til omkring 400 000 par, hvoraf 53% fandtes i Avanersuaq, 30% i det nordlige Upernavik, 10% i det øvrige Vestgrønland og 7% i Østgrønland ved Kangertittivaq/Scoresby Sund.

De vestgrønlandske Polarlomvier, som yngler fra Upernavik og sydpå, overvintrer dels i Åbentvandsområdet så langt mod nord som isforholdene tillader, dels ved Newfoundland og Nova Scotia i Canada (Kort 62-63). Trækforholdene hos den store bestand i Avanersuaq er dårligt kendt, men fuglene overvintrer formodentlig dels i Canada, dels i Grønland ligesom nabobestandene i Upernavik og højarktisk Canada. I det mindste i nogle år overvintrer et antal ungfugle fra den østgrønlandske bestand i Vestgrønland og Canada, men det vides ikke om dette er et fast trækmønster, og der vides intet om de voksne fugles trækbevægelser. Op mod halvdelen af den vestgrønlandske bestand overvintrer formentlig i Canada, men på grund af forskelle i genfundschancen i de forskellige dele af fuglenes vinterområde er det ikke muligt at fastlå en mere nøjagtig fordeling. Polarlomvier fra Upernavik, Uummannaq og Ilulissat ankommer til Åbentvandsområdet fra midten af september til november, og bevæger sig gradvist sydpå frem til januar. I december-marts synes hovedparten af de fugle, som overvintrer i Vestgrønland, at befinde sig ud for Sisimiut-Nuuk. Forårstrækket sker i april-maj. De grønlandske Polarlomvier, som trækker til Canada, overvintrer hovedsagelig omkring Newfoundland, kun en mindre del ved Nova Scotia. Hovedparten ankommer til Newfoundland i november, adulte senere end årsunger. I løbet af vinteren bevæger mange fugle sig mod syd som følge af isdannelser ved den nordlige del af Newfoundland, og store tal af grønlandske Polarlomvier dukker først op i den sydlige del efter januar. De fleste grønlandske fugle forlader Newfoundland fra marts til starten af maj, men nogle ungfugle forbliver i området sommeren over.

Ud over de vestgrønlandske Polarlomvier overvintrer der store mængder canadiske og østatlantiske fugle i Åbentvandsområdet. Størrelsen af den samlede vinterbestand i Vestgrønland kendes ikke, men det drejer sig formentlig om et syv-cifret antal fugle. Mange canadiske Polarlomvier fra kolonier i den nordvestlige del af Baffin Bugt overvintrer i Åbentvandsområdet, som sandsynligvis også huser fugle fra den store koloni i Reid Bay på østkysten af Baffin Island (kun meget få fugle ringmærket og ingen genfund). De Polarlomvier, som yngler i Hudson Strait og sydpå, overvintrer i Canada og genmeldes stort set ikke i Grønland om vinteren, men nogle ungfugle fra denne bestand oversomrer i Vestgrønland. De overvintrende canadiske fugle når generelt Vestgrønland fra midten af september til begyndelsen af oktober og bevæger sig gradvist mod syd i november. Langt den største del forbliver dog nord for Maniitsoq (Kort 61 og 64). De canadiske vintergæster forlader atter Grønland i april-maj.

De østatlantiske Polarlomvier ankommer hovedsageligt til det sydvestlige Grønland i løbet af november og trækker bort i marts-april. Efter ankomsten fordeler fuglene sig hurtigt langs sydvestkysten op til omkring Maniitsoq. Omkring 90% af de østatlantiske fugle er genmeldt syd for Nuuk, og de overvintrer således generelt sydligere end de canadiske og grønlandske Polarlomvier. De østatlantiske fugle stammer fra Island, Svalbard, Rusland, Nordnorge og formentlig Jan Mayen. Langt den største del af den østatlantiske vinterbestand i Grønland stammer dog fra Island og Svalbard.

I betragtning af det anseelige antal udenlandske Polarlomvier, som overvintrer i Vestgrønland, kunne man måske forvente nogen indvandring til de grønlandske ynglebestande, men dette synes kun at finde sted i beskeden grad. Der findes kun et sikkert bevis på indvandring udefra, en fugl ringmærket som unge i Hudson Strait og kontrolleret som ynglefugl i Avanersuaq. Herudover er der enkelte sommergenfund af ældre udenlandske fugle, som muligvis kan have indvandret. Udveksling af fugle mellem grønlandske kolonier synes ligeledes kun at ske i begrænset omfang, og der er endnu ingen sikre eksempler på, at unger født i én koloni har ynglet andetsteds selvom det givetvis sker af og til; adulte skifter praktisk talt aldrig koloni, når først de er begyndt at yngle.

Alk *Alca torda*

11 GRC, 2 FRC af fugle fra hhv. Rusland og Irland. I Grønland yngler Alken udelukkende langs vestkysten fra Qaqortoq til Avanersuaq, og bestanden er anslået til 2000-5000 par. De få genfund antyder, at de grønlandske Alkes trækmønster minder om Polarlomviens, således at en del af bestanden overvintrer ud for den canadiske kyst, en anden del i Åbentvandsområdet. Kun meget få Alke fra andre lande optræder i Grønland.

Tejst *Cepphus grylle*

1337 GRC (Tabel 105, se også Tabel 106-111, Fig. 25 og Kort 65-66), 13 FRC af fugle ringmærket i Island og genmeldt om efteråret og vinteren på hhv. østkysten (11) og vestkysten (2). Blandt de grønlandske genfund er kun to fra udlandet, begge fugle fra Upernavik genfundet om foråret ved Baffin Island i Canada. Tejsten er den videst udbredte alkefugl i Grønland og mangler stort set kun som ynglefugl langs det meste af nordkysten. Bestanden langs vestkysten er estimeret til mindst 25 000 – 100 000 par. Tejsten kan overvintre næsten hvor som helst der er en smule åbent vand, og overvintrende Tejster er blevet fundet så langt mod nord som Avanersuaq på vestkysten og Wollaston Forland på østkysten. Bortset fra, at de fleste Tejster forlader Avanersuaq, når vinteren sætter ind, kendes denne bestands trækforhold ikke. Det samme gælder for den østgrønlandske bestand, som formentlig overvejende overvintrer ud for østkysten.

Der er ringmærket mere end 10 000 Tejster i Vestgrønland, og genfundene giver her et bedre indblik i trækforholdene. Groft sagt er Tejsterne fra Upernavik og sydpå kort-distance-trækfugle eller standfugle. Om vinteren opholder ungfuglene sig i samme områder som de gamle, men om sommeren forbliver mange ungfugle noget syd for det område, de er født i. De fleste Tejster fra Upernavik

og Uummannaq overvintrer fra Disko Bugt mod syd til Nuuk. Nogle forbliver nord for dette område, andre trækker endnu længere sydpå, helt ned til Qaqortoq, og atter andre trækker til Canada. De mange genfund i Grønland tyder dog på, at langt de fleste forbliver i landet året rundt. Tejsterne trækker bort fra Upernavik fra midten af september til midten af oktober, fuglene fra Uummannaq en uge eller to senere. De ankommer til Disko Bugt i sidste halvdel af oktober; ynglefuglene vender tilbage i april-maj, afhængig af lokale isforhold. Selvom Tejster, der yngler i Disko Bugt, overvintrer i praktisk taget samme område som fugle fra Upernavik og Uummannaq, ligger tyngdepunktet dog længere mod syd. I strenge vintre sker der sydgående bevægelser i løbet af vinteren hos disse bestande, og generelt synes mange vestgrønlandske Tejster i februar-marts at opholde sig ude til havs i områder med op til 95% isdække. Der er kun ringmærket få Tejster i Kangaatsiaq og Sisimiut, men tilsyneladende overvintrer disse fugle hovedsagelig lokalt, hvilket vil sige fra den sydlige del af Disko Bugt til Nuuk. Tejster fra Maniitsoq og Nuuk er standfugle, som i gennemsnit overvintrer mindre end 100 km fra deres yngleplads. Tejster fra Paamiut er tilsyneladende også standfugle, mens i det mindste nogle fugle fra Qaqortoq bevæger sig nordpå for at overvintre i Paamiut-Nuuk.

Tilsyneladende overvintrer der kun ret få udenlandske Tejster i Vestgrønland. Et ukendt antal unge islandske Tejster trækker til Sydøstgrønland om efteråret, men kun meget få af dem når Sydvestgrønland. Hvorvidt der overvintrer Tejster fra højarktisk Canada i Vestgrønland er stadig et åbent spørgsmål.

Søkonge *Alle alle*
597 GRC (Tabel 112, Kort 67), 18 FRC af fugle ringmærket på Svalbard. Hovedparten (588) af de grønlandske genfund er af fugle ringmærket og genfanget i Avanersuaq, men med ret upræcise angivelser af sted og tid. Af omkring 10 000 fugle ringmærket her er kun 3 blevet genmeldt andetsteds, alle ved Newfoundland i oktober-december. Fuglene fra Svalbard er alle genfundet i Vestgrønland (Qaqortoq-Kangaatsiaq), hovedsagelig i november-februar. Grønland huser langt den største del af verdensbestanden af ynglende Søkonger, over 20 mio. par. Hovedparten af disse yngler i Avanersuaq, en mindre del i Ittoqqortoormiit på østkysten. Andre store bestande findes på Jan Mayen, Svalbard, Franz Josef Land og Novaya Zemlya.

I Avanersuaq ankommer Søkongerne til ynglepladsen i maj og forlader den i slutningen af august. Om efteråret følger hovedparten formentlig først den Vestgrønlandske Strøm rundt om den nordlige ende af Baffin Bugten og dernæst den sydgående Canadiske Strøm langs Baffin Island. Søkongerne forlader de nordlige dele af Baffin Bugten i september, og i begyndelsen af oktober ankommer de første fugle til Newfoundland, mens mange stadig opholder sig i Davisstrædet og Labradorhavet. På den grønlandske side af Davisstrædet er der i september set store antal fra Disko Bugt mod syd til Maniitsoq by, så nogle fugle følger formentlig denne rute inden de trækker videre mod den canadiske kyst. Hovedparten af Søkongerne fra Avanersuaq overvintrer ud for Newfoundland og tildels Nova Scotia. I løbet af marts-april forlader de fleste Søkonger disse områder, og passerer Davisstrædet fra slutningen af april til begyndelsen af maj og den nordvestlige del af Baffin Bugten omkring midten af maj. En del et-årige fugle forbliver formentlig syd for ynglområdet, for eksempel i pakis-zonen ud for Baffin Island.

I Ittoqqortoormiit ankommer Søkongerne også til ynglepladserne i maj og trækker bort i august, men denne bestands trækforhold er ikke kendt. Formentlig overvintrer fuglene i pakis-zonen ud for Sydøst- og Sydvestgrønland sammen med fugle fra Svalbard og Jan Mayen. I oktober ankommer der mange Søkonger til Sydvestgrønland. Disse fugle trækker bort fra marts til begyndelsen af april, og genfundene fra Svalbard viser, at i hvert fald en del af dem stammer herfra. På Svalbard ankommer de fleste ynglefugle i den første halvdel af april. Hvorvidt nogle Søkonger fra Østgrønland og Svalbard også overvintrer i den østlige del af Atlanten, eller for den sags skyld ved Newfoundland, vides ikke.

Lunde *Fratercula arctica*
8 GRC, 8 FRC af fugle ringmærket 1957-1979 i Island, Norge, Færøerne og Storbritannien (Tabel 113, Kort 68). I Grønland yngler Lunden især i Nuuk, Disko Bugt og Upernavik; bestanden tæller omkring 5000-8000 par. Om vinteren ses Lunden kun sjældent, men kan dog visse år være talrig i Åbentvandsområdet.

Lunder overvintrer normalt langt fra land, og deres trækbevægelser er dårligt kendt. De europæiske fugle overvintrer normalt i den østlige del af Atlanten syd for 67ºN, mens de amerikanske – og formentlig også de grønlandske – hovedsagelig overvintrer ud for Newfoundland. En del europæiske Lunder, især ungfugle, trækker dog også til Newfoundland, og det er antagelig disse fugle, som visse vintre dukker op i Sydvestgrønland.

Stenpikker *Oenanthe oenanthe*
35 GRC (Tabel 114). Af disse genfund er 14 – alle ringmærket i Vestgrønland – blevet genmeldt fra de Britiske Øer mod syd til Portugal (Kort 69). Syv fugle på efterårstræk blev genmeldt fra Frankrig (46ºN) til Portugal (42ºN), de fleste i perioden 1. til 18. oktober. Syv andre fugle blev genmeldt på forårstræk fra det nordlige Frankrig (49ºN) til de Britiske Øer (53ºN) i perioden 28. april til 25. maj; genfundenes tyngdepunkt faldt omkring 800 km nordligere end om efteråret. Stenpikkeren er en almindelig ynglefugl i det meste af Grønland. Fuglene tilhører underarten *leucorhoa*, som også yngler i Canada og Island, og som overvintrer i tropisk Vestafrika, formentlig fra Senegal og Sierra Leone mod øst til Mali. De grønlandske ynglefugle trækker bort i august-september og vender tilbage fra slutningen af april til begyndelsen af maj. Efterårsgenfundene antyder, at de grønlandske Stenpikkere flyver direkte til den vesteuropæiske kyst syd for de Britiske Øer. Herfra trækker de sandsynligvis mere eller mindre direkte til Vestafrika. Med 6 ud af 7 i oktober er

genfundene i Vesteuropa dog påfaldende sene og vedrører måske fugle, der har været tvunget på en nordlig kurs af dårligt vejr. Det er muligt, at en stor del af de grønlandske og canadiske stenpikkere trækker non-stop over Atlanten til Vestafrika, en rute hvor chancen for genfund er minimal. Teoretisk set skulle det være muligt for en Stenpikker at trække de omkring 4400 km fra det sydlige Grønland til den vestafrikanske kyst, især i medvind. I den forbindelse er det interessant, at grønlandske Stenpikkere om efteråret opmagasinerer store brændstofreserver i form af fedt – så store, at den relative vægtforøgelse er næsten dobbelt så stor som hos skandinaviske Stenpikkere.

Forårsgenfundene tyder på, at de grønlandske Stenpikkere ankommer til området omkring den Engelske Kanal – betydeligt længere nordpå end om efteråret – fra slutningen af april til midten af maj. Manglen på genfund syd for dette område kunne tyde på, at fuglene ankommer hertil efter længere flyvninger. Det vides ikke, om for eksempel de vestgrønlandske Stenpikkere trækker direkte herfra over indlandsisen til ynglepladserne, eller om de først raster i Island. Under alle omstændigheder tyder tidspunkterne for genfundene på, at opholdet i Vesteuropa er ret kort. Salomonsen (1967b) foreslog, at Stenpikkerne trækker langs mere nordlige breddegrader om foråret end om efteråret, fordi de har tilpasset sig de fremherskende vejrsystemer, de østgående lavtryk, som regelmæssigt passerer syd om Island. Ved at trække bag og syd om lavtrykkene om efteråret vil Stenpikkerne kunne flyve i medvind, på samme måde som de kan, hvis de trækker nord om lavtrykkene om foråret.

Ravn *Corvus corax*
85 GRC (Tabel 115 og 116, Kort 70); over halvdelen af disse fugle er ringmærket ved Kangerlussuaq/Søndre Strømfjord i Maniitsoq. På nær de allernordligste egne yngler Ravnen i hele Grønland, og kan selv om vinteren ses i de højarktiske dele.

Generelt synes Ravne fra den nordlige del af Vestgrønland (fra Disko Bugt og nordover) at strejfe længere omkring end fugle fra den centrale del af Vestgrønland, mens fugle fra den sydlige del af landet overvejende er standfugle. Ravnenes bevægelser er i høj grad relateret til deres fødesøgning. For eksempel trækker mange Ravne fra Kangerlussuaq/Søndre Strømfjord allerede i det tidlige efterår de 130 km til lossepladsen ved Sisimiut by. Under deres omstrejfen kan nogle fugle tilbagelægge betydelige afstande, eksemplificeret ved genfund af fugle fra Uummannaq og Kangaatsiaq i Qaqortoq, hhv. 1130 og 970 km syd for mærkningsstedet.

Gråsisken *Carduelis flammea*
31 GRC (Tabel 118). Hovedparten af genfundene gjort lokalt, men én Gråsisken ringmærket i Maniitsoq er genfundet i Michigan, USA. Gråsiskenen er en almindelig, vidt udbredt ynglefugl i Grønland. Selvom små antal kan overvintre i Vestgrønland, er hovedparten trækfugle, som forlader landet i september-oktober og ankommer i april-maj.

Salomonsen (1967b) mente, at den vestgrønlandske bestand trak til det sydøstlige Canada, og den østgrønlandske til Island og endda til Storbritannien. Den faktiske viden om de grønlandske Gråsiskeners trækforhold er dog begrænset. Genfundet fra USA viser, at de vestgrønlandske fugle i hvert fald visse år kan tilbagelægge betydelige afstande, og at vinterkvarteret kan omfatte det nordlige USA. Hovedparten af den vestgrønlandske bestand trækker utvivlsomt til Nordamerika, men den østgrønlandske bestands trækforhold er stort set ukendt. Gråsiskener af grønlandsk oprindelse (underarten *rostrata*) forekommer i Skotland i varierende, men generelt lave antal. Der vides meget lidt om forekomsten af grønlandske Gråsiskener i Island, bl.a. fordi de islandske Gråsiskener (underarten *islandica*) varierer meget både i udseende og antal. Måske trækker hovedparten af den (syd)østgrønlandske bestand også til Nordamerika ligesom Laplandsværlingerne og Snespurvene fra dette område.

Laplandsværling *Calcarius lapponicus*
119 GRC (Tabel 119, Kort 71). Langt de fleste af genfundene er gjort lokalt, men fire fugle er dog genmeldt i udlandet (Canada 2, USA 2). To af disse genfund er af fugle ringmærket på østkysten. Laplandsværlingen er en almindelig ynglefugl i det meste af Grønland. Selvom nogle overvintrer i den sydvestligste del af landet, er hovedparten trækfugle, som trækker bort fra slutningen af august til begyndelsen af oktober og vender tilbage fra slutningen af april til hen i maj. Langt den største del af bestanden overvintrer i Nordamerika fra det sydlige Canada mod syd til Iowa i USA. De grønlandske Laplandsværlinger er i gennemsnit større end de skandinaviske, og sådanne store fugle er blevet fanget i Island, Storbritannien og Holland. En beskeden del af de (øst)grønlandske fugle synes således at nå Vesteuropa. Om en del af fuglene fra for eksempel den nordligste del af det østgrønlandske udbredelsesområde regelmæssigt trækker til Europa, eller om forekomsten blot skyldes bestemte vejrforhold under de indledende stadier af efterårstrækket hos fugle, der normalt ville være trukket til Nordamerika, vides ikke.

Snespurv *Plectrophenax nivalis*
1168 GRC (Tabel 120, se også Tabel 121 og Kort 72-73), 6 FRC af fugle ringmærket i USA (4, genmeldt i Vestgrønland), Island (1, genmeldt i Østgrønland) og Norge (1, genmeldt i Østgrønland). Blandt genfundene af de grønlandske fugle er 1109 fra Grønland (heraf 914 kontrolleret levende) og 59 fra udlandet (Canada 42, USA 3, Island 1, Norge 5, Rusland 7, Storbritannien 1). Snespurven er en almindelig ynglefugl i praktisk talt hele Grønland. Selvom en del fugle, hovedsagelig hanner, kan overvintre nær bebyggelser i den sydlige del af landet, er de grønlandske Snepurve langt overvejende trækfugle. De forlader landet i september-oktober og vender tilbage fra slutningen af marts til hen i maj; hannerne 2-4 uger før hunnerne. Snespurve fra Vest- og Sydøstgrønland overvintrer i Nordamerika fra det østlige Canada til det nordlige USA mellem 52º og 42ºN, formentlig overvejende øst for de store søer (Kort 72). Snespurve fra Nordøstgrønland overvintrer derimod i Rusland, sandsynligvis overvejende på stepperne vest for Ural og nord for det Kaspiske Hav.

En beskeden del af de østgrønlandske fugle synes dog at overvintre i Vesteuropa, hovedsagelig Island og Skotland.

Når de vestgrønlandske Snepurve starter deres efterårstræk, krydser de formentlig Baffin Bugten/Davisstrædet direkte, uden nogen indledende sydgående trækbevægelse i Grønland. Efter at have fulgt den canadiske kyst mod syd til St. Lawrencebugten, fortsætter nogle mod vest, mens andre overvintrer i dette område. Forårstrækket følger formentlig samme rute. Det vides ikke, om Snespurvene fra Sydøstgrønland følger østkysten mod syd eller trækker over indlandsisen til rastepladser i Vestgrønland. Kontrollen i Nuuk af en fugl ringmærket på østkysten og flere observationer af Snepurve på indlandsisen tyder dog på, at i det mindste nogle fugle følger denne rute.

Efterårstrækruterne hos de nordøstgrønlandske Snespurve er dårligt kendt, men fuglene trækker via det nordlige Norge til vinterkvarterene på de russiske stepper. Forårstrækket er bedre kendt. I begyndelsen af april ankommer mange Snepurve til rastepladser i Arkhangelsk, hvorfra de trækker de omkring 1000 km videre til rastepladser i Nordnorge. Nogle af de norske rastepladser kan huse op mod 10000 fugle, bl.a. Bodø og Andøya. På Andøya ankommer de første Snespurve i begyndelsen af april. I slutningen af denne måned topper antallet, og efter midten af maj er fuglene væk igen. Generelt sker ankomst til og afrejse fra de norske rastepladser tidligere hos gamle hanner end hos gamle hunner og unge hanner, som igen ankommer tidligere end unge hunner. Samme mønster ses i Nordøstgrønland, hvortil de første gamle hanner ankommer i løbet af de første fjorten dage af april.

Tilsyneladende overvintrer en beskeden del af de østgrønlandske fugle også i Island og i nogen grad også på de Britiske Øer. Der vides dog ikke ret meget om disse forhold, og forekomsten af grønlandske Snespurve i Vesteuropa skyldes måske, at nogle fugle – ligesom hos Laplandsværling og Gråsisken – visse år trækker denne vej på grund af bestemte vejrforhold, snarere end at de opsøger bestemte vinterkvarterer.

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Bagged Brünnich's Guillemot, Upernavik, W Greenland. Photo: P. Lyngs.

Appendix

Longevity records of birds ringed in Greenland. Unkn.: age at ringing not known.
Aldersrekorder (år,måneder) af fugle ringmærket i Grønland. Unkn.: alder ved mærking ukendt.

Species	Elapsed time (days)	Ringed as (age)	Min. age (years, months)
Red-throated Diver *Gavia stellata*	6861	ad.	18,08
Northern Fulmar *Fulmarus glacialis*	6517	chick	18,00
Great Cormorant *Phalacrocorax carbo*	3775	chick	10,04
Pink-footed Goose *Anser brachyrhynchus*	3324	ad.	9,01
White-fronted Goose *Anser albifrons*	5733	ad.	15,03
Barnacle Goose *Branta leucopsis*	8449	ad.	23,02
Mallard *Anas platyrhynchos*	3962	chick	10,10
Common Eider *Somateria mollissima*	8443	ad.	23,02
King Eider *Somateria spectabilis*	9133	ad.	25,00
Long-tailed Duck *Clangula hyemalis*	5561	unkn.	15,03
Red-breasted Merganser *Mergus serrator*	5268	unkn.	15,05
Peregrine Falcon *Falco peregrinus*	3664	chick	10,00
Purple Sandpiper *Calidris maritima*	1666	unkn.	4,07
Dunlin *Calidris alpina*	2968	chick	8,01
Ruddy Turnstone *Arenaria interpres*	2802	juv.	7,08
Arctic Skua *Stercorarius parasiticus*	2905	chick	8,00
Iceland Gull *Larus glaucoides*	8194	chick	22,05
Glaucous Gull *Larus hyperboreus*	7967	chick	21,10
Great Black-backed Gull *Larus marinus*	8452	chick	23,02
Black-legged Kittiwake *Rissa tridactyla*	7243	chick	19,10
Ivory Gull *Pagophila eburnea*	5402	ad.	14,10
Arctic Tern *Sterna paradisaea*	10210	chick	28,00
Common Guillemot *Uria aalge*	5556	ad.	15,02
Brünnich's Guillemot *Uria lomvia*	8768	chick	24,00
Black Guillemot *Cepphus grylle*	6400	ad.	17,05
Little Auk *Alle alle*	3479	ad.	9,05
Northern Wheatear *Oenanthe oenanthe*	1479	ad.	4,10
Common Raven *Corvus corax*	3899	unkn.	10,08
Lapland Bunting *Calcarius lapponicus*	2181	chick	6,00
Snow Bunting *Plectrophenax nivalis*	3678	chick	10,01