THE HISTORY OF REINDEER IN ICELAND AND REINDEER STUDY 1979 - 1981

Reinsdyrenes historie på Island og reinsdyrstudier i årene 1979 - 1981.

Final report

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Abstract: This report deals with the history of reindeer in Iceland and reindeer study in East Iceland in the years 1979 - 1981.

The study included about half of the Icelandic reindeer population, i.e. that part of it affected by the proposed Austurlandsvirkjun hydro-electric power scheme. The study was originally based on «Proposal for study of reindeer and ranges in Iceland» by Eldar Gaare and Eigil Reimers (1978). A summary of the investigation plan is shown in Table 1.

***Rangifer** 4 (2): 22 - 38*

THÓRISSON, S. 1983. Reinens historie på Island og reinundersøkelser 1979 - 1981.

Sammendrag: Denne rapport omhandler historien om reinsdyr på Island samt undersøkelser over reinen på Øst-Island i årene 1979 - 1981. Disse studier omfatter omlag halvdelen av den islandske reinpopulasjon, d.v.s. den del som blir berørt av den foreslåtte hydroelektriske utbygging i Austurlandsvirkjun. Undersøkelsene ble opprinnelig planlagt etter et forslag om undersøkelser av rein og reinbeiter på Island utarbeidet av Eldar Gaare og Eigil Reimers. En oversikt over denne plan er vist i Tabell 1.

***Rangifer** 4 (2): 22 - 38*

THÓRISSON, S. 1984. Porojen historiaa Islannissa ja porojen tutkimusta vuosina 1979 - 1981.

Yhteenveto: Raportti käsittelee porojen historiaa Islannissa ja ne porotutkimukset, jotka suoritettiin Itä-Islannissa vuosina 1979-1981.

Tutkimukset käsittävät suunnilleen puolet Islannin porokannasta tai siitä sen osan, johon Austurlandsvirkjuniin ehdotettu voimalaitossuunnitelma vaikuttaa. Alunpitäen tutkimukset ovat perustuneet Eldar Gaaren ja Eigil Reimersin työhön: «Ehdotus porojen ja porolaidunten tutkimuksesta Islannissa». Katsaus projektisuunnitelmista on näytetty taulukossa 1.

***Rangifer** 4 (2): 22 - 38*

THE INTRODUCTION OF REINDEER TO ICELAND

The original aim in introducing reindeer to Iceland was to improve Icelandic farming practices. The government planned to get a Sami family along with the reindeer, to teach Icelandic farmers reindeer husbandry. That idea did not materialize as the government regarded conditions for reindeer husbandry unsatisfactory.

Reindeer were introduced on four occasions to Iceland. Being of Norwegian domestic stock, they have survived in a feral state to the present (Fig. 1).

First introduction of reindeer to Iceland in 1771

In 1771 13 or 14 animals were brought to the Westman Islands, originating from the island of Sorø in Finnmark. About half of them died in the first year but the survivors were shipped to the mainland and released in South Iceland. Only two females and one male survived the transportation. At first they increased in number, reaching a maximum of 16 animals. It is recorded that the 13 calves which were born, were all males. This herd became extinct around 1786.

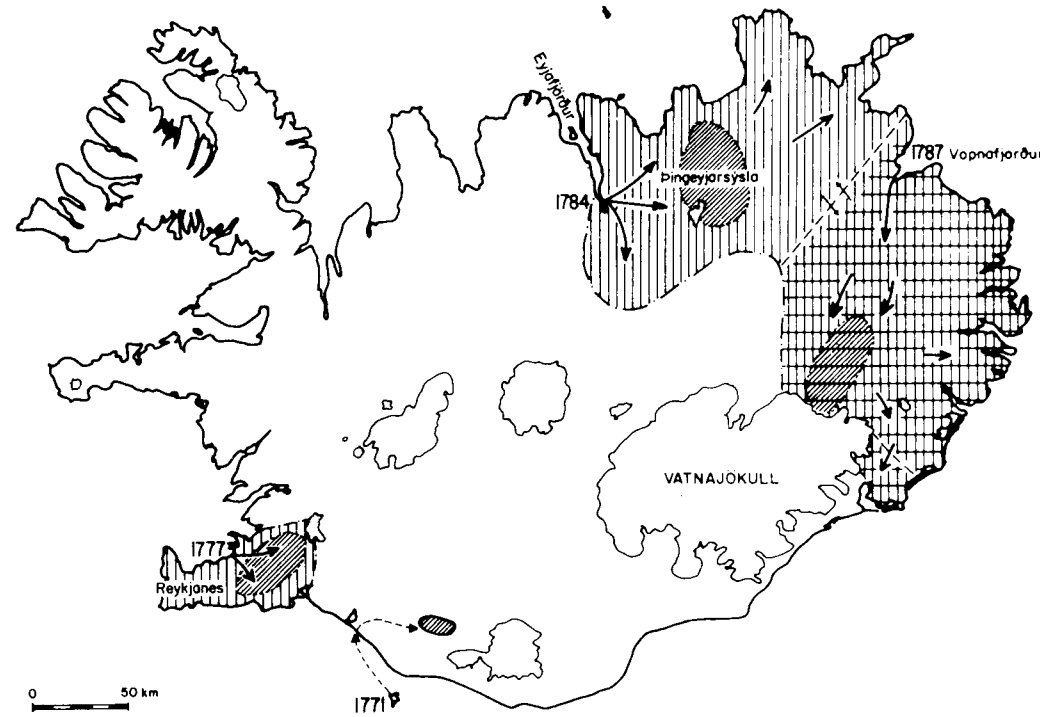

Fig. 1. The introduction of reindeer to Iceland.
Innførsel av rein til Island.

Past distribution *Tidligere utbredelse*
Principal distributional range *Hovedutbredelsesområde*
Present distribution *Nåværende utbredelse*

The introduction of reindeer to southwest Iceland in 1777

In 1777 a group of 23 reindeer was introduced to Southwest Iceland. The original number was 6 males and 24 females but 7 animals (sex unknown) died in transport. They were of the same origin as the reindeer of 1771. This herd increased rapidly but it is believed that a large number was never reached. A few reports of 100 or so animals exist, and their distribution was always local. It appears that the population reached a peak around the mid 19th century. Then it declined becoming extinct between 1920 - 1930. The most likely causal factors are thought to have been severe winters at the end of the 19th century with possible overgrazing of winter pastures.

The introduction of reindeer to northern Iceland in 1784

In 1784 a group of 35 reindeer (numbers of each sex unknown) was introduced to North Iceland. They originated from Kautokeino, Finnmark. They increased rapidly in number but were restricted to the same area for some 40 years, when they deserted that area and moved further east. Severe winters were thought to be the reason for this, though there is also the possibility of overgrazing. Around 1800, local farmers started complaining to he local authorities, about the effect of grazing by reindeer on *Cetraria islandica*, a species of lichen at that time used for human consumption.

The number of reindeer increased in their new area, and is believed to have reached a peak around 1850.

Table 1. Summary of the investigation plan, priorities and time schedule (from Gaare and Reimers 1978).

Tabell 1. Sammendrag av plan for undersøkelser, prioriteringer og tidsskjema (fra Gaare & Reimers 1978).

Biological information *Biologisk informasjon*	Project indentification *Prosjektidentifikasjon*	Priority *Prioritet*	Month *Måned*											
		1 - 3	J	F	M	A	M	J	J	A	S	O	N	D
Population size & calf production *Populasjonsstørrelse og kalveproduksjon*	2a	1							A					
Migration pattern *Trekkmønster*	1a	1	A		A		A	A	A	A	A		A	
Plant communities grazed *Plantesamfunn beitet*	1b	1	B					B	B	B				
Control plots *Kontrollfelter*	1b	1							R					
Plant species eaten, N and fiber in rumen *Plantearter beitet, N og trevler i vomma*	1c	1		B			B		B		B			
Physical condition *Fysisk kondisjon*	2c,e,d	1					R				R			
Composition counts, males, females, calves *Flokksammensetning, bukk, simle, kalv*	1b	2									A			
Pregnancy rates, females with antlers vs. females with shed antlers *Drektighet, simler med gevir kontra uten gevir*	2e	2				A								
Calving & rutting time and place *Kalving og brunst, tid og sted*	2f	1				R	R				R	R		
Activity budgets *Aktivitetsbudsjett*	2g	3	R		R			R	R	R				

Time-priorities *Tidsprioriteringer*
1. High (*Høy*)
2. Medium (*Middels*)
3. Low (*Lav*)

A Annually (*Årlig*)
R Regular intervals every 4th-5th year (*Regelmessige intervaller hvert 4.-5. år*)
B Basic study done once (*Grunnstudier, engangs*)

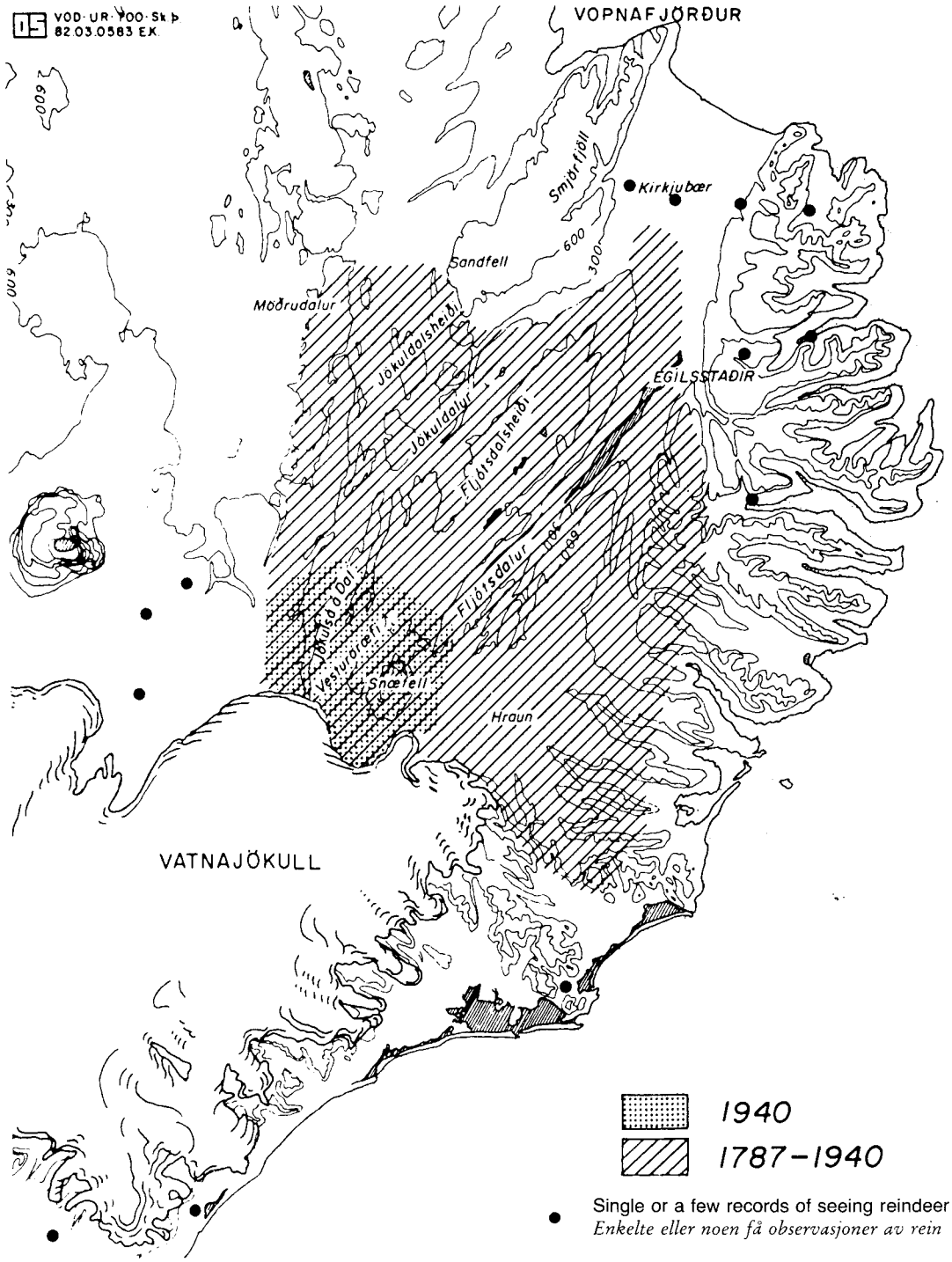

Fig. 2. The past distribution of reindeer in East Iceland. *Tidligere utbredelse av rein på Island.*

This new area was occupied for 10 - 20 years to be deserted again, for an even more easterly one.

In the second half of the 19th century this population began to decline and around the end of the century a few animals were believed to be left, disappearing for good in 1936.

Reasons for this population decline are most likely the same as before. Winters were unusually severe between 1850 and 1920, presumably limiting access to grazing.

Limited hunting of reindeer was permitted in 1790, but by 1849 a new law claimed no restrictions on hunting. Consequently it was a popular idea that excessive hunting caused the decline in reindeer numbers during the 19th century. I am of the opinion that the hunting pressure was low at that period, hunting methods and firearms being primitive. Three of the most renowned hunters in southwest Iceland, are thought to have killed only some 50 animals each during their lifetime.

The introduction of reindeer to East Iceland in 1787

In 1787 a herd of 35 reindeer, 5 males and 30 females were let ashore at Vopnafjördur, East Iceland. They came from Avjovarre in Finnmark. Their rapid increase in numbers soon aroused complaints from the local people claiming overgrazing of *Cetraria islandica* and some deterioration of the winter ranges. It is thought that the reindeer population reached its peak around the middle of the 19th century, declining from then on until about 1940. This population was mostly restricted to the highland plateaus of East Iceland (Fig. 2).

Again the main reason for the decline in the population seems to have been severe winters. This is indicated by the decline of the sheep stocks in East Iceland by some 40% in the years 1856 - 1869. On 28th March, 1875 the volcano Askja erupted with the result that a 5 - 10 cm thick layer of ash covered the principal winter pastures of the reindeer. This event most likely also caused a decline in the reindeer population.

In August 1939 an expedition was mounted to count the number of animals left on the eastern-Iceland plateaus, in Kringilsárrani and Vesturöraefi, at the northeast corner of the Vatnajökull icecap. At that time the reindeer were mostly confined to these areas. Only 100 reindeer were observed (40 females, 40 males and 20 calves), and the population size at that time is believed to have been 100 - 300 animals. These animals did not show any definite seasonal migrations, leaving former winter ranges on Fljótsdalsheidi free from grazing for some 30 - 50 years.

GROWTH AND DISTRIBUTION OF THE ICELANDIC REINDEER POPULATION AFTER 1940

Annual population censuses were started in 1940 and for the first 16 years this was done on horseback. From 1956 onwards counts have been made from an aeroplane, mainly in late July. Hunting was limited in 1882 and in 1901 reindeer were totally protected. Hunting was permitted again in 1943, and for the first 10 years only males were shot. The opinion was that a 1:1 sex ratio limited further growth of the population. The mean annual harvest was 38 males (range: 13 - 64).

The population has grown steadily since the 1940's as shown in Fig. 3. The harvest from 1954 - 1981 is also shown. Annual recruitment seems to have outnumbered the harvest all these years with the exception of 1976 and 1977. Since 1978 the population numbers seem to have been stable at about 3500 animals.

Shortly after 1940 regular migrations became gradually noticeable. For about 15 years the summering grounds were at Kringilsárrani and Vesturöraefi and the wintering grounds mainly on Fljótsdalsheidi. Then the population numbered about 1800 animals. As the population increased even more, a part of it started to use new winter areas. Some animals wintered to the east and the southeast (the Eastern fjords), others to areas west and northwest (Jökuldalsheidi). In Fig. 4 the dispersal of reindeer after 1940 is shown.

The migration to and from Kringilsárrani and Jökuldalsheidi seems to have begun in the years 1955 - 1960. Animals wintering in the Eastern fjords in the first 10 - 15 years were mostly males and yearlings and their numbers increased very little. In the years 1965 - 1970 animals permanently settled in this area. Their increase was rapid, as a result of calving in the area but also because of emigration from the highland plateau areas. At present about half of the reindeer population (ca. 1700 animals) was found all year round in the Eastern fjords. About 600 animals use the highland plateau (Vesturöraefi) in summer but migrate and spend the winter mostly in the southern parts of the Eastern fjords. A further 600 animals migrate

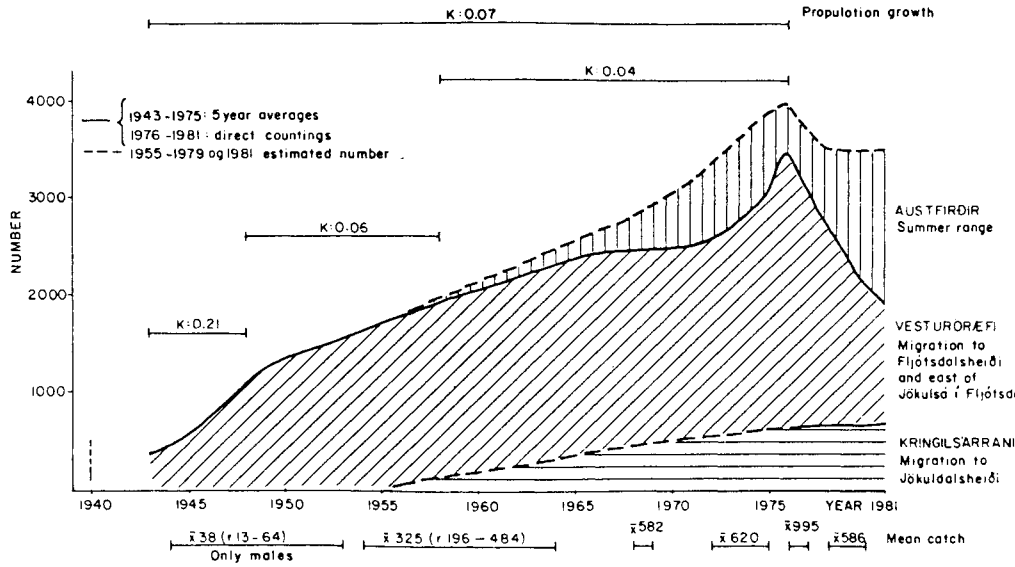

Fig. 3. The size of the Icelandic reindeer population 1940 - 1981

Størrelsen av den islandske reinpopulasjon 1940 - 1981.

from Vesturöraefi to Fljótsdalsheidi and the same number from Kringilsárrani to Jökuldalsheidi to winter in the latter areas (see Fig. 3). The number of animals in Kringilsárrani and Jökuldalsheidi has increased slightly but declined on the Vesturöraefi and Fljótsdalsheidi. The reason for this is believed to be emigration due to overgrazing on the Fljótsdalsheidi area.

REINDEER RESEARCH 1979 - 1981 IN CONNECTION WITH THE PROPOSED AUSTURLANDSVIRKJUN HYDRO-ELECTRIC POWER SCHEME

The regions inhabited by reindeer in East Iceland, can be broadly divided into two: a) High ground plateau (500 - 600 m a.s.l.) with isolated ridges and mountains between the glacial rivers Jökulsá á Fjöllum and Jökulsá í Fljótsdal, and b) lowland valleys (0 - 200 m a.s.l.) of the Eastern fjords.

The research in 1979 - 1981 focused mainly on the reindeer in the former region, which will be affected by the Austurlandsvirkjun scheme. This subpopulation numbered 1800 animals in summer 1980 - 1981, or about half of the Icelandic reindeer population.

The highland plateau can be further subdivided into two parts: 1) The area between Jökulsá i Fljótsdal and Jökulsá á Dal (mainly Vesturöraefi, Fljótsdalsheidi and Fellaheidi) and 2) between Jökulsá á Dal and Jökulsá á Fjöllum (mainly Kringilsárrani, Saudafell, Jökuldalsheidi and Tunguheidi).

The main summer ground was Vesturöraefi, taking about 1200 reindeer in 1980 - 1981. About 600 animals migrated to winter on the Fljótsdalsheidi and Fellaheidi heathlands, and another 600 animals to the Eastern fjords.

The distribution of reindeer at various times of the year is shown in Fig. 5.

Distribution studies of reindeer in winter are lacking because the wintering grounds are mostly outside proposed development sites.

About 92% of this subpopulation used the principal summer grounds (Vesturöraefi, Kringilsárrani, Saudafell) during 1976 - 1981 but only 56% during 1966 - 1974 (based on aerial censuses in mid July). The reason for this is thought to be an increase in human activities in border regions from 1974 onwards.

Spring migration (Fig. 5) starts at the end of April with pregnant cows moving to the principal calving grounds, these being a component of the main summer pastures. From late May until the beginning of June barren cows, males and some cows that calved outside the principal calving grounds, arrived at the main summer areas.

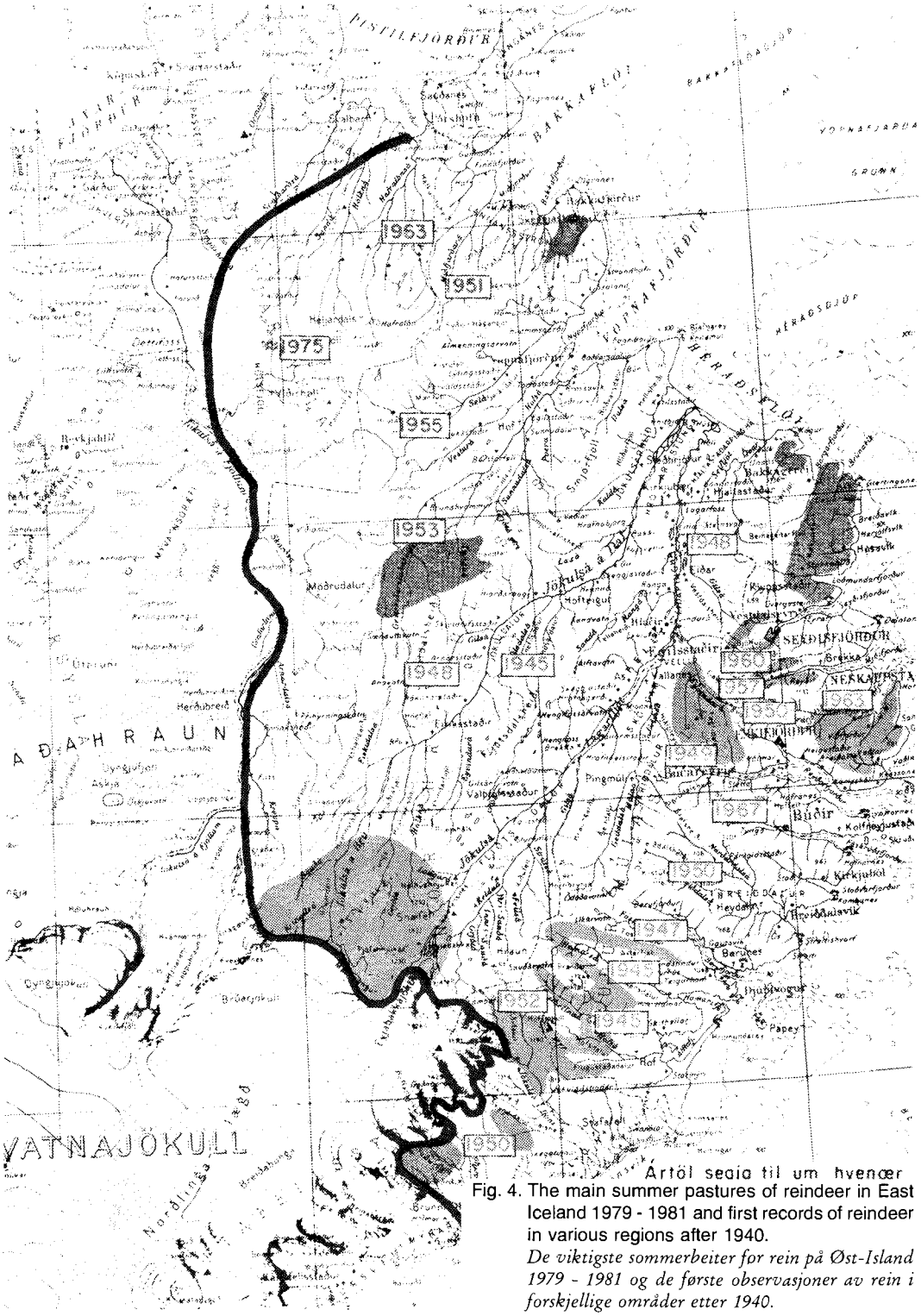

Fig. 4. The main summer pastures of reindeer in East Iceland 1979 - 1981 and first records of reindeer in various regions after 1940.
De viktigste sommerbeiter for rein på Øst-Island 1979 - 1981 og de første observasjoner av rein i forskjellige områder etter 1940.

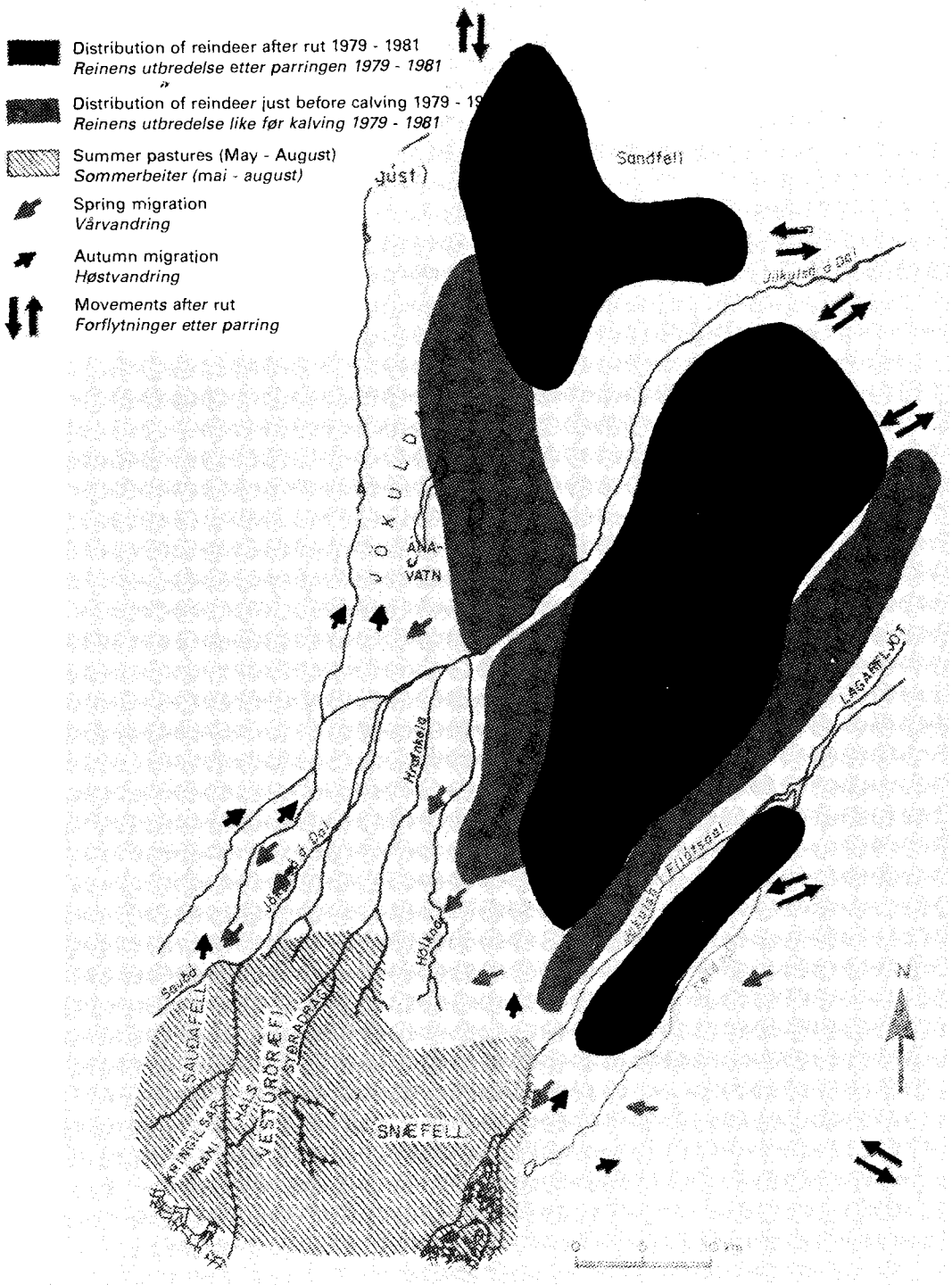

Fig. 5. The migration and distribution of reindeer *Reinens vandringer og utbredelse*

Table 2. Calf mortality in the first 12 months of life.
Tabell 2. Kalvedødelighet de første 12 levemåneder.

	1979		1980		1981	
	Number of calves per 100 cows *Antall kalver pr. 100 simler*	Mortality *Dødelighet*	Number of calves per 100 cows *Antall kalver pr. 100 simler*	Mortality *Dødelighet*	Number of calves per 100 cows *Antall kalver pr. 100 simler*	Mortality *Dødelighet*
Born calves *Fødte kalver*	72	—	79	—	87	—
Number of calves in the end of calving *Antall ved kalvingens slutt*	65	10%	64	19%	67	23%
Number of calves one month after calving *Antall en måned etter kalving*	41	43%	—	—	—	—
Number of calves two months after calving *Antall to måneder etter kalving*	31	57%	53	33%	56	34%
Mortality of calves between Oct.-May *Kalvedødelighet oktober - mai*		≃10%		≃10%		≃10%
Natural mortality the first 12 months of life *Naturlig dødelighet første 12 levemåneder*		≃67%		≃43%		≃44%
Hunting - *Jakt*		5%		—		3%
Total mortality the first 12 months of life *Total dødelighet første 12 levemåneder*		≃70%		≃45%		≃45%

Because of unfavourable weather conditions in 1979 the spring migration was delayed for about a fortnight, causing a greater proportion of calving outside the principal calving grounds, and a resulting high calf mortality.

Autumn migration (Fig. 5) started in late August - to the beginning of September. At the beginning of August reindeer on Vesturöraefi moved to the area east of Snaefell. After about a month's stay there, half of them migrated onwards to Fljótsdalsheidi and the other half towards the east and the northeast.

Thirty newborn calves were eartagged on the calving grounds. Because of difficulties in sighting the tags on yearlings and older animals a plastic flag, 10 - 15 cm long, was added to the last animals that were tagged. Seven tags have been recovered, and several tagged animals have been observed.

The reindeer population of East Iceland, is thought to have been stable in 1978 - 1981 (about 3500 animals). On the Vesturöraefi in summer, the number of reindeer dropped by about 600 animals during this period. The reason is believed to be emigration to the Eastern fjord areas.

The number of reindeer at Kringilsárrani and Saudafell seems to have been stable during the same period.

The ratio of antlered (=pregnant) females just before calving in 1979 - 1981 was 72%, 79% and 87%, respectively.

The principal calving grounds are on the Vesturöraefi, Kringilsárrani and Saudafell. The present studies focused mainly on calving on the Vesturöraefi.

About 20% of the cows summering on Vesturöraefi, calved there in 1979, about 50% in 1980 - 1981. The cause of this difference is thought to have been unfavourable snow conditions in spring 1979. A great number (but unknown proportion) of cows did not arrive in the calving grounds on Kringilsárrani and Saudafell but calved on Jökuldalsheidi.

For the first two months after calving in 1979 - 1981, calf mortality was estimated at 57%, 33% and 34%, respectively (Tab. 2). The high calf mortality in 1979 is thought to have been caused by severe weather and snow conditions. Also, a greater proportion of cows calved outside the principal calving grounds. An aerial census in mid-July 1979 showed that calf mortality was about 50% higher on the heathland between Jökulsá í Fljótsdal and Jökulsá á Dal than between Jökulsá á Dal and Jökulsá á Fjöllum. The reason for this is believed to be due to more abortions and a weaker mother-young relationship, because of the poorer physical condition of cows. This in turn is believed to be linked with the poorer quality pastures in the former area (Fljótsdalsheidi) compared with the latter (Jökuldalsheidi) (see Egilsson 1983).

The only predator species in the region, is the arctic fox (*Alopex lagopus*). Nothing points to foxes being responsible for any appreciable mortality of calves. Fox dens are few on the reindeer ranges. Often carcasses of reindeer calves were found at these, but were most likely scavenged. Calf mortality October-May is estimated at about 10%. The numbers of calves killed during the hunt in 1979 - 1981, was 3 - 5%. The total first-year mortality in 1979 was about 70%, but 45% in 1980 - 1981 (Tab. 2 and 3).

Table 3. The time of death of reindeer calves during the first 4 months of life (based on carcasses)
Tabell 3. Dødstidspunktet for reinkalver gjennom de 4 første levemåneder (basert på skrotten).

Age *Alder*	Causes of death *Dødsårsak*	Numbers *Antall*
Newborn *(Nyfødte)*	Unknown *(Ukjent)*	8
	Stillbirth/accident *(Dødfødt/ulykke)*	6
0 - 1 month *(0 - 1 måned)*	Unknown *(Ukjent)*	5
1 - 3 months *(1 - 3 måneder)*	Unknown *(Ukjent)*	4
	Disease *(Sykdom)*	2
4 months *(4 måneder)*	Illegal hunting *(Ulovlig jakt)*	4
	Fell into a waterfall *(Falt i foss)*	2

Table 4. The causes of mortality in Reindeer (based on carcasses)
Tabell 4. Dødsårsak hos rein (basert på skrotten)

Causes of death *Dødsårsak*	Calves (1 - 4 months) *Kalver (1 - 4 mnd.)*	Calves (5 - 12 months) *kalver (5 - 12 mnd.)*	Females (12+ months) *Simler (12+ mnd.)*	Males (12+ months) *Bukker (12+ mnd.)*
Calving *(Kalving)*			11	
Starvation *(Sult)*		3	8	
Starvation/old age *(Sult/elde)*			3	1
Fell into a waterfall *(Falt i foss)*	2		7	1
Falling from cliffs *(Falt utfor stup)*		1	2	
Drowning *(Druknet)*		2		
Got stuck in mud *(Satt fast i gjørme)*			1	
Killed by a dog *(Drept av hund)*			1	
Illegal hunting *(Ulovlig jakt)*	4		2	1
Disease *(Sykdom)*	2			
Stillbirth or killed by another reindeer *(Dødfødt eller drept av annet reinsdyr)*	6			
Unknown *(Ukjent)*	17	5	9	6
Total *(Ialt)*	31	11	44	9

Natural adult mortality was estimated at 5%. This was calculated assuming a stable population of 3500 animals in mid-July 1978 - 1981. Other components which had to be taken in consideration were (1). An average of 24% calves of the total, (2) estimated winter mortality of calves of 10%, and (3) the average proportion of reindeer killed during the autumn hunt of 16%.

The main causes of death of adult females, based on 37 carcasses, were: (1) those connected with calving (30%), (2) starvation (30%), (3) unknown (24%) (Tab. 4). About 84% of these females had died in late winter or spring. Very few adult male carcasses were found and the cause of death in most instances is unknown. Six out of nine males had died in early winter, so the most likely cause of death was in connection with rutting activities (Tab. 5).

The rut starts in late September proceeding through to mid-October. The distribution of reindeer at rutting time is shown in Fig. 5. The number of adult males has declined dramatically on the Fljótsdalsheidi in the last few years. This has resulted in only 1 - 8 two+ year old males and 22 - 26 one+ year old males to every 100 cows.

On the Jökuldalsheidi the number of 2+ year old males to every 100 cows, was 32 in 1979. This figure has decreased since then to a mere 12 in autumn 1981.

The reason for this decline is selective hunting of adult males. In 1975 about 65% of hunter-killed reindeer on the highland plateau were males, but only 45% in 1980.

The ratio of males to females in the subpopulation of the Eastern fjords is not known exactly. Yet this is much higher than in the subpopulation on the highland plateau. In the period 1975 - 1980 the proportion of males of hunter-killed animals in the Eastern fjords was 60 - 85%.

Counts aimed at studying age- and sex-distribution, were made at various times and places. The proportions of one+ year old females, males and calves at rut in years 1979 - 1980 were as follows: On the Jökuldalsheidi females were 52%, 51% and 54%, males 23%, 17% and 18%, and calves 24%, 32% and 20%, respectively. On the Fljótsdalsheidi females were 75%, 56% and 58%, males 10%, 14% and 7%, and calves 17%, 30% and 35%, respectively.

The proportion of calves at rut was somewhat higher than indicated by the mid-July censuses because of selective hunting of adults in August/ September.

On the principal calving grounds (at Vesturöraefi) before calving in 1979 - 81 females were 92%, 82% and 76%, males 0, 3% and 5% (mainly young ones) and yearlings 8%, 15% and 18%, respectively.

As a part of this study, cooperation was sought with reindeer hunters, to collect mandibles from hunter-killed animals with some basic information. This sample constituted only about 18% of all hunterkilled animals in 1979 - 1981.

To establish the physical condition at the end of the summer (August - September) data were collected directly from hunters and 20 animals shot for the purpose of this study. Animals were also collected in July, February, and May, 20 in each month.

Age determination was based on annual layers in cementum of the first incisor. The oldest male shot was 9 years of age, and the oldest female 12 years.

On the highland plateau only one male was older than 5 years, 39% of males being 3 - 9 years old.

Table 5. The known and estimated time of death in fullgrovn reindeer (based on carcasses)
Tabell 5. Kjent og anslått tidspunkt for død av fullvoksne rein (basert på skrotten).

	Summer *Sommer*	Autumn *Høst*	The first half of winter *Første halvdel av vinter*	Late winter or spring *Senvinter eller vår*	Spring *Vår*
Yearlings *(Åringer)*		1*	2	4	
Females *(Simler)*		2(+7)*	3	16	11
Males *(Bukker)*		1	6	2	

* Fell into a waterfall in the autumn 1981.
Omkommet i en foss høsten 1981.

Table 6. The comparison of carcass weight (kg) of 3+ year old females in September, February and the beginning of May in two separate areas.
Tabell 6. Sammenligning av skrott-vekter (kg) hos 3+ år gamle simler i september, februar og begynnelsen av mai i to adskilte områder.

Time *Tid*	Fljótsdalsheidi			Jökuldalsheidi			t-test
	x̄	n	s.d.	x̄	n	s.d.	
August/September [3]	40.8	6	4.7	42.1	15	5.5	n.s.[1]
February [4]	31.7	6	2.2	37.8	4	2.2	0.01 [2]
May [4]	31.5	4	2.6	30.8	4	1.0	n.s.

1) P>0.10
2) P=0.01
3) Barren and lactating *(Gjelde og melkende)*
4) Pregnant *(Drektige)*

Table 7. The thickness of backfat (mm) of reindeer in August - September 1979 - 1980.
Tabell 7. Tykkelsen av ryggfettet på rein (mm) i august - september 1979 - 1980.

	x̄	n	s.d.
Females *(Simler)*			
Barren *(Gjeldsimler)*			
1 year old *(1 års)*	6.9	7	5.5
3+ years old *(3+ år)*	23.1	8	15.25
Lactating *(Melkende)*			
3+ years old *(3+ år)*	6.9	10	8.92
All females *(Alle simler)*			
3+ years old *(3+ år)*	14.1	18	14.38
Males *(Bukker)*			
1 year old *(1 års)*	11.5	4	15.59
3+ years old *(3+ år)*	51.3	20	11.16

On the Eastern fjords 64% of males were 3 - 8 years old. This difference is explained by heavier selective hunting on the highland plateau.

The mandibles were compared between the Eastern fjords and the two sub-areas on the highland plateau (Fljótsdalsheidi and Jökuldalsheidi). There was no significant difference between the Eastern fjords and Jökuldalsheidi. However, a significant difference was found between the latter and Fljótsdalsheidi for 3+ year old females and 1 - 3 year old males (Figs. 6 and 7).

A comparison of carcass weight of reindeer in August - September on the Fljótsdalsheidi and Jökuldalsheidi showed no significant difference, but male calves and 3 year old males did. Information, especially from Fljótsdalsheidi, is lacking.

No significant difference was found in carcass weights between 3+ years old females in late August - September between the Fljótsdalsheidi and Jökuldalsheidi. A significant difference was found in February with cows on the Jökuldalsheidi, being on average 6 kg heavier, but no difference was found at the beginning of May (Tab. 6).

The explanation of the difference in February is believed to be much better winter pastures on the Jökuldalsheidi than Fljótsdalsheidi, mainly because of overgrazing of lichens on the Fljótsdalsheidi (cf. Egilsson 1983). Some emigration takes place in winter from the Fljótsdalsheidi to Jökuldalsheidi. This is believed to be the reason that there is no difference in females carcass weights in May. Mortality, selecting the low-weight animals, may also be the reason.

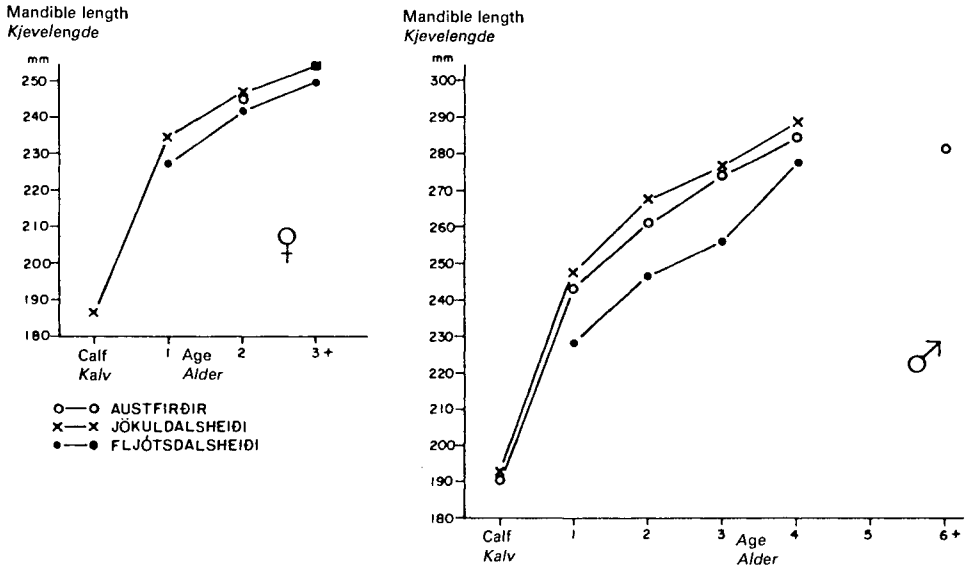

Fig. 6. The comparison of the length of mandibles from reindeer killed at Fljótdalsheidi, Jökuldalsheidi and the Eastern fjords, August - September 1979 - 1981.

Sammenligning av kjevelengder fra rein skutt på Fljótdalsheidi, Jökuldalsheidi og fjordene i øst, august - september 1979 - 1981.

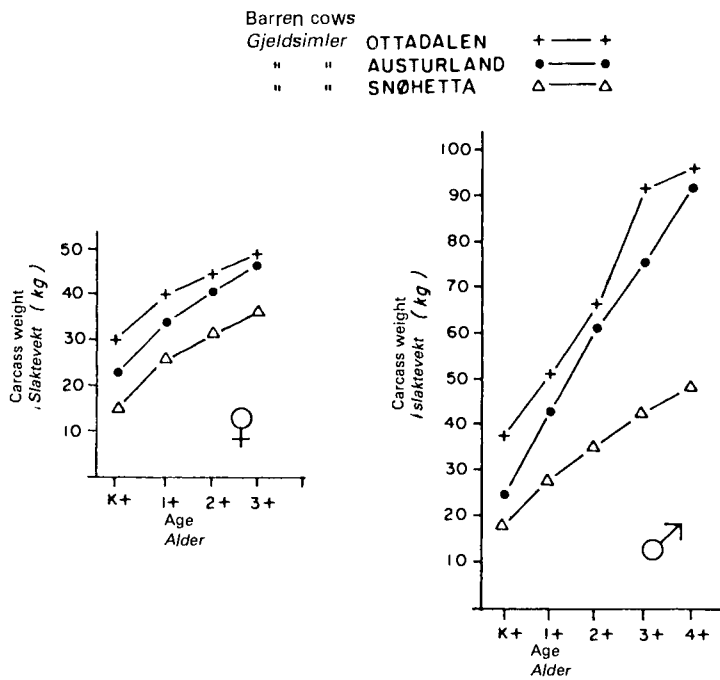

Fig. 7. Comparison of carcass weight of Icelandic and Norwegian reindeer (based on Reimers 1969 & 1972)

Sammenligning av slaktevekter fra islandsk og norsk rein (basert på Reimers 1969 & 1972).

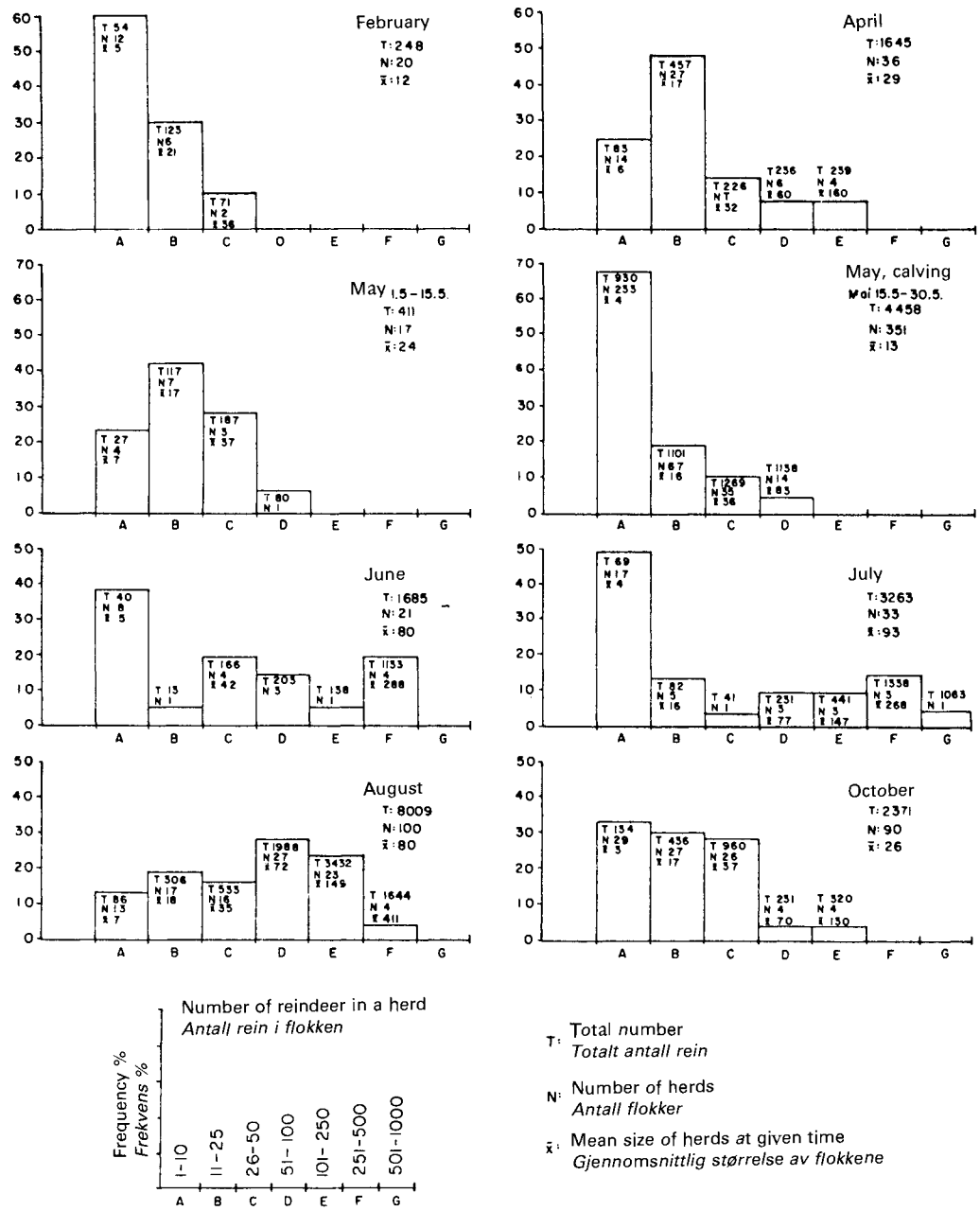

Fig. 8. The frequency distribution for the size of reindeer herds at different time of year.

Frekvensfordeling av flokkstørrelsen til forskjellige tider av året.

Measurements of the maximum thickness of the back-fat layer of reindeer on the Jökuldalsheidi, gave an average of 23.1 mm for 3+ year old barren females and 6.9 mm for lactating females. For 3+ year old males this was 51.3 mm (Tab. 7).

Very limited behaviour studies were made in 1979 - 1981 but these are time-consuming, and were given very low priority.

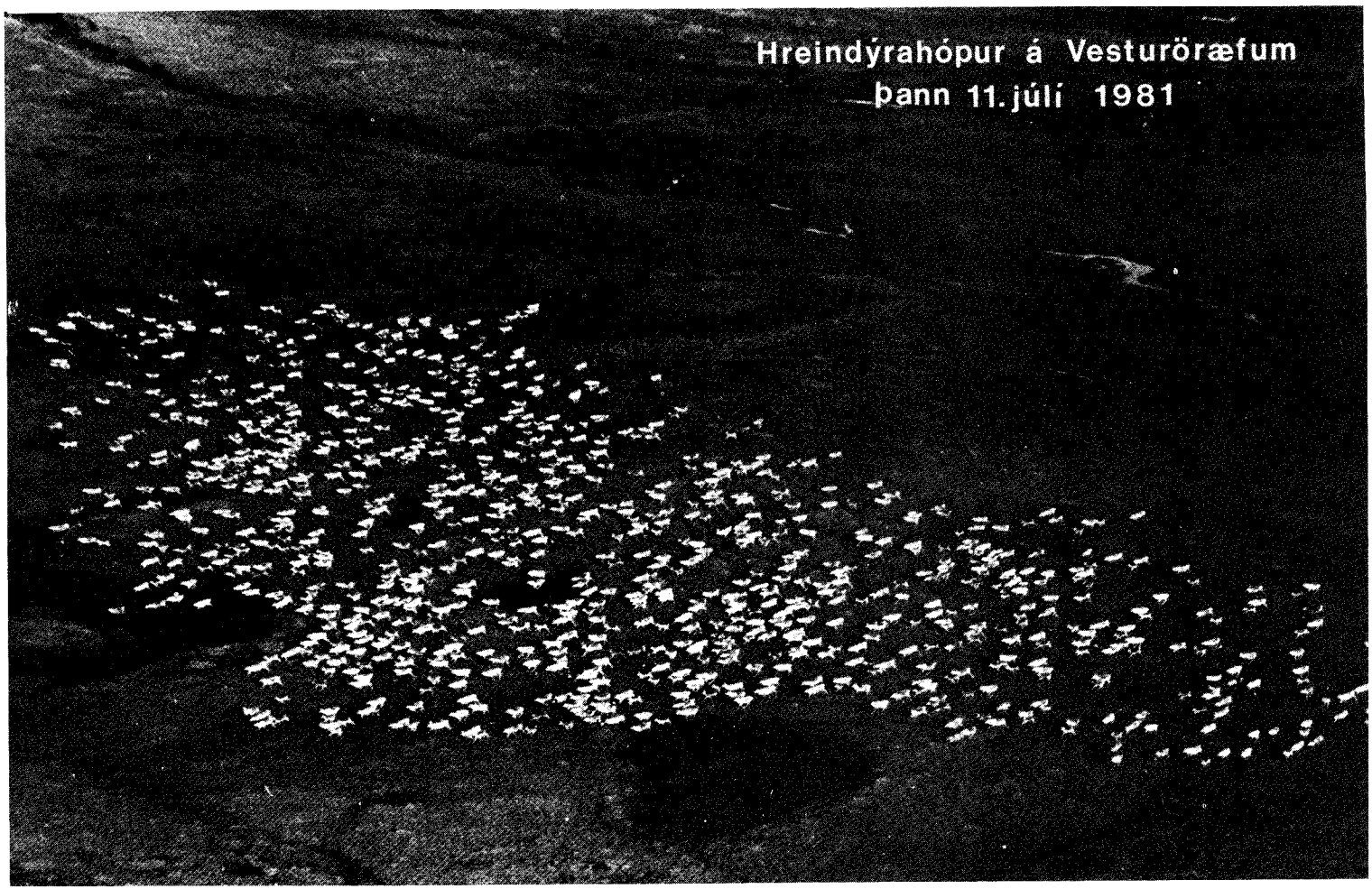

Fig. 9. A reindeer herd at Vesturöræfi July. 11, 1981. *Reinflokk ved Vesturöræfi 11. juli 1981.*

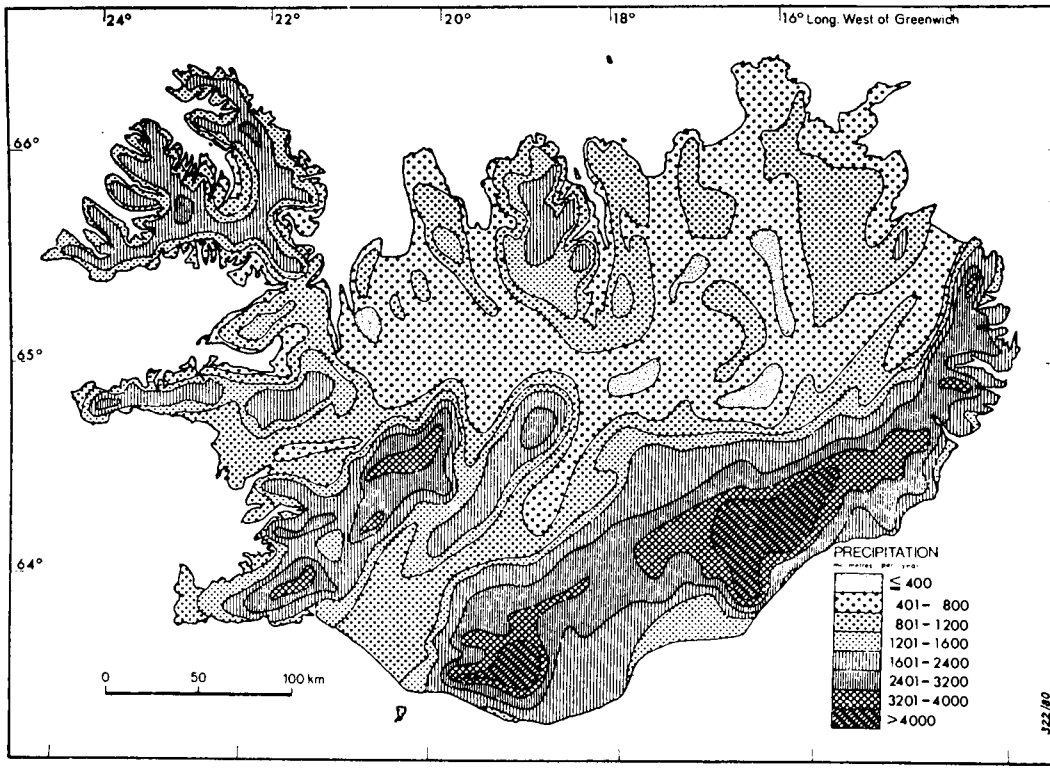

Fig. 10. The mean annual precipitation in Iceland 1931 - 1960 (based on Hjartarson 1980).

Årlig middel for nedbør på Island 1931 - 1960 (basert på Hjartarson 1980).

Frequency distributions of the size of reindeer herds at different times of year are shown in Fig. 8 (p. 127). In mid winter there were on average, 12 animals in a herd reaching a peak of 93 animals in the postcalving period. The largest herd observed at that time was 1063 animals.

Presumably because of the absence of parasitizing and biting insects, reindeer herds are very similar in size during July and August (Fig. 9).

The mean annual precipitation in Iceland in years 1931 - 1960 is shown in Fig. 10.

Wild mammals, other than reindeer, on the highland plateau of East Iceland are the arctic fox, the mink (*Mustela vison*), and the fieldmouse (*Apodemus sylvaticus*). Only two mink were observed, and only the tracks of fieldmice.

Arctic foxes were observed only now and then, a few dens being found. Food items at dens were mostly pink-footed geese (*Anser brachyrhynchus*), but also reindeer calves, and sheep.

On the principal calving and summer grounds fox hunters only found two dens each year during 1979 - 1981. The density of dens in this area is about 1 den per 50 - 70 km^2.

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