

10/17/2008

**Caribou harvest advice 2006**

**for**

**Inglefield- Prudhoe Lands, Olrik Fjord, Nuussuaq Halvø, Ivittuut and**

**The Naternaq, North, Central, South & Paamiut Regions:**

**ADVISORY DOCUMENT TO THE GREENLAND HOME RULE GOVERNMENT**

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## **Caribou harvest advice 2006**

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This document presents advice on caribou harvest in west and northwest Greenland from the Greenland Institute of Natural Resources (GN) to the Ministry of Environment and Nature (DMN) of the Greenland Home Rule Government for caribou / reindeer harvests in autumn/winter 2006–2007.

### **Background**

Following aerial surveys in 1993, the total number of caribou in West Greenland was estimated at 9,000 animals and hunting was banned for two years, 1993-1994. Aerial surveys in 1996 estimated 22,000 animals and harvest quotas were kept low from 1995 through 1999. However, West Greenland range quality supported a phenomenal fertility in the 1990's (Cuyler & Østergaard 2005), and the abundance estimates from the 1990's were shown to be underestimates (Linnell et al. 2000, Cuyler et al. 2002, 2003). New helicopter surveys in 2000 and 2001 revealed that caribou in west Greenland numbered approximately 140,000 caribou, i.e., individual stocks were five to seven times their estimates in 1996. Harvest quotas were abruptly and substantially increased in 2000, 2001 and 2002. Open unlimited hunting began in 2003 and continued in 2004 and 2005.

The wild caribou in west and northwest Greenland are currently recognized to consist of about 10 more or less discrete stocks that each receives a specific management advice. To provide sound scientific advice for each stock it is crucial to understand the dynamics of the stock in the light of the harvest. To date GN has performed a crude monitoring of the abundance of three to four of the major stocks in West Greenland, but even for these stocks a sound management advice is limited by the lack of catch data.

At present there are no catch data on the removal of caribou per stock, but only an estimate of the total annual catch for all stocks in Greenland. Owing to expected financial cut-backs and their consequences for the abundance monitoring of caribou in West Greenland, correct harvest statistics will become increasingly important for the management advice in the future. In consequence GN might not be able to provide future management advice for caribou unless catch data for each geographical unit becomes available. With no subdivided harvest data, modelling of stock dynamics is not an obvious option, and a management advice that covers several years cannot be given at present.

### **Stock structure**

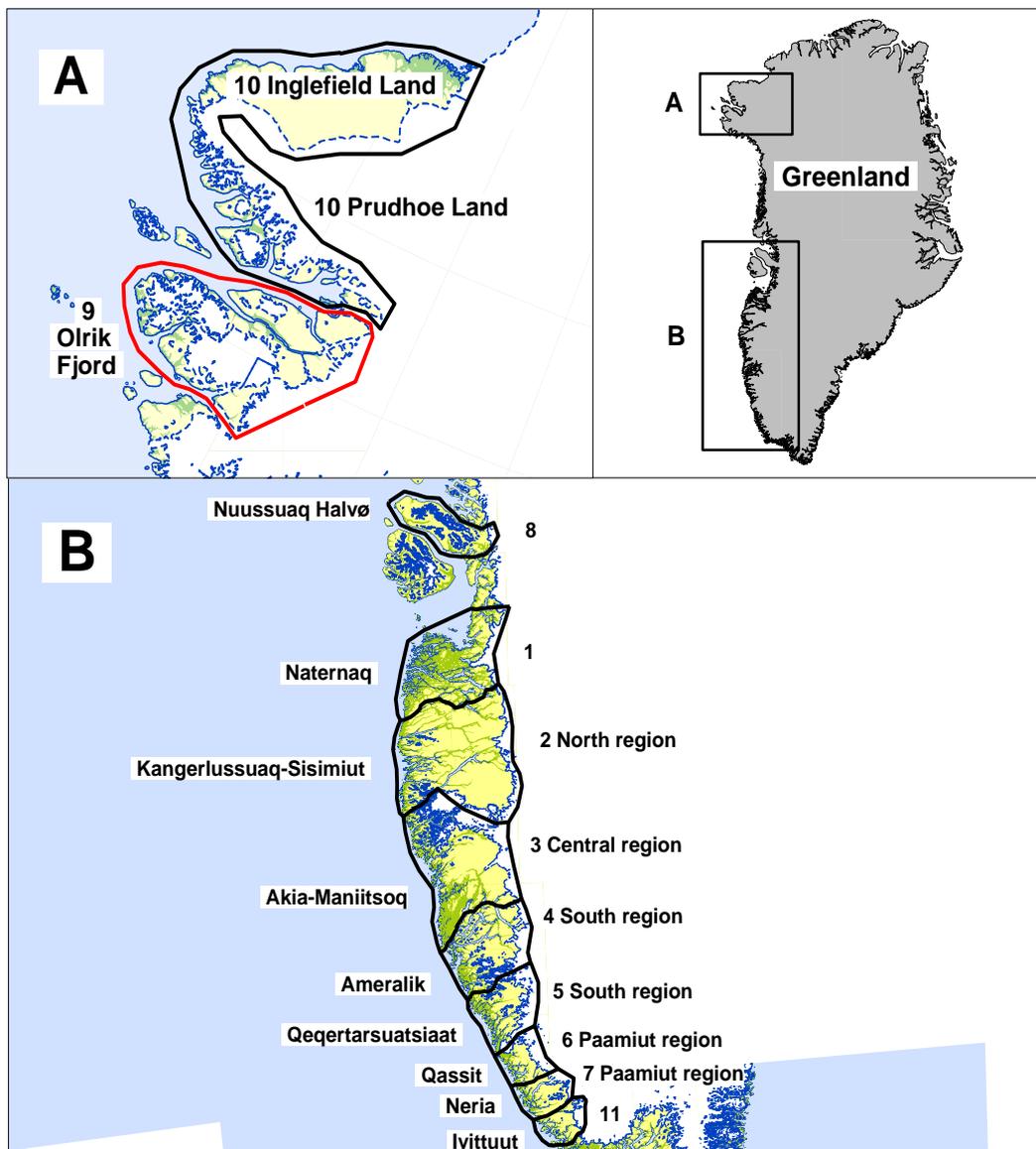
The Greenland Home Rule government added an eleventh stock for harvesting during the 2005-2006 hunting season. Escaped semi-domestic reindeer had established a feral population north of the reindeer husbandry district of Isortoq, which is in southern Greenland. This eleventh stock inhabits the Ivittuut area, encompassed by the large Sermiligaarsuk Fjord to the north and the Ivittuut municipal boundary to the south.

The stocks (region name in parentheses) are in order from north to south (Fig. 1):

- Inglefield Land / Prudhoe Land: small stock

- Olrik Fjord / Pituffik: small stock
- Nuussuaq Halvø: small stock
- Naternaq (Naternaq): small stock
- Kangerlussuaq–Sisimiut (North): large stock
- Akia–Maniitsoq (Central): large stock
- Ameralik(South): medium stock
- Qeqertarsuatsiaat (South): small stock
- Qassit (Paamiut): small stock
- Neria (Paamiut): small stock
- Ivittuut: unknown size stock (feral reindeer)

The caribou population borders (Fig. 1) generally agree with the areas where hunting is permitted for those populations. Notable exceptions are Inglefield land and Naternaq. In the former, the eastern ½ of the region is protected from hunting. In the latter hunting is permitted in only 2 small areas on the southern border.



**Figure 1.** Locations of Greenland caribou / feral reindeer populations in 2006, with corresponding harvest region number, and where applicable a region name.

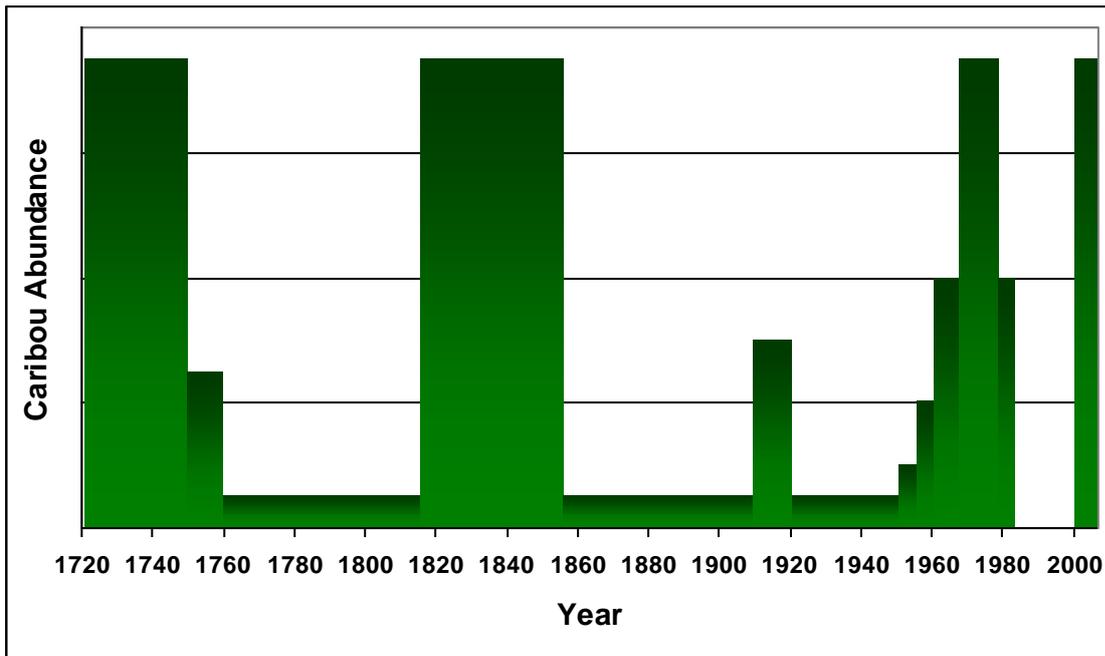
## **Recommendations**

### ***General advice***

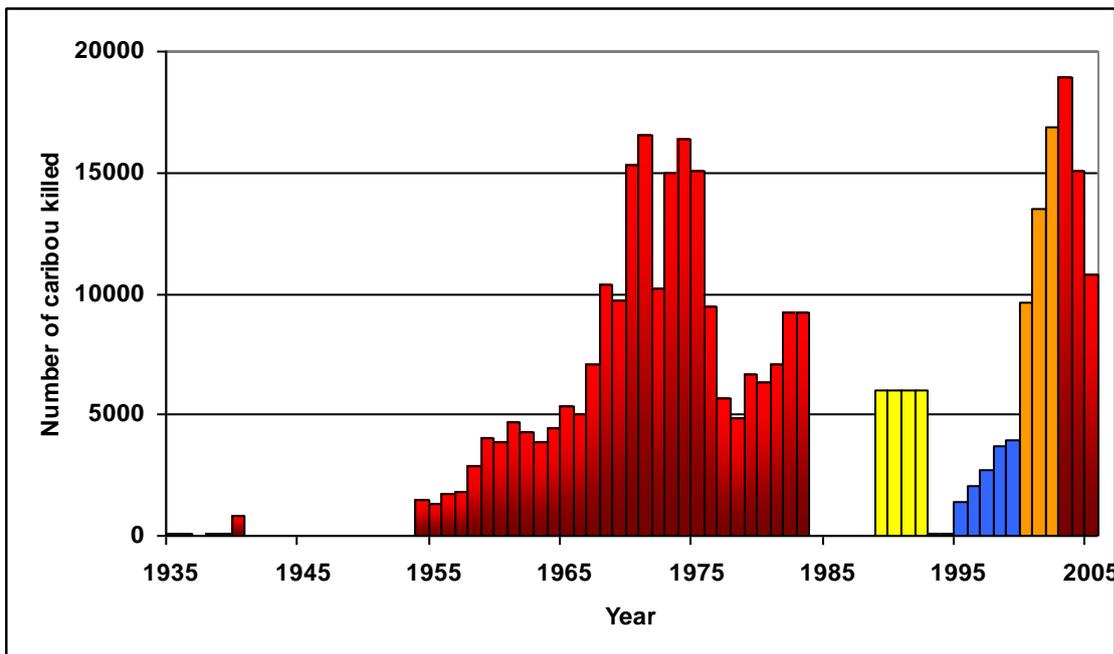
Boom and crash cycles appear to have been the norm for caribou populations in west Greenland (Fig. 2). Historically the booms have been infrequent with each boom lasting only a short period of time, typically one to three decades. Following a crash, the periods of low caribou abundance have lasted much longer between five and eight decades, suggesting that periods with low caribou abundance are the norm, with boom conditions being rare. The catch data for West Greenland (Fig. 3) indicates that a caribou boom period may have began in the late 1960's and extended into at least the early 1980's, when harvest statistics were discontinued. Alternately the catch increase into the 1970's may reflect an increase in overall hunting effort. A boom period during the past decade is also clear from the 2000 to 2006 population estimates. Combined they suggest a caribou boom period covering most of the past 35 years. As booms are short-lived, we might in the near future experience a transition into a longer period with low caribou abundance.

The 2005 survey from the Kangerlussuaq-Sisimiut and Akia-Maniitsoq populations (regions North and Central respectively) suggested that density dependent effects had reduced calve recruitment, perhaps increased bull mortality, and resulted in a decline in caribou numbers in the Akia-Maniitsoq population (Cuyler et al. 2005). The aerial surveys in 2006 confirmed density effects even more pronounced in the south region, with a three-fold reduction in the estimated stock in the Ameralik area between 2001 and 2006. For the more southerly Qeqertarsuatsiaat area, however, the estimated abundance was unchanged between 2001 and 2006, although some evidence suggests that this stability might be due to immigration of caribou from the Ameralik area. Caribou numbers in West Greenland may therefore already be in a transition phase, where the apparent increase in abundance during the 1990s has levelled off with a possible, but unknown, decline in the near future. Since there is no explicit modelling of these dynamics, the recommendations in this document is a short-term advice applying only to the 2006 season.

Healthy caribou populations are possible only when their range is protected from overgrazing and trampling. Where the range has been compromised caribou numbers can be expected to decline regardless of our efforts. If however, hunting accelerates caribou declines already in progress some of the range might be preserved for an earlier recovery. Alternately, if caribou are low in abundance unless there are management strategies in place or a terrain providing natural protection, then excessive harvesting may cause over-depletion that may unnecessarily postpone a future recovery. Further, one catastrophic winter with deep snows and severe icing events would be enough to cause abrupt immense declines in number. Sound management of a declining population is therefore extremely difficult, and the present level of knowledge about caribou in West Greenland is likely not sufficiently detailed to strike the right balance. The advice in this document represents a best short-term judgment given the available information.



**Figure 2.** Historical boom and crash cycles of caribou abundance in west Greenland based on harvest records (Vibe 1967, Meldgaard 1986) and the 2001 abundance estimate. Only general trends are illustrated, since the caribou populations in west Greenland do not rise and fall in synchrony.



**Figure 3.** Caribou harvest records 1935 – 2005 (Grønlands fangstlister, Piniarnaq). No records were kept between 1983 and 1993. Red █ columns are open harvest. Yellow █ columns are assumed harvest level (Peter Nielsen pers comm). Blue █ columns (1995 to 1999) are harvests attained when legal quotas were low. Orange █ columns (2000 to 2002) are harvests attained when legal quotas were dramatically increased. The 2005 column is incomplete, since lacks data 1 Oct – 15 Nov 2005.

**The following general recommendations are suggested:**

- 1) With the exception of the Ameralik and Qeqertarsuatsiaat stocks (see (3)), the advice is generally similar to 2005 (Cuyler & Witting 2005). For the large stocks in the North (Kangerlussuaq-Sisimiut) and Central (Akia-Maniitsoq) regions, a long hunting season with an open harvest is recommended for 2006/2007. Removing caribou prior to November would facilitate conservation of lichen winter ranges, since Greenland caribou already begin using lichen winter range in November (Lund et al. 2000). No hunt should occur in March because this is the primary month for scientific investigations, e.g., aerial or ground surveys, herd structures, recruitment indexes etc. Further, prohibiting hunting after 1 March would benefit gestating females.
- 2) Owing to the 2005 and 2006 signs of acting density regulation in the major caribou populations in West Greenland, the uncertainty on the 2006 status of caribou in the North and Central region, and the difficulty in managing potentially declining stocks, it is no longer specifically recommended that hunters be encouraged to shoot females. Instead it is recommended that males and females be taken in equal numbers, aiming for a natural population sex ratio to ensure the future genetic diversity and growth potentials in the stocks.
- 3) The Ameralik and Qeqertarsuatsiaat stocks appear to have successfully reached a density compatible with the recommended 1.2 per sq km. Further reduction in the population size may not be necessary, if the current range status (i.e., vegetation type, quality, quantity, availability) can support today's density of 1.1 per sq km. Therefore the management strategy recommended for this stock is unlike that recommended for all the other populations in West Greenland. The recommended strategy includes three main points: short hunting season, no winter hunt and an open harvest.
- 4) Continued cooperation by hunters should be encouraged regarding the use and return of hunter licenses/reports. It is strongly recommended that information on catch numbers by sex in the eleven management areas are included in *Piniarneq* because this information is needed to assess the impacts of the hunt.

## ***Recommendations for individual caribou stocks***

Below the caribou populations are presented in order from north to south.

### **Region (10) Inglefield Land and Prudhoe Land – Inglefield Land stock**

This region is inaccessible to hunters for most of the year, and given current means of transport difficult even when possible. In 1999 the population was estimated at ca. 2,260 caribou in the Inglefield Land region. No new data are available and the advice remains essentially unchanged from 2005, when local knowledge concerning recent die-offs and expansion movement indicated the possibility that the Inglefield Land region was overstocked.

GN suggest the following in 2006:

- 1) **Hunting season** – Given the latitude of the region and possible inaccessibility of the region, two harvest periods, e.g., 1 August - 15 October, and 1 March – 30 April might be considered in consultation with local Qaanaaq authorities and hunters.
- 2) **Quota for 2006** – In the 2005/2006 autumn-winter harvests, the Greenland Home Rule government set caribou harvest quotas at 150 for Inglefield Land and 50 for Prudhoe Land. GN suggests DMN consider consultation with local Qaanaaq authorities and hunters to ascertain whether these quotas be continued in 2006.
- 3) **Warble- & Botflies** – Owing to local concern that warble and botfly parasites have or will infect the Inglefield Land stock, GN suggests adding a question on presence or absence of warble / botfly larvae on the caribou hunting licenses for this region.
- 4) **Protected reserve in ENE Inglefield Land** – In the 2005/2006 autumn-winter harvests, the Greenland Home Rule government protected the eastern ½ of Inglefield Land from caribou hunting. GN suggests this practice continue, as a reserve might preserve this stock regardless of possible quota increases or disastrous stochastic weather events.

### **Region (9) Olrik Fjord – Olrik Fjord stock**

These feral reindeer are the descendants of 9 semi-domestic reindeer introduced to Olrik Fjord in 1965. The Greenland Home Rule government decided in April 2005 that this stock should be exterminated. GN recommends that either Qaanaaq municipality or the Greenland Home Rule government devise a plan to perform the eradication and assess when the eradication has been accomplished.

For the 2005/2006 autumn-winter harvests, the Greenland Home Rule government set the Olrik Fjord quota at 200 animals. An *ad hoc* quota of 200 animals is very unlikely to eradicate the population, which is of unknown abundance. A minimum of a free hunt over an almost free hunting season is likely required. Additional actions as 1) temporarily closing the hunt on the Inglefield / Prudhoe Land Stock forcing hunters to Olrik Fjord, and 2) no requirement that shot animals are removed should also be considered in consultation with local Qaanaaq authorities and hunters. Further information may be found in GN's 2005 advice, which made several detailed suggestions as to how the goal could be accomplished.

### **Region (8) Nuussuaq Halvø – Nuussuaq Halvø stock**

GN's recommendation for this small region, ca. 6,000 sq km, is unchanged from 2005, i.e., a long season to ensure quota is attained, but no open harvest. Given the small size of this stock, if the harvest were open and lasted from August to February then rapid stock depletion could occur and negate sustainable use of the stock.

The harvest quota and season may both remain unchanged from the 2005/2006 autumn-winter harvests, unless information sources from local sources indicate otherwise. In the 2005/2006 autumn-winter harvests the quota was for 420 caribou/reindeer and the season 1 August to 15 November 2005, and 1 January to 28 February 2006.

### **Region (1) Naternaq – Naternaq stock**

Hunting was banned in this region from 1993 until 2004. Unfortunately, there is no field data on which to base a recommendation. Anecdotal accounts from hunters and GN personnel, however, suggest extremely few caribou. In 2004 and 2005 open harvesting was permitted in limited sub-areas of the region. This may continue unchanged from last year, since it is not expected to threaten the population.

### **Region (2) North – Kangerlussuaq–Sisimiut stock**

There is serious concern regarding overstocking, as densities in 2005 exceeded the recommended target density by 3- to 6-fold. The stock was estimated to 51,600 caribou (90% CI: 40,400 – 62,800) in March 2000, and 90,464 caribou (90% CI: 70,276 – 113,613) in March 2005. GN's harvest recommendation is unchanged from 2005, i.e., open harvesting may continue with a long hunting season, 1 August 2006 to 28 February 2007.

### **Region (3) Central – Akia–Maniitsoq stock**

In March 2001 this stock was estimated to 46,236 (80% CI: 37,115 – 55,808) individuals, and comparable surveys in 2005 estimated a stock of 35,807 caribou (90% CI: 27,474 – 44,720). There is concern regarding overstocking, as densities in 2005 exceeded the recommended target, but density-dependent factors may already be reducing the stock. GN's harvest recommendation is unchanged from 2005, i.e., open harvesting may continue with a long hunting season, 1 August 2006 to 28 February 2007.

### **Region (4) South – Ameralik stock**

#### ***Background Ameralik stock***

This stock is a genetic mix of indigenous caribou and feral reindeer (Jepsen et al 2002). In March 2001, the Ameralik stock was aerial surveyed and estimated at ca. 31,880, with a mean density of 4 per sq km, which exceeded the management target density of 1.2 caribou per sq km. Given the 2001 herd structure, herd movements towards the south into previously unused areas and reports of heavy overgrazing, Cuyler et al. (2003) suggested that this population may have peaked around 1997-98 and likely had been overstocked for several years. When surveyed in 2001 it was still overstocked and likely declining in number.

Local knowledge has reported markedly fewer caribou on all ranges, during the 2004 and 2005 hunting seasons, where earlier caribou had been numerous, i.e., Ameralik, Buksefjord and the Sermilik-Alángordlia fjord system, (Rink Heinrich & Jens Bjerge pers comm).

The Ameralik caribou now appear in areas previously used only by the Qeqertarsuatsiaat stock, e.g., inner portions of Grædefjord and Fiskefjorden. This is evidenced by the observations in March 2006 of animals with an overall brown pelage, which indicates feral reindeer descent. Mixing of the two stocks may already have occurred, or could in the future.

The 2006 helicopter survey of the Ameralik stock gave a current estimate of 9,680 animals (90% CI: 6,515 – 13,147), (Appendix 1). Although this is about 1/3 of the caribou estimated five years ago, there are still thousands of caribou in the region. While this reduction may be the result of density dependent factors, there have been no observations of high natural winter mortality. It is also possible that harvest is primarily responsible, however, this is impossible to evaluate because stock specific harvest statistics are not available. Regardless, with the reduction in abundance the current density is ca. 1.2 caribou per sq km and coincides with the management target density. Present low density may be the cause of the observed improved late winter calf recruitment. In 2001 when the density was 3.7 caribou per sq km the late winter calf recruitment was only 40 calves per 100 cows. The current figure is an impressive ca. 60 calves per 100 cows. Although shooting female caribou could have influenced this ratio, the reasonable herd structure (41.45% female, 33.76% male, 24.79% calves) suggests no scarcity of adult females in the population.

Given the 2006 late winter calf recruitment this stock appears to be at acceptable stocking densities. However, it must be remembered that the majority of this stock has over the past two decades consistently moved south exploiting new ranges. It is unknown whether the current density is compatible with the range now available. Owing to possible overstocking/overgrazing in the past, current range may not be able to sustain grazing pressure even at the target density, 1.2 caribou per sq km. Further decline in this stock may therefore occur from natural density dependent causes and may be inevitable.

### **Region (5) South – Qeqertarsuatsiaat stock**

#### ***Background Qeqertarsuatsiaat stock***

In March 2001, the Qeqertarsuatsiaat stock was aerial surveyed and estimated at ca. 5,372, with a mean density of 1.1 caribou per sq. km. Calf percentage and recruitment were high (Cuyler et al. 2003), and could have caused growth in herd size.

Local knowledge from the 2005 hunting season reported markedly greater numbers of caribou where earlier there had been few or none, i.e., inside Grædefjorden and the mainland southeast for the town of Fiskenæsset (Rink & Nikolaj Heinrich pers comm).

The 2006 helicopter survey estimated the Qeqertarsuatsiaat stock to 5,224 animals (90% CI: 2,831 – 7,881). This number is indistinguishable from the estimate five years ago. Similarly, density remains relatively unchanged being now 1.0 caribou per sq km and continues to

coincide with the management target density. In contrast the late winter calf recruitment dropped from 61 calves per 100 cows in 2001, to only 32 calves per 100 cows in 2006. The current figure is difficult to explain, but is reflected in a skewed herd structure (24.56% female, 67.54% male, 7.89% calves) predominated by males. There were a lack of females and calves in the observations from the 2006 aerial survey.

### ***AMERALIK AND QEQERTARSUATSIAAT STOCKS***

Owing to the new information GN is changing the harvest recommendation for the Ameralik and Qeqertarsuatsiaat stocks; recommending the following for the Ameralik and Qeqertarsuatsiaat harvest in 2006 / 2007:

- A shorter hunting season is recommended to limit the number of caribou harvested, i.e., a maximum one-month season is recommended for the period 01 – 30 September. Shooting females is no longer recommended; it is instead recommended that an even number of males and females be taken.
- No winter harvest in 2007. These two stocks do not need further reduction and therefore a winter harvest is not warranted. Prohibiting the winter hunt will also benefit gestating females.
- Continued open harvest. The majority of the Ameralik stock has steadily moved south and further and further away from Nuuk/Kapisillit with each year. The present range in the Qeqertarsuatsiaat area is relatively inaccessible. Although the combined Ameralik+Qeqertarsuatsiaat stock is ca. 14,000 caribou, these animals seem few-and-far-between because they are spread over a ca. 13,473 sq km area and can be difficult to locate when hunting. These factors and the typically unpredictable sailing weather in West Greenland will likely limit hunting success sufficiently if the season is only 1 month long. Further, continuing the open harvest is advantageous for bureaucratic and logistic reasons, which are outside the responsibility of GN. These may include 1) policing a quota in only this one region will be impossible to implement, and 2) extra work for municipal and federal government employees to implement management and distribution of a quota and lotteries for licences.

**Region (6) Paamiut – Qassit stock**

The most recent field data was obtained in autumn 2000, with a mean density of 1.0 caribou per sq. km surveyed, a high recruitment of 77 calves per 100 cows, but no abundance estimate. Because of the general lack of data we cannot give direct recommendations. An open harvest with a long season was permitted in 2004 and 2005.

**Region (7) Paamiut – Neria stock**

The most recent field data was obtained in autumn 2000, with a mean density of 1.8 caribou per sq. km surveyed, a high recruitment of 72 calves per 100 cows, but no abundance estimate. Because of the general lack of data we cannot give direct recommendations. An open harvest with a long season was permitted in 2004 and 2005.

**Region (11) Ivittuut / Arsuk – Ivittuut stock**

There is no data on this stock and therefore we cannot give direct recommendations. An open harvest with a long season was permitted in 2004 and 2005.

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## Appendix 1

### New Aerial Survey Data since last year's advice

A GN technical report is expected within 2006.

#### Ameralik and Qeqertarsuatsiaat caribou stocks

The Ameralik and Qeqertarsuatsiaat caribou stocks (South Region) were surveyed by helicopter between the 11<sup>th</sup> and 15<sup>th</sup> of March 2006 (Table 1). Methods and analysis followed Cuyler et al. (2003). The survey method and design were identical to those used in 2001. The region was stratified into Ameralik and Qeqertarsuatsiaat areas, and the same random transects from 2001 were flown. Flight height, speed and strip width were unchanged. The only deviation from 2001 was that 3 transects not capable of being flown in 2001 were flown in 2006. As in 2001, some transects or areas were zigzagged to allow classifying the age and sex of animals seen. Despite the correction for missed animals, since not the entire 600-metre strip width may be seen for the full length of each transect, and owing to the difficult conditions for sighting caribou, the 2006 population size estimate may be considered a minimum.

**Table 1.** Ameralik & Qeqertarsuatsiaat caribou stocks: Helicopter survey 11-15 March 2006.

<b>AERIAL SURVEY: POPULATION ESTIMATES</b>			
	<b>Ameralik</b>	<b>Qeqertarsuatsiaat</b>	<b>Totals</b>
Total Area <sup>1</sup> (km <sup>2</sup> )	8 377	5 096	13 473
Number transects ( <i>n</i> )	40	24	64
Length of transect (km)	7.5	7.5	7.5
Area surveyed (km <sup>2</sup> )	180	108	288
Flight altitude (metres)	15 (50 feet)	15 (50 feet)	15 (50 feet)
Flight speed (km / hr)	46 to 65	46 to 65	46 to 65
Total strip width (metres)	2 x 300	2 x 300	2 x 300
Caribou number observed	198	109	307
Raw Density per sq km	1.1	1.0	1.1
Corrected Density per sq km	1.16	1.02	1.11
<b>Mean population estimate</b>	<b>9 680 caribou</b>	<b>5 224 caribou</b>	<b>14 871 caribou</b>
90 % Confidence Interval	(6 515 – 13 147)	(2 831 – 7881)	(11 689 – 18 231)
<b>AERIAL SURVEY: HERD STRUCTURE</b>			
Number groups observed	43	22	<b>65</b>
Average group size	5.44 ± 3.06 S.D.	5.18 ± 3.28 S.D.	<b>5.35 ± 3.11 S.D.</b>
Maximum group size	15	14	<b>15</b>
Minimum group size	1	1	<b>1</b>
Number sexed & aged	234 (100 %)	114 (100 %)	<b>348 (100 %)</b>
Males > 4 years	53 (22.65 %)	59 (51.75 %)	<b>112 (32.18 %)</b>
Females > 1 year	97 (41.45 %)	28 (24.56 %)	<b>125 (35.92 %)</b>
Males > 1 year & < 4 years	26 (11.11 %)	18 (15.79 %)	<b>44 (12.64 %)</b>
Calves from 2004	58 (24.79 %)	9 (7.89 %)	<b>67 (19.25 %)</b>
Calves per 100 cows	59.8	32.14	<b>53.6</b>
Bull (> 4 years old) to Cow ratio	0.55	2.11	<b>0.90</b>

<sup>1</sup> Area includes islands, lakes and rivers, but deletes ice caps and glaciers.