

## Estimates of Minimum Population Size for Walrus around Southeast Baffin Island

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### Abstract

To support management objectives in Canada and Greenland, DFO-GNIR joint research was begun in 2005. Direct counts were used to determine the minimum number alive in summer on the SE coast of Baffin Island. Aerial surveys spanned the coast from roughly the Saddleback Island in northern Hudson Strait to Isabella Bay on eastern Baffin Island but concentrated on the area between Loks Land and Cape Dyer. The maximum count was obtained on 3-4 September 2007 during boat surveys. This count of 1056 may be adjusted for animals at sea by using tag data from other areas. The resulting estimate of ~4400 however must be viewed with caution until better data are available for this area.

### Introduction

Atlantic walrus (*Odobenus rosmarus rosmarus*) occur in Canada in several stocks, some of which may be shared with Greenland. The Hudson Bay – Davis

Strait stock (Born *et al.* 1995, COSEWIC 2006, NAMMCO 2006, Stewart 2008). Until recently (Dietz *et al.* WP, this meeting) this connection was speculative (Born *et al.* 1995 and referenced therein, COSEWIC 2006). However it is clear, now, that some portion of the walrus population that winters off West Greenland moves to the SE coast of Baffin Island in summer, and that there is a complimentary trip from Canada to Greenland.

Walrus have been reported from most of the south-eastern coastline of Baffin Island, from Resolution Island to Isabella Bay (Born *et al.* 1995, COSEWIC 2006) although it is thought the occupancy range in this region has diminished in modern history (COSEWIC 2006). Here we report on aerial and boat surveys designed to obtain current estimates of the Minimum-Known-Alive (MKA, Krebs 1966) for walrus in the SE Baffin area in late summer. Known or reported terrestrial haulout sites, where walrus traditionally come ashore to rest, were examined systematically to obtain counts of animals. Aerial surveys spanned the coast from roughly the Saddleback Island in northern Hudson Strait to Isabella Bay on eastern Baffin Island but concentrated on the area between Loks Land and Cape Dyer.

## **Methods**

The scientific literature (*e.g.*, the review by Born *et al.* 1995), Inuit *qaujimaningit*, or IQ (*e.g.*, community consultations, Inuit participants) and other traditional knowledge (*e.g.*, long-time Arctic researchers) were used to identify former, current, and potential haul out sites. These sites and intervening coastlines were

examined from the air (primarily fixed wing aircraft) repeatedly each year in the season when maximum numbers were expected to occur based on IQ. In 2007, major haulouts were examined at surface level during a boat-based survey. For both types of survey, digital images were taken using a Canon EOS 30D or 40D and a EF17-85 mm or 70-300 mm zoom lens, with image stabilizer. Cameras were synchronized with the GPS used to record tracks and sightings. Images were later processed using Adobe Photoshop® CS2 and walrus counted (Stewart *et al.* WPa this meeting).

### *Aerial Surveys*

In 2005, aerial surveys were conducted using a Messerschmitt-Bolkow-Blohm (BO-105-CBS) helicopter based on the Canadian Coast Guard (CCG) icebreaker *Henry Larsen*. The helicopter flew with a target altitude ~150 m ASL and a searching speed of approximately 185 kph, reduced when counting at haulouts. Three observers occupied the front left and two rear positions. Flying time was constrained by other operational responsibilities of the icebreaker. A de Havilland Canada DHC-6 Twin Otter was used to fly surveys on 25-26 July, 28-29 August, and 26-27 September 2006, on 16 August, 17 September and 15 October 2007, and 6, 8, 9 and 11 September, 2008. Target altitude 300 m ASL, at about 210 kph. There were least two observers, one on each side, on all flights, but usually a third observer. The flight crew also contributed observations.

When walrus were seen, the numbers were estimated independently by each observer and oblique aerial photographs were taken whenever possible. In the absence of tag-data for this area, the same distance criteria as applied to high Arctic sites was used for SE Baffin haulouts (Stewart *et al.* WPa this meeting).

### Surface Surveys

In 2005, it was possible to land at one haulout site. Visual estimates and digital images were taken from a vantage point slightly above the site. In 2007, as part of tagging studies (Dietz *et al.* WP this meeting) several of the known SE Baffin haulouts were visited by boat. Surface level estimates were made from a vantage point on land above the haulout, and from boats, frequently below the lowest walrus on shore according to the stage of the tide and amount of surf present at the site. Observations and imagery were processed as for aerial data.

Regardless of source, counts at individual haulouts were summed to produce maximum daily estimates. These were in turn summed when the distance criterion was met to produce an annual minimum known alive (Krebs 1966) estimate.

### **Results**

2005 The 2005 helicopter survey covered approximately 3000 km of coastline but found only two occupied haulouts on a single day (Figure 2). On 26 August, 21 walrus were counted in photographs on a tiny rock near Kekertuk Island in

Hoare Bay and three haulouts within sight of each other at Angijak Island had an estimated 806 (photo counts of two sites, estimate of third) for a total of 827. No other haul outs were found despite examining all locations in the area, previously identified in the literature and by local contacts in Pangnirtung and Qikiqtarjuaq.

2006 In 2006, approximately the same areas were surveyed in late July, August and September (Table 1). Monthly counts increased into September with about 160 seen in July, all in the water, over 440 seen in August, and over 700 in September.

The potentially large haulouts at Lady Franklin and Monumental islands were empty when seen in September. The absence of “in water” sightings in September may be due to increased hauling out behaviour or decreased detectability given the high winds during the survey. No walrus were seen on the south side of Cumberland Sound in September.

2007 Based on the 2006 results, the survey was moved to August-October. The maximum aerial count (450) was obtained in October but the maximum daily counts from boat surveys were on 3 September (907; 3 at sea) at two major haulouts, Angijak (78) and Anna's Skerries (970) to which the observation at Exeter on 4 September may be added (86) for a total of 1056, virtually all on land. There were also 77 walrus counted at Clephane on 2 September which could have moved to Exeter by 4<sup>th</sup> and are excluded.

2008 Aerial surveys were conducted in September. Walrus were found on 6 and 8 Sept but surveys on 9 Sept (1157 km) and 11 Sept (753 km) added no additional walrus. The maximum count was 988 walrus at 5 haulouts (Table 3).

## **DISCUSSION**

The coast of SE Baffin is a challenging area in which to conduct aerial surveys, especially in late summer/early autumn. Over the 3 years approximately 36,000 km were flown supporting survey "on-effort" of about 14,000, roughly 36% efficiency. The weather deteriorates from July into October with average winds of about 13 kph in September and October. One can expect 60% of the days to have >8/10 cloud cover

([http://www.climate.weatheroffice.ec.gc.ca/climate\\_normals/index\\_e.html](http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html), accessed 6 Nov 2009). There were too few data to correlate walrus numbers with either hours flown or numbers of haulouts visited although the latter appears to have an effect. Number of haulouts visited does not reflect hours flown because a short trip to 1 or 2 occupied sites can yield bigger numbers than a long trip to several small sites. Until a greater area can be surveyed in a shorter time, walrus estimates will remain incomplete and under-estimated.

Even with complete coverage, counts and visual estimates tend to be negatively biased. Especially in mixed herds smaller animals are overlooked easily. This is

a greater problem with surface level counts than aerial counts, and larger groups than smaller ones.

Researchers for the Government of Nunavut conducting polar bear (*Ursus maritimus*) surveys off SE Baffin in 2006 reported (E. Peacock GN, *in litt* 16 July 2007) large groups of walrus at:

- Cornelius Grinnell Bay (600-700) near Brevoort Island, on 11 Sept 2006
- Cape Colby (150-200) on 9 September 2006; and at
- Monumental Island (1000-1500) on 18 Sept 2006.

We observed 48 at Monumental Island and 15 at Cape Colby on 26 September.

Distances among these locations are sufficiently short that the observations on 9 and 11 September may be subsumed by the Monumental Island estimate on 18 September. However, visual estimates by the GN observers have not been calibrated against the other estimates used here and are not included in further calculations.

Minimum-known-alive estimates were 827 (in 2005), 710 (2006) 1056 (2007) and 988 (2008). A reasonable approximation for the surveyed area is therefore 1100, virtually all of which were on land. Using adjustment factors derived for East Ellesmere surveys (Born *et al.* WP this meeting), the number of walrus in late summer off SE Baffin Island could be 4400 but the applicability of these hauling patterns for an area which is largely ice-free during the survey period is untested. Moreover, these expanded population estimates are sensitive to the definition of

“hailed out,” based on tag data. The tenuous assumption that hauling behaviour of individuals within a group of walrus untested. Adjusted population estimates based on the minimum known alive estimate of 1000 are to be viewed with caution.

Haulout surveys in the late 1970s reported a few to hundreds of animals, with 600 to 700 near Lady Franklin Island (Born *et al.* 1995 and references therein). These surveys appear to be the basis of Richard and Campbell's (1988; Figure 5) estimate of "1000+" However, there appears to have been no correction for potential double-counting between surveys within a year, survey effort is difficult to assess, and the location data are too imprecise to be able to identify specific haulouts observed (e.g., Maclaren Marex 1979) . Without these ancillary data it is impossible to asses a trend in population size.

It is known that some walrus summering in the survey area wintered off west Greenland. But walrus also winter in Cumberland Sound and other areas around south Baffin Island (Born *et al.* 1995, DFO 2000, Stewart 2008). The proportions of animals that move to Greenland, enter Cumberland Sound, or disperse elsewhere for the winter are unknown.

Although some previously reported haulouts were not identified with sufficient precision to determine if they have moved, some were identified and observed but no walrus were present. These include all four on eastern Baffin Island identified in Born *et al.* (1995) Fig. 10: Isabella Bay, Alexander Bay, Home Bay

and Ketaluk Island. Similarly, no walrus were seen at Gabriel or Kendall straits, Lipton Channel, Loks Land, Cape Farrington of the several sites west of Cape Mercy illustrated in Born et al. (1995) Figure 16. Most of these sites are rocky shore and would show little evidence of recent occupation. Cornelius Grinnell Bay and Cape Colby were both covered by our surveys and found empty, but walrus were seen ashore during the GN bear surveys.

### **Conclusion**

The maximum count of walrus in the SE Baffin area was recorded during a boat survey in 2007. Approximately 1100 walrus were seen. This count could be adjusted by using tag data from other areas but extrapolation to ~4400 walrus should be viewed with caution. There is some evidence that previously occupied haulout sites are not used intensively now.

Figure 1. Survey area ranged from Saddleback Island to Isabella Bay.



Figure 2. Area surveyed by ship-based helicopter in August 2005

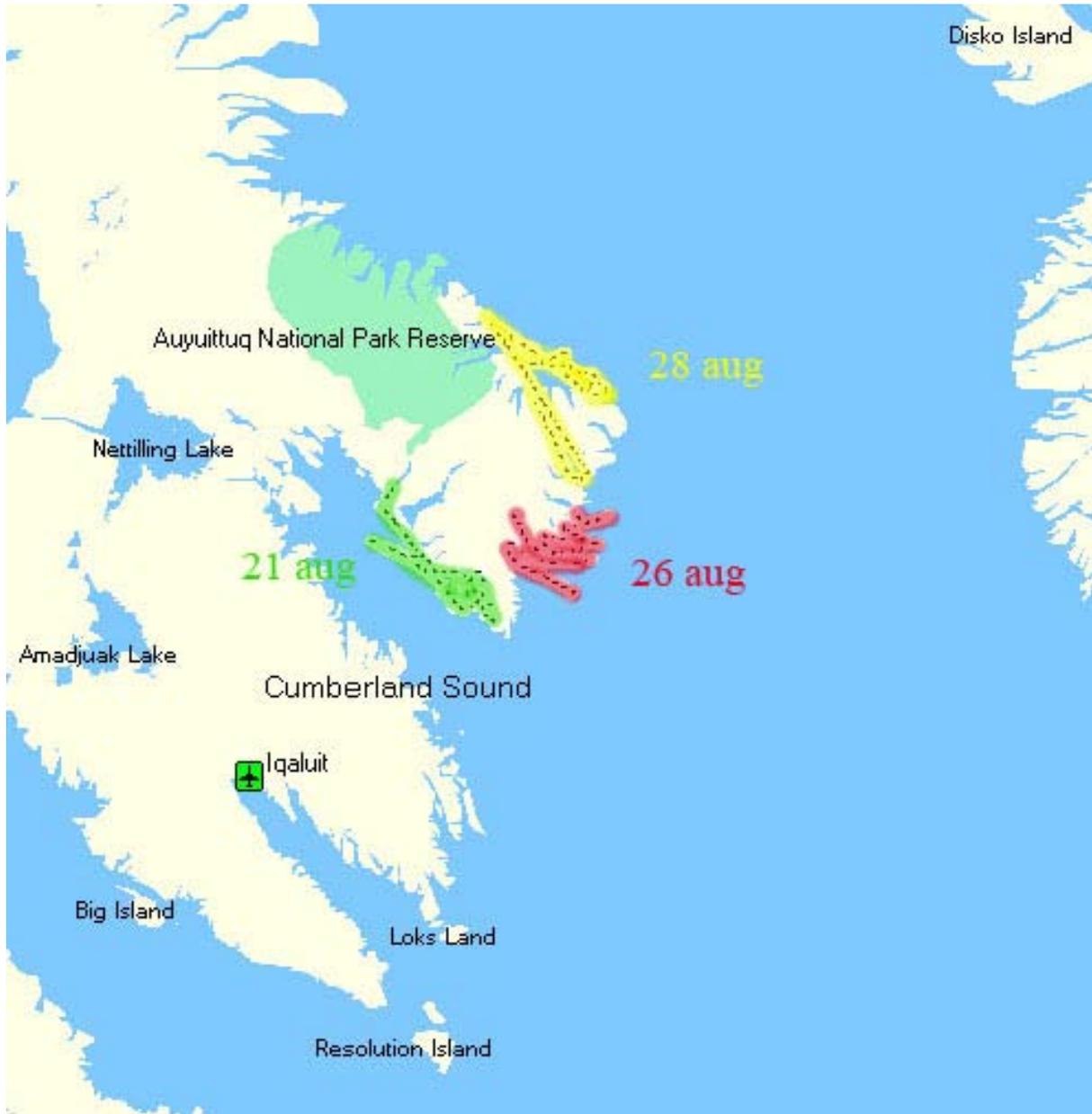
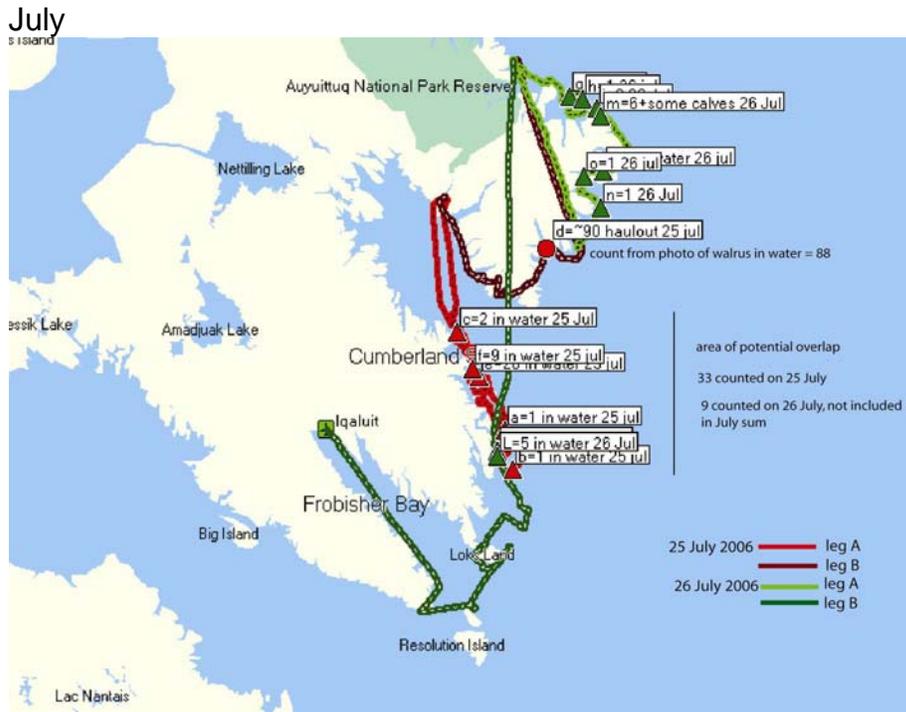
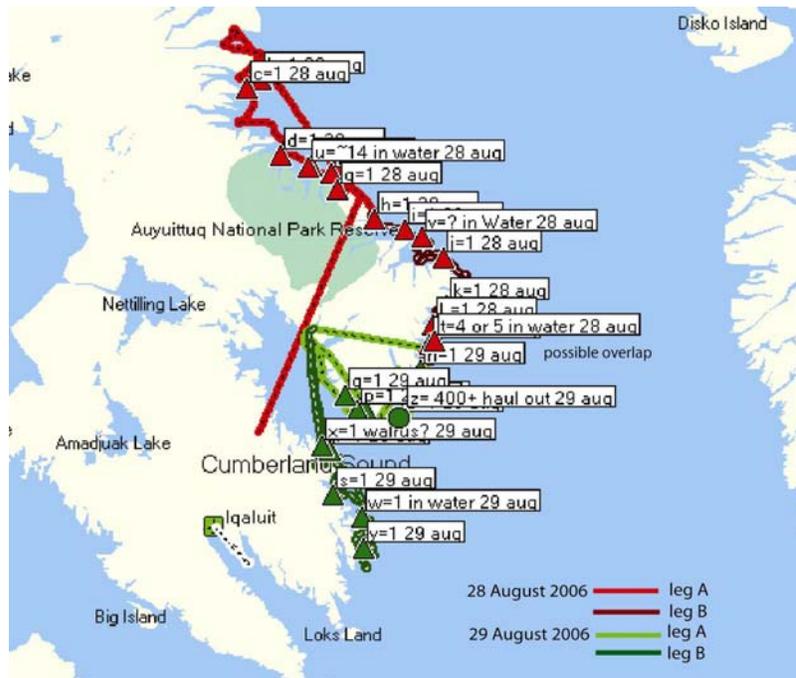


Figure 3. Twin otter surveys conducted in 2006



August



# September

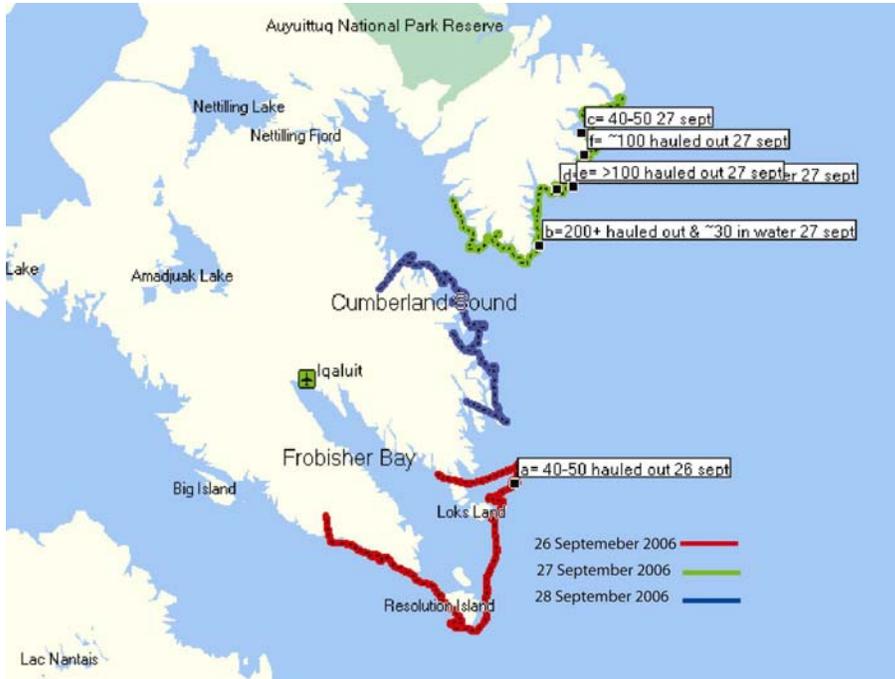


Table 1. 2006 Twin Otter Survey Summary

Date	Max	Survey km	Haulouts Observed	Comments
25-26 July	160	2028	Angijak Exeter Touaq	<ul style="list-style-type: none"> <li>• 63 at sea;</li> <li>• 9 excluded as possible duplicates</li> </ul>
28-29 August	439	2459	Angijak Anna's Skerries Clephane Exeter Touaq	<ul style="list-style-type: none"> <li>• 39 at sea; excluded as possible duplicate;</li> <li>• &gt;400 estimated at one haulout site (no photos)</li> </ul>
26-27 September	701*	1665	Angijak Anna's Skerries Clephane Exeter Lady Franklin Is. Monumental Is. Touaq	<ul style="list-style-type: none"> <li>• 0 at sea;</li> <li>• no overlap</li> </ul>

\* photographs of two large herds on 27<sup>th</sup> are badly blurred due to air turbulence; counts are under estimates.

Table 2. 2007 Twin Otter Survey Summary

Date	Max	Survey km	Haulouts Observed	Comments
16 August	241	1329	Lemieux Is.	<ul style="list-style-type: none"> <li>• 38 at sea;</li> <li>• 144 on land;</li> <li>• 59 on ice</li> </ul>
17 September	219	1062	Angijak Gordon's Rock	<ul style="list-style-type: none"> <li>• 0 at sea;</li> </ul>
15-16 October	450	1734	Angijak Anna's Skerries Clephane Gordon's Rock Lady Franklin Is. Monumental Is.	<ul style="list-style-type: none"> <li>• 6 at sea;</li> <li>• 1 on ice;</li> <li>• no overlap</li> </ul>

Table 3 2008 Twin Otter Survey Summary

Date 2008	Max	Survey km	Haulouts Observed	Comments
6, 8 September	988	1775	Angijak Anna's Skerries Clephane Lady Franklin Is. Monumental Is.	<ul style="list-style-type: none"><li>• 44 at sea;</li></ul>

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