



ASSESSMENT OF THE SOUTH AND EAST HUDSON BAY ATLANTIC WALRUS (*ODOBENUS ROSMARMUS ROSMARMUS*) STOCK IN 2022



Atlantic walrus hauled out on Kidney Island during the 2022 aerial survey (photo credit: DFO)

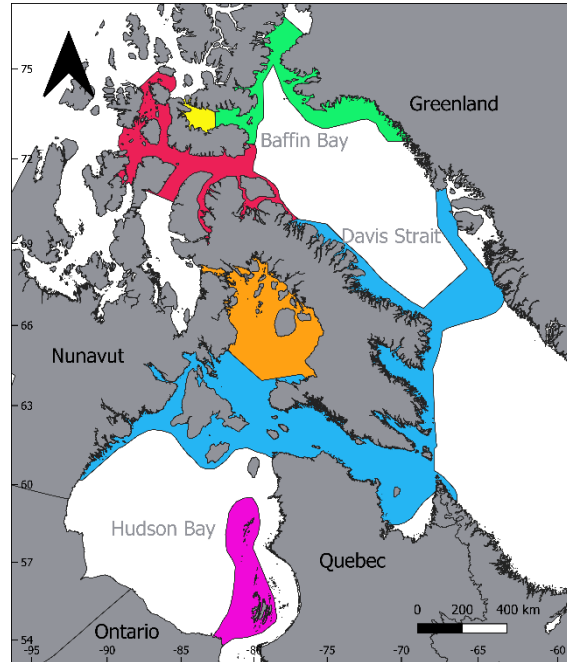


Figure 1. Distribution of Atlantic walrus stocks (red: Penny Strait-Lancaster Sound; green: Baffin Bay; yellow: West Jones Sound; orange: Foxe Basin; blue: Hudson Bay-Davis Strait; purple: South and East Hudson Bay) in the eastern Canadian Arctic.

Context:

Since 2017, the Atlantic Walrus in Canada is considered to consist of three designatable units (DUs). The DU referred to as the Central / Low Arctic population includes animals from South and East Hudson Bay (known as the SEHB stock), from Foxe Basin, and the southeast Baffin Island portion of a stock shared with Greenland (the Hudson Bay-Davis Strait or HBDS stock). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) first assessed the Central /Low Arctic population as Special Concern in Canada in 2006, and this was reaffirmed in 2017.

A survey conducted in 2014 estimated the number of walrus in the SEHB to be 200 (95% CI = 70–570). A new aerial survey of SEHB walrus was completed in September of 2022.

Walrus from both the SEHB and HBDS stocks are hunted in Nunavik and Nunavut, and consultations are underway regarding the listing of the Central / Low Arctic DU under Schedule 1 of SARA (species of special concern).

*This Science Advisory Report is from the October 16-20, 2023 national peer review on Population Abundance Estimate and Potential Biological Removal (PBR) for Atlantic Walrus (*Odobenus rosmarus rosmarus*) in South and East Hudson Bay. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.*

SUMMARY

- The aerial coastal photographic survey conducted in September 2022 covered all known terrestrial haul-out sites identified within the distribution range of South and East Hudson Bay (SEHB) walrus, based on previous surveys and *Inuit Qaujimagatuqangit* (local knowledge).
- Average counts of hauled out walrus from the photographic aerial survey totaled 130. The corresponding abundance estimate (rounded to the nearest 10) was 430 (95% CI = 160–1,190) after accounting for animals at sea during the survey.
- Satellite images covering most of the surveyed area, taken between August and October 2022, were also analyzed to obtain a second abundance estimate.
- Average number of walrus hauled out estimated from satellite images was 190, corresponding to an abundance estimate of 630 (95% CI = 230–1,770) after accounting for animals at sea.
- The combined estimate of abundance from both the aerial survey and satellite images is 500 (95% CI = 230–1,060) walrus.
- Based on the combined estimate of abundance, the Potential Biological Removal (PBR) estimate for the SEHB stock is 4.
- The correction factor for animals at sea has a large impact on the abundance estimate but is informed by a limited amount of data.

INTRODUCTION

The South and East Hudson Bay (SEHB) walrus stock is part of the central Arctic population. It occurs from the Ottawa Islands south to Ekwan Point, western Hudson Bay (Figure 1).

Walrus often haul out in large aggregations during summer months. Aerial survey counts of hauled out animals, adjusted for animals in the water when the surveys are flown, is thought to be an appropriate survey method for this species. On the other hand, it has recently been reported that walrus can be detected from 30-cm resolution satellite imagery and that reasonable estimates of abundance can be obtained by applying density estimates of hauled out animals from aerial survey photographs to the area occupied by animals on satellite images (Matthews et al. 2022).

ASSESSMENT

A photographic survey was flown in September 2022 to estimate abundance of the SEHB walrus stock using a deHavilland Twin Otter 300 aircraft. The survey covered all known walrus haul-out sites within eastern Hudson Bay south of Akulivik as well as in James Bay (Figure 2).

In addition, georeferenced, 30-cm resolution satellite images covering most of the survey area that were taken between August and October 2022, were obtained.

The aerial survey resulted in an estimate of 130 (rounded to the nearest 10) walrus hauled out, 129 of which were from a single haul-out site on Kidney Island, and one individual from Eddy Island, in the Ottawa Islands archipelago. Assuming that 30% (CV = 0.07) of the walrus were hauled out on average during the survey, abundance for the SEHB stock was estimated at 430 (95% CI = 160–1,190) walrus.

An estimate of aggregation density was obtained from two aerial photographs of the Kidney Island haul-out site. Multiplying the area delineated by walrus on satellite photographs by the estimated walrus aggregation density (0.44 individuals·m⁻² on average; CV = 0.03) provided an estimate of 190 walrus hauled out on Kidney Island and near Cape Henrietta Maria. Correcting this number for walrus in the water resulted in an abundance estimate of 630 (95% CI = 230–1,770) walrus.

The combined adjusted estimate of abundance for the SEHB stock, using data from both the aerial survey and satellite images, is 500 (95% CI = 230–1,050) walrus.

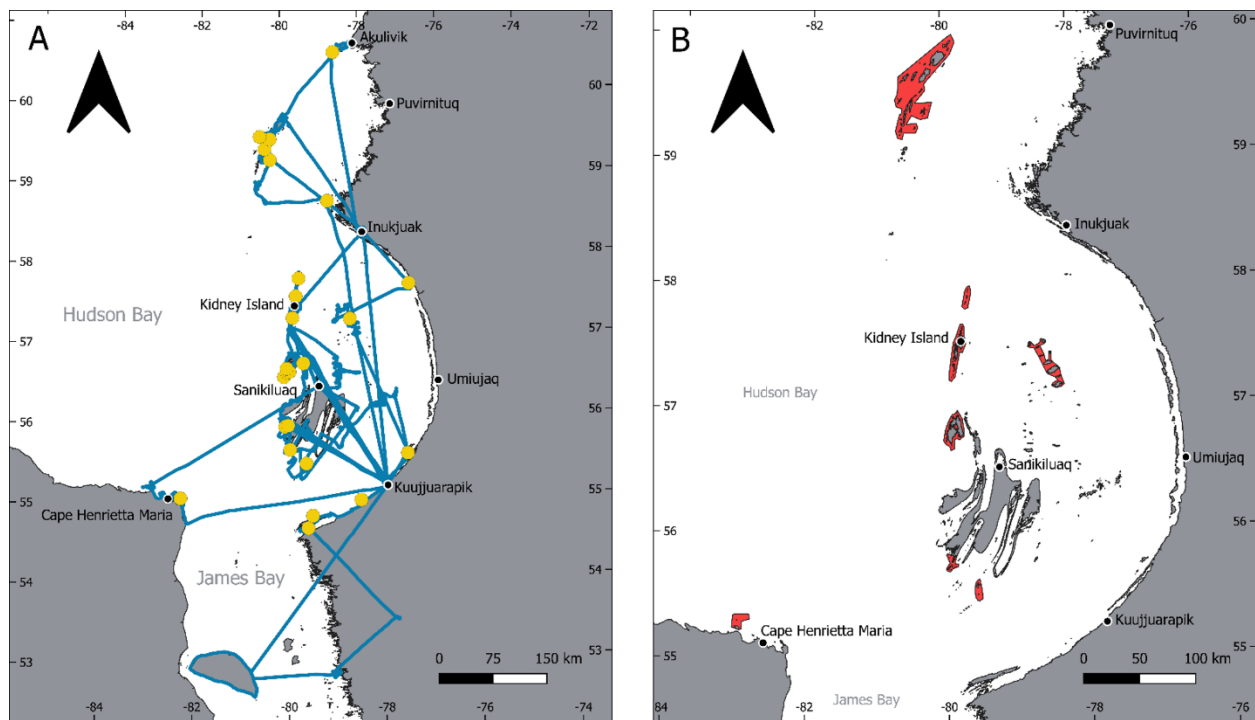


Figure 2. A) Location of known walrus haul-out sites (yellow circles), and survey tracks (blue lines) flown by the aircraft during the September 2022 aerial survey. B) Geographical extent (red polygons) of satellite imagery collected in southeastern Hudson Bay between August 11 and October 15, 2022.

Potential Biological Removal (PBR)

The PBR for SEHB walrus was estimated at 4 individuals based on the 2022 combined estimate of abundance. This calculation assumed a maximum growth rate (R_{max}) of 0.08, and a recovery factor (RF) of 0.25, which is the recommended value for small stocks with a stable trend.

Sources of Uncertainty

Walrus are challenging to enumerate owing to their aggregated distribution and correlated haul-out behaviour. This results in high temporal variability in the number of animals hauled out at one time. This has a large impact on the uncertainty around adjusted abundance estimates.

The haul-out proportion estimate used to adjust abundance for animals missed because they were at sea represents an average from the literature for stocks of Atlantic walrus other than SEHB walrus. Because pinniped haul-out behaviour may vary regionally, this haul-out proportion may not be entirely representative of the SEHB stock.

There is uncertainty associated with walrus movements among haul-out sites within the study area. Any directional movements of walrus aggregations among haul out sites over the study period could result in animals being missed or double-counted, which would result in abundance being under- or overestimated, respectively. While this was not a concern for the aerial survey in this study, it may have had an impact on the abundance estimate derived from satellite imagery which was collected over a larger time window.

In addition, while four management stocks have been identified within the Central / Low Arctic walrus population, little is known about walrus movements between the management stock distribution areas. While directional movements of walrus from other stocks into the SEHB distribution area would result in SEHB abundance being overestimated, SEHB walrus moving out of the area covered during the study period would yield an underestimated abundance for this stock.

The resolution of commercially available satellite images is insufficient to count individual walrus. The method relies on using aerial survey images to derive walrus densities on haul-out sites, which are then applied to satellite images. The uncertainty associated with these density estimates is likely currently underestimated.

CONCLUSIONS AND ADVICE

This study estimates an abundance of 500 (95% CI = 230–1,050) individuals for the SEHB walrus stock. The 2022 assessment provides the second abundance estimate for the SEHB walrus stock, which is not statistically different from the 2014 estimate of 200 (95% CI = 70–600) walrus. While both estimates are associated with high uncertainty, they indicate that stock size is small.

Based on the 2022 assessment, the PBR for the SEHB walrus stock is estimated at 4 individuals.

OTHER CONSIDERATIONS

No genetic analysis has been carried out on walrus from the SEHB stock. Therefore, it is unclear if walrus from SEHB form a unique stock, or if part or all of this stock represents the southern limit of the Hudson Bay-Davis Strait (HBDS) stock. If SEHB and HBDS walrus form a single stock, PBR would need to be recalculated based on total stock abundance.

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SOURCES OF INFORMATION

This Science Advisory Report is from the October 16–20, 2023 national peer review on Population Abundance Estimate and Potential Biological Removal (PBR) for Atlantic Walrus (*Odobenus rosmarus*) in South and East Hudson Bay. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada \(DFO\) Science Advisory Schedule](#) as they become available.

Matthews, C.J.D., Dispas, A., and Mosnier, A. 2022. [Evaluating satellite imagery for Atlantic walrus \(*Odobenus rosmarus rosmarus*\) stock assessment – a pilot study](#). Can. Tech. Rep. Fish. Aquat. Sci. 3492: v + 25 p.

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