Fisheries and Oceans Canada | Pêches et Océans Canada
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Central and Arctic Region

Canadian Science Advisory Secretariat
Science Advisory Report 2020/048

# INFORMATION RELATED TO THE DELINEATION OF THE ECLIPSE SOUND AND ADMIRALTY INLET NARWHAL STOCKS

*Narwhals (*Monodon monoceros*) in Eclipse Sound*

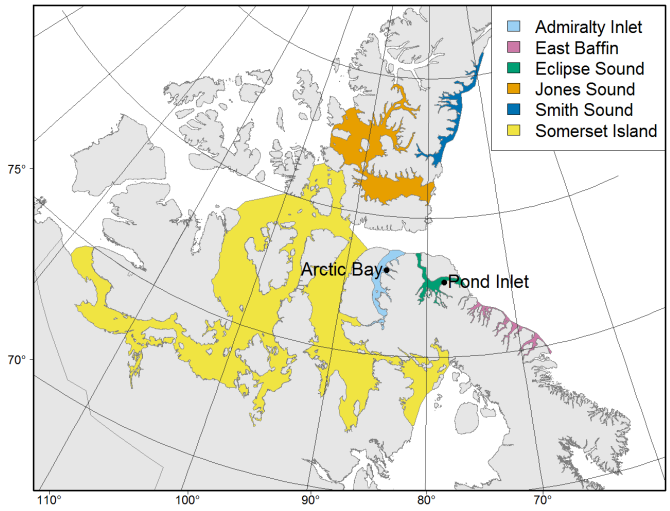


*Figure 1. Map of narwhal summer aggregations in the Canadian High Arctic.*

## Context:

*The Baffin Bay narwhal population is large (> 140,000 animals) and composed of four summer stocks and two tentative stocks which are defined primarily by recurring summer aggregations (DFO 2013, 2015). Each of these summering stocks is considered a separate management unit, for which DFO has provided a corresponding Total Allowable Landed Catch (TALC) recommendation (DFO 2015). Although the Eclipse Sound and Admiralty Inlet narwhal aggregations are currently considered as separate management units, satellite telemetry data indicate that some mixing occurs between them (DFO 2013). DFO Resource Management has requested DFO Science to: 1) assess the degree of connectivity between the Eclipse Sound and Admiralty Inlet narwhal summer aggregations based on recent tagging data (2016–2018) and new published information; and, 2) if appropriate, recommend modifications (division or amalgamation) to the current definition of narwhal summer aggregation areas (i.e., management units) for Eclipse Sound and Admiralty Inlet.*

*This Science Advisory Report is from the February 11–15, 2019 Meeting on Eclipse Sound & Admiralty Inlet Narwhal - Sustainability of a Combined Management Unit. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.*

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## SUMMARY


- The management framework for the Baffin Bay narwhal population assumes seasonal site fidelity. It has been difficult to clearly resolve the delineation between these stocks using current information (e.g., genetics, chemical signatures).
- Previously published telemetry data from 2009–2011 showed movement of narwhals between summer management areas.
- Recent satellite telemetry data obtained in 2012, 2016–2018 provided further information on the movement of 30 narwhals tagged between July 31 and September 11 in Eclipse Sound.
- Three out of nineteen (16%) narwhals visited another summer management area during July 25–August 24 corresponding to the period of aerial surveys.
- Ten of the 30 tagged narwhals (33%) travelled to one or more management areas during the typical open water season.
- The current data do not warrant a change to the definition of management units. However, this new information, in addition to previous telemetry data and Inuit Qaujimajatuqangit, suggests that the allocation model used for the estimation of the Total Allowable Landed Catch for the Baffin Bay population should allow for mixing between the management units during the summer hunt.


## INTRODUCTION

The Baffin Bay narwhal population is the largest narwhal population in the world (> 140,000 narwhals; DFO 2015) and is genetically distinct from the two other populations (Northern Hudson Bay and East Greenland; DFO 2011). Narwhals from the Baffin Bay population overwinter in Baffin Bay and Davis Strait. They spend their summers in fiords and inlets of northeastern Canada and northwest Greenland. It has been assumed from previous telemetry data that narwhals tend to stay in their summering aggregations (DFO 2013).

The Integrated Fishery Management Plan (IFMP) for Narwhal in the Nunavut Settlement Area recognizes four recurring summer aggregations of Baffin Bay narwhals. There are two putative stocks in Jones Sound and Smith Sound; although their relationship to Baffin Bay narwhals is not yet clear. Each aggregation is considered a distinct stock for hunt management. For each stock, a corresponding management unit encompasses the areas traditionally surveyed to estimate abundance (Figure 1).

In 2013, DFO‘s High Arctic Cetacean Survey provided new abundance estimates and sustainable harvest advice for the Baffin Bay narwhal management units (DFO 2015). In 2013, the estimated abundance of the Eclipse Sound stock was approximately half that estimated in 2004 (i.e., 20,200 to 10,500; DFO 2013). Conversely, there was an increase in the abundance for the adjacent Admiralty Inlet stock from the 2010 estimate (i.e., 18,000 to 35,000; DFO 2012). In addition, telemetry data from 2009–2011 showed some evidence of mixing between aggregations (Watt et al. 2012). Traditional Inuit knowledge also suggests movement of narwhals between the Eclipse Sound and Admiralty Inlet management areas during the summer.

Here, the results of satellite telemetry studies conducted in Eclipse Sound from 2012–2018 are presented to provide more information on the movement of narwhals between the Eclipse Sound and Admiralty Inlet management areas. In addition, information on the composition of the

landed catch from the Eclipse Sound and Admiralty Inlet management units are presented to further understand the population structure of these two summer stocks.

## ASSESSMENT

A total of 30 narwhals were equipped with satellite transmitters in 2012, 2016–2018 in the Eclipse Sound summer management area (Marcoux and Watt 2020). Three (2 males, 1 female) out of nineteen (16%) narwhals visited another summer management area during the period aerial surveys are usually conducted (July 25–August 24), corresponding to 137 days out of 245 days tagged (56%; Figure 2).

Ten tagged narwhals (33%; five male and five female) visited another summer management area during the ice-free period (July 25–October 7; Figure 2), and were therefore available to hunters in other summer management areas. This corresponded to 229 days out of a total of 1309 days that narwhals were tagged (17%). Of these, eight narwhals visited the Admiralty Inlet summer management area, four narwhals visited the Somerset Island summer management area and one narwhal visited the East Baffin summer management area (Figure 2). In addition, three of these narwhals visited two different summer management areas (Admiralty Inlet and Somerset Island; Figure 2).

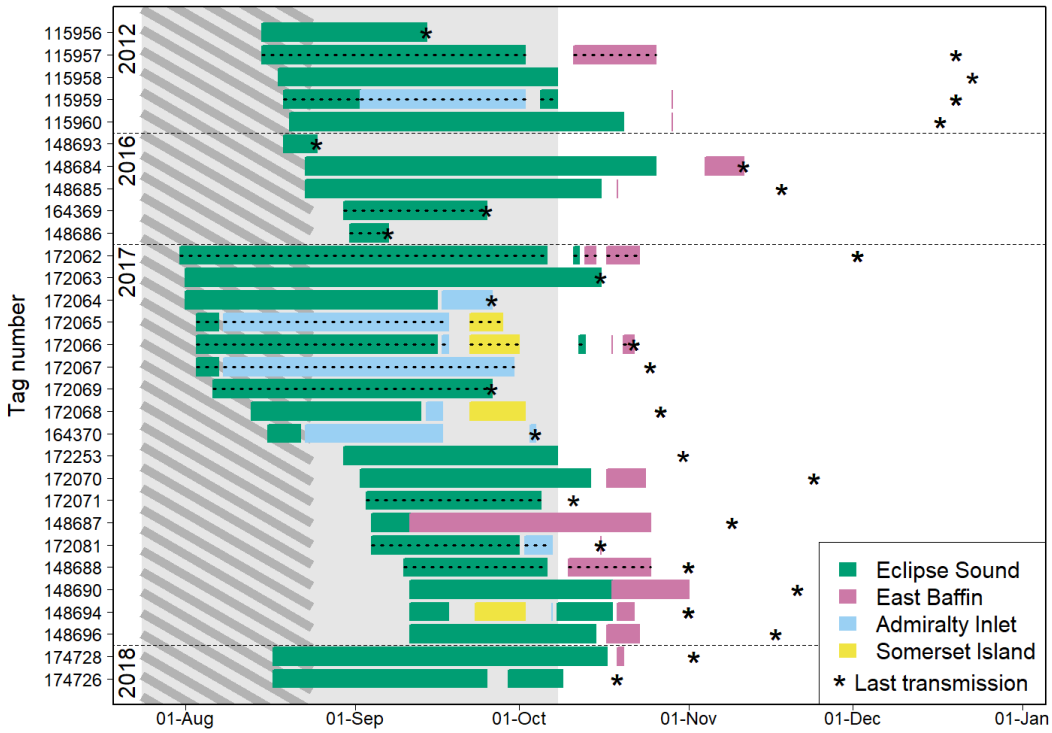


*Figure 2. Management areas visited by narwhals tagged in Eclipse Sound in 2012, 2016–2018. Males are represented by a dotted horizontal line. Gray area represents summer period (July 24–October 7) and shaded area represents recommended period for aerial survey (July 24–August 24).*

Harvest statistics from Pond Inlet (Eclipse Sound) and Arctic Bay (Admiralty Inlet) from 2012–2016 showed that Arctic Bay reported a higher proportion of males than females compared to Pond Inlet (Marcoux and Watt 2020). Tusk length measurements of hunted males from Arctic Bay were significantly larger than tusks harvested in Pond Inlet. Assuming that tusk length provides an index of age, these data suggest that hunted males in the Eclipse Sound

management area are younger than those in Admiralty Inlet. However, because of the difficulties associated interpreting these data, this information cannot be use to evaluate the current stock definition.

### Sources of Uncertainty

The uncertainty related to individual and inter-annual variability, as well as small sample size could not be determined. In addition, 43% (13 out of 30) of the narwhals were tagged after August 24, providing no information about their movement during the period aerial surveys are usually conducted.

The satellite tags used in this study transmitted for less than 100 days. Therefore, this new data does not provide information on the inter-annual site-fidelity of narwhal. Development of new tagging techniques and improvement of current tags and attachment methods are required to answer this question. In addition, tagging in other summer management areas is required to investigate movement of narwhals among management areas.

Interpretation of harvest data can be challenging due to hunter biases and other factors, such as which animals are available to be harvested. Additional information is needed to evaluate the suitability of these data to be used to assess stock composition.

The drivers of narwhal movements are still not well understood but are probably influenced by a combination of different factors. Narwhals in Eclipse Sound may be displaced by an increased level of vessel traffic from mining and cruise ships, ice breaking, and anthropogenic development. In addition, killer whales (*Orcinus orcas*) have been observed in the area every summer during the time frame of this study (2016–2018). These factors could affect narwhals' level of site fidelity.

## CONCLUSIONS AND ADVICE

The current allocation model used for the estimation of the Total Allowable Landed Catch (TALC) for the Baffin Bay population in Canada assumes that the summering stocks are discrete and do not mix. The current data do not warrant a change to the definition of management units. However, this new information, in addition to previous telemetry data and Inuit Qaujimajatuqangit suggests that the allocation model used for the estimation of the TALC for the Baffin Bay population should allow for mixing between the management units during the summer hunt.

## OTHER CONSIDERATIONS

Other sources of data, such as Inuit Qaujimajatuqangit, on seasonal movement patterns, harvest selection, sex and age composition of the summer aggregations, and environmental factors in the different management areas could help to delineate stocks.

There are additional data from previous tagging studies that can inform stock delineation. Nineteen (19) narwhals were tagged in 2009–2011 (Watt et al. 2012). One transmitter attached to a female narwhal in Eclipse Sound lasted long enough to investigate inter-annual site-fidelity. After overwintering in Davis Strait, this female travelled to Admiralty Inlet where she stayed for at least two months until the tag stopped transmitting.

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## SOURCES OF INFORMATION

This Science Advisory Report is from the February 11–15, 2019 Meeting on Eclipse Sound & Admiralty Inlet Narwhal - Sustainability of a Combined Management Unit. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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