

The Harvest Allocation Model

Introduction

Proposed revisions to the current narwhal management regime would separate the Baffin Bay population into four distinct Management Units, based on observed summering aggregations and satellite telemetry. Each Management Unit (Somerset Island, Admiralty Inlet, Eclipse Sound, and East Baffin Island) supports a different stock of the Baffin Bay population. This understanding is also supported by information from Inuit in some communities who report that there are physical and behavioral differential among narwhal in their area.

For each of the four Baffin Bay narwhal stocks, the most recent abundance estimate has been used to recommend a sustainable harvest recommendation, presented as Total Allowable Landed Catch¹ (TALC) (DFO 2008, 2011). The TALC for each Management Unit applies throughout the year, i.e., for narwhal on their summer and winter ranges and during seasonal migrations. When Total Allowable Harvest (TAH) and Basic Needs Level (BNL) are established for each of the Baffin Bay stocks, the Basic Needs Level (BNL) will be sub-allocated by the Regional Wildlife Organization (RWO) among the affected communities.

Communities within the Admiralty Inlet, Eclipse Sound and East Baffin Island Management Units harvest narwhal from their respective stocks during the summer aggregation period. In spring and fall, these communities harvest narwhal from a mixture of Baffin Island stocks that are migrating to/from their overwintering areas. Because of the mixed stock harvesting that occurs during the spring and fall migratory periods, DFO has developed a Harvest Allocation Model (“Model”) (Richard 2011/056), to assist the RWOs in deciding how to sub-allocate the BNL for the four narwhal stocks to ensure that the total catch from each Baffin Bay stock does not exceed the stock’s sustainable harvest limit.²

The Model was developed using the information available about the seasonal distribution of Baffin Bay narwhal. The Model has two parts, an Allocation step and a

¹ Total Allowable Harvest (TAH) is the term used under the Nunavut Land Claims Agreement for the amount of a wildlife stock or population that can be lawfully harvested (i.e., the harvest limit). The term used in recent DFO science advice on narwhal hunt limits is Total Allowable Landed Catch (TALC), emphasizing that the limit is set on the landed catch from a stock, after discounting for hunting loss rates.

² The Model cannot be used to allocate narwhal catches within Parry Channel-Jones Sound-Smith Sound as there is insufficient information about these narwhal. Similarly, the Model cannot be used to sub-allocate narwhal catches within the Northern Hudson Bay narwhal population, because it is managed separately.

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Risk Analysis step. Both steps need to be used together, to explore the impact of different sub-allocation scenarios, before decisions are finalized for the upcoming harvest year.

Information Used by the Model

The Model uses Inuit and scientific knowledge of Baffin Bay narwhal to evaluate sub-allocation scenarios. It requires the following input decisions:

1. the landed catch that will be allocated for the upcoming harvest season to communities at the western and eastern extremes of the summering distribution of Baffin Bay narwhal.
 - a. The Western Catch is the sum of catches that will be allocated by the RWOs to communities that harvest from the Somerset Island Management Unit for the upcoming harvest season (Fig. 1a).
 - b. The Eastern Catch is the sum of catches that will be allocated by the RWO to Pangnirtung and Iqaluit for the upcoming harvest season (Fig. 1b).

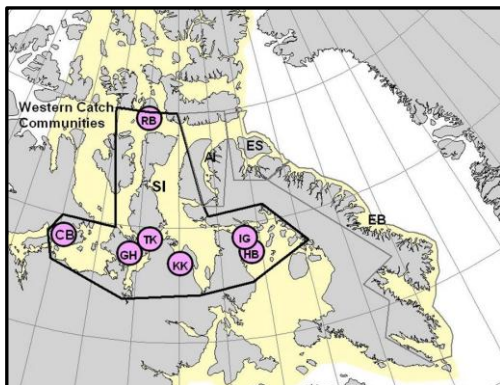


Fig. 1 (a) The Western Catch is the sum of the Community Harvest Limits allocated by the RWOs to communities that harvest from the Somerset Island Management Unit. (RB: Resolute Bay, TK: Taloyoak, CB: Kugluktuk, GH: Gjoa Haven, KK: Kugaaruk, IG: Igloodik, and HB: Hall Beach).

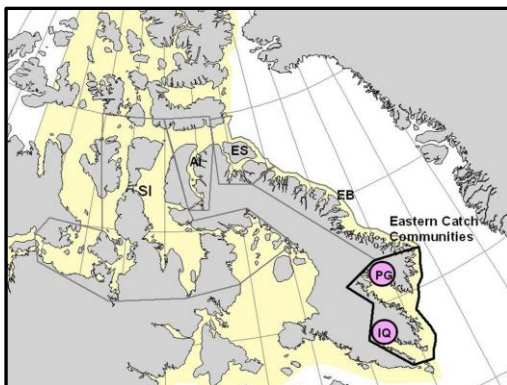


Fig. 1 (b) The Eastern Catch is the sum of the Community Harvest Limits allocated by the RWO to the two southern communities in the East Baffin Island Management Unit. (PG: Pangnirtung, IQ: Iqaluit).

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- The proportion (%) of the total catch that will be assigned to the summer (open-water) hunting season in Arctic Bay, Pond Inlet, Clyde River and Qikiqtarjuaq (Fig. 2). These communities harvest migrating narwhal from other Baffin Bay narwhal stocks during spring and fall. The start and end dates for the summer (open water) hunting season should be fixed by each HTO in advance of the upcoming harvest year, based on their local knowledge and experience of spring/fall weather and ice conditions.

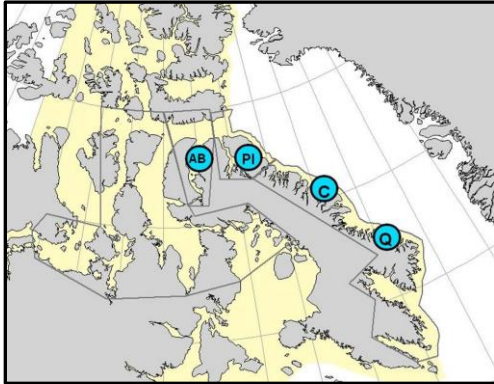


Fig. 2. Communities that harvest narwhal on their summer ranges, as well as migrating narwhal from other Baffin Bay narwhal stocks during spring and fall. (AB: Arctic Bay, PI: Pond Inlet, C: Clyde River, and Q: Qikiqtarjuaq).

Summer and Non-Summer (Migratory) Narwhal Harvests

Spring and fall catches in Arctic Bay and Pond Inlet are from a Western Stock Mixture (Fig 3a), composed of migrating narwhal from the Somerset Island, Admiralty Inlet and Eclipse Sound stocks. Spring and fall catches in Clyde River and Qikiqtarjuaq are from an Eastern Stock Mixture (Fig 3b), composed of migrating narwhal from the Admiralty Inlet, Eclipse Sound, and East Baffin Island stocks

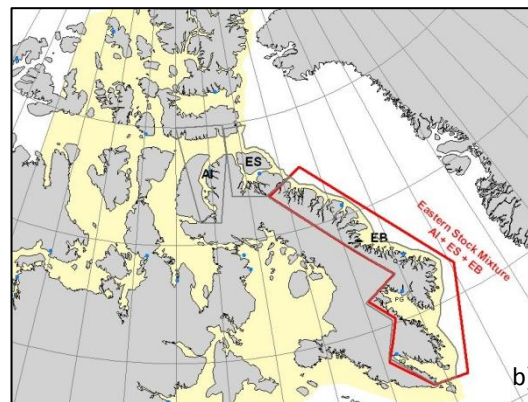
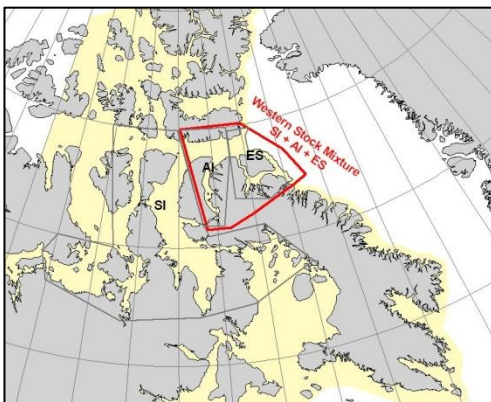


Fig 3 Migratory mixtures of narwhal available to hunters in spring and fall:
(a) Western Stock Mixture (Somerset Island + Admiralty Inlet + Eclipse Sound),
(b) Eastern Stock Mixture (Admiralty Inlet + Eclipse Sound + East Baffin Island).

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The four communities do not need to adopt the same cut-off dates for their local summer and migratory hunting seasons. The HTOs should choose cut-off dates for their summer hunting season that best define when narwhal are harvested from the local summering stock.

For the Model to be correct, Arctic Bay and Pond Inlet should use the same cutoff dates between summer and non-summer seasons, because they are assumed to have access to migrating narwhal from other stocks at approximately the same times. Clyde River and Qikiqtarjuaq can use different cut-off dates for summer and non-summer than those chosen by Arctic Bay and Pond Inlet. In doing so, they can decide either to adopt the same cut-off dates as each other, or adopt different dates that are consistent with the known lag in narwhal migratory movements between them.

For a given harvest year, in-season changes to the agreed summer and migratory Community Harvest Limits for these four communities are not advised. The Model calculates annual sub-allocations using specific seasonal proportions. It would be difficult to evaluate the consequences to TALC of proposed in-season changes, and ensure that harvests for all of the Baffin Bay stocks remain within sustainable limits. Instead, it is recommended that communities follow agreed summer and migratory Community Harvest Limits for the year and consider changes, if desired, for subsequent years after a post-season review and assessment.

Information Provided by the Model

The Model's first part (Allocation step) uses set values for each of the Western and Eastern annual catches, and the summer (open water) proportion of the annual catch that will apply in Arctic Bay, Pond Inlet, Clyde River and Qikiqtarjuaq. The Model determines a summer (open-water) catch limit for each of these four communities. It provides the maximum possible summer catch for each community, without exceeding the sustainable harvest recommendation for any of the four Baffin Bay narwhal stocks

During spring/fall migrations, Somerset Island narwhal are available to hunters in other Management Units (Admiralty Inlet, Eclipse Sound and East Baffin Island). The Model assumes that the ratio of stocks available to communities in the spring and fall harvests is proportional to stock size; and Somerset Island contributes the most narwhal to non-summer community catches. Before accepting the Model's Allocation solution, it is necessary to assess the risk that the ratio of MUs represented in spring/fall harvests is not proportional to stock size

The Model's second part (Risk Analysis step) evaluates the risk of over-harvest in each of the four Baffin Bay narwhal Management Units, if migrating narwhal are not available to hunters in mixtures that are proportional to the size of their stock of origin. It allows co-

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managers to examine how additional small reductions to the catch limits determined in step one, can reduce the risk of exceeding the TALC for any one stock.

The Model works as a 2-step process. Each time changes are made to the values in the Allocation step, the corresponding Risk Analysis step has to be run again.

The Model can be updated as new information becomes available, which has undergone scientific peer-review and is agreed with co-management partners.

Literature Cited

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