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Quebec Region

Canadian Science Advisory Secretariat
Science Advisory Report 2020/031

2020 HARVEST ADVICE FOR EASTERN HUDSON BAY BELUGA (*DELPHINAPTERUS LEUCAS*)

Beluga Whales (Delphinapterus leucas). Photo by V. Lesage (DFO)

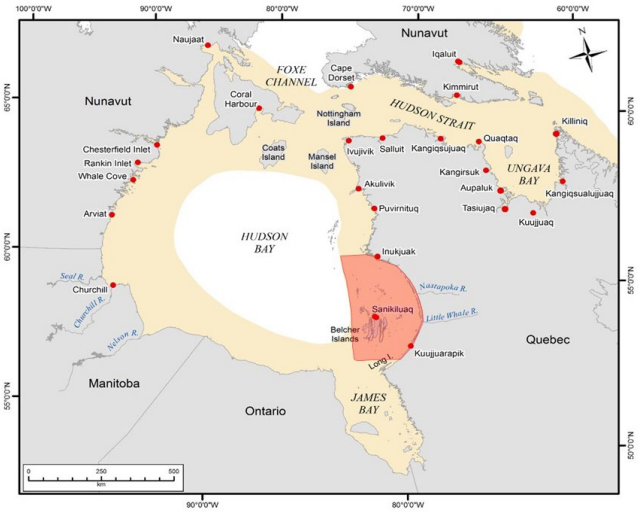

Figure 1. General beluga distribution in Hudson Bay and Hudson Strait (beige) and summer range of the Eastern Hudson Bay population (red). Nunavut and Nunavik (Quebec) communities and place names mentioned in the text are shown.

Context

Inuit subsistence harvests of beluga occur along the eastern, western and northern coasts of Hudson Bay, around the Belcher Islands, along Hudson Strait and some eastern Hudson Bay communities.

Harvesting in Nunavik has been regulated through a combination of area closures, and seasonal and regional total allowable takes (TAT). A 3-year management plan developed by the Nunavik Marine Region Wildlife Board expired in January 31, 2020. In the last year of the plan, the harvest exceeded the total allowable take (TAT) by about 30 animals.

DFO resource managers have requested Science to review the current state of the Eastern Hudson Bay (EHB) beluga stock, evaluate the impacts of recent TAT over-runs on EHB beluga, and provide sustainable harvest advice for the next three year management plan cycle.

SUMMARY

- Genetic analyses have shown that the proportion of Eastern Hudson Bay (EHB) beluga in the harvest of hunters from Nunavik and the Nunavut community of Sanikiluaq varies spatially and seasonally.
- This advice is based on abundance estimates from the last survey (2015) as well as recent harvest (until 2019) and updated genetics (until 2018) information.

- For most areas the proportion of eastern Hudson Bay belugas in the harvest has changed little, except for the northeast HB harvest area where an increase from 30 to 45% was noted in the fall harvest.
- The annual Total Allowable Take (TAT) in the 2017-2020 management plan was 68 animals. A total of 70, 74, and 98 EHB beluga were estimated to have been harvested by communities in Nunavik and Sanikiluaq in 2017, 2018 and 2019 respectively.
- The 2019 estimated abundance from a population model is 3300 (95% CI: 1900 – 5200) belugas (rounded to the nearest 100). This is similar, but slightly lower than the estimated abundance in 2016 of 3400 (95% CI: 2300 – 5400) from the last review.
- After correcting for the estimated struck and loss and non-reported harvests, an annual reported harvest of 58 EHB belugas will have a 50% probability of the population being above 3400 after five years.
- The Potential Biological Removal (PBR) for the stock is 14 animals assuming a recovery factor of 0.25.

BACKGROUND

Beluga are distributed around Hudson Bay, in James Bay and Ungava Bay. Discontinuity in their summer distribution, genetics and other evidence has been used to distinguish among summering stocks for management purposes to avoid local depletion and maintain genetic diversity. At least four summer stocks of beluga that have different migratory patterns (Western Hudson Bay [WHB], Eastern Hudson Bay [EHB], James Bay and Ungava Bay stocks) have been identified in this region. The EHB stock occupies an area bounded in the east by the eastern Hudson Bay arc, extending to the west of the Belcher Islands (Figure 1). In 2004, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommended that the EHB stock be listed as Endangered. Its status is currently being re-assessed. The EHB and the WHB stocks overwinter in Hudson Strait and the Labrador Sea, and migrate together through Hudson Strait into Hudson Bay for the summer. Belugas are harvested by Inuit in all the Nunavik Marine Region and from the community of Sanikiluaq (Nunavut).

A tissue sampling program in Nunavik has been in place since the mid-1990s. Hunters from all Nunavik communities provide a tooth, skin samples and information on where animals were harvested. This material is used to estimate the proportions of animals from each stock that are taken in the subsistence harvest. A similar program operates in Sanikiluaq (Nunavut).

ASSESSMENT

Genetic mixture analysis

A genetic mixture analysis was carried out to estimate the proportion of individuals in the harvest belonging to one of two source stocks, defined as EHB or WHB stocks. The analysis focused on tissue samples collected in Nunavik as well as Sanikiluaq (Nunavut), between 1982 and 2019 in order to determine the proportion of EHB beluga in the harvest.

Areas of mixed hunts in Nunavik coastal waters along the common EHB and WHB seasonal migratory corridor were identified and include northeastern Hudson Bay (NEHB), southern Hudson Strait (HS), Ungava Bay (UNG) and the Sanikiluaq (SAN) area which encompasses hunting zones located around the Belcher Islands (Nunavut, Figure 1). For NEHB, HS and UNG, samples were divided into two hunting seasons: a “spring” hunt from February 1 to August 31, and a “fall” hunt from September 1 to January 31.

In Nunavik, samples from the spring harvest indicate that 6% and 11.7% of the whales harvested respectively in the Ungava Bay and the Hudson Strait hunting areas belong to the EHB stock.

In the fall harvest, the estimated proportion of EHB beluga in the Hudson Strait and northeast Hudson Bay areas are 29.1% and 44.5% respectively.

For Sanikiluaq only, 84% of the reported harvest is assumed to occur during a period in the spring ("Extended Spring") (i.e., April 1 to July 14). In this area, EHB beluga represent 4.6% of the harvest. This proportion increases to 25.6% in summer. No EHB animals have been reported from the fall harvest in Sanikiluaq.

The Harvest

Harvesting of beluga is limited by regional and temporal closures and a TAT in Nunavik, and by a seasonal closure in Sanikiluaq (Nunavut). Total harvests in these two areas combined were 323, 422, and 380 animals including 70, 74 and 98 EHB belugas in 2017, 2018, and 2019 respectively. Reported harvests for Sanikiluaq in 2019 were not available. This analysis uses the average of the 2017 and 2018 reported harvest in its place (Table 1). For this three year period, EHB beluga comprise an estimated 22% of the total reported harvest from Nunavik and Sanikiluaq. This increases slightly to 24% of the harvest if Sanikiluaq removals are excluded.

Table 1. Reported harvests (2017-2019) from Nunavik communities and from Sanikiluaq (Nunavut). For Sanikiluaq the average of the 2017 and 2018 harvests was used for 2019. The genetic information was used to convert the total number of animals harvested into number of EHB belugas. The estimated number of EHB belugas harvested in Sanikiluaq (brackets) are included in Total EHB.

YEAR	NUNAVIK	SANIKILUAQ (NUNAVUT)	TOTAL	TOTAL EHB
2017	293	30	323	70 (1)
2018	372	50	422	74 (2)
2019	340	40	380	98 (2)

Abundance estimate

The EHB area was last surveyed in 2015, producing an abundance estimate of 3800 animals (rounded to the nearest 100) (Table 2).

Table 2. Abundance estimates from seven aerial surveys of the EHB region. Indices have been corrected for availability bias.

Year	EHB estimate (95% CI)
1985	4282 (3322 – 5520)
1993	2729 (1282 – 5808)
2001	2924 (1197 – 7140)
2004	4274 (2115 – 8620)
2008	2646 (1102 – 6353)
2011	3351 (1350 – 8319)
2015	3819 (1704 – 8561)

Modeling abundance of beluga in Hudson Bay and impact of harvests

A population model incorporating updated information on harvest statistics (1974-2019) and stock composition of the harvest from the genetics information (1985-2018) was fitted to EHB aerial survey estimates of abundance (1985-2015). The model indicates that the population declined from 1974, reaching a minimum of 3100 in 2001 (rounded to the nearest 100), increased to a maximum of approximately 3400 animals in 2014 and has remained relatively stable since then with an estimated 2019 population of 3300 (95% CI: 1900 – 5200) (Figure 2).

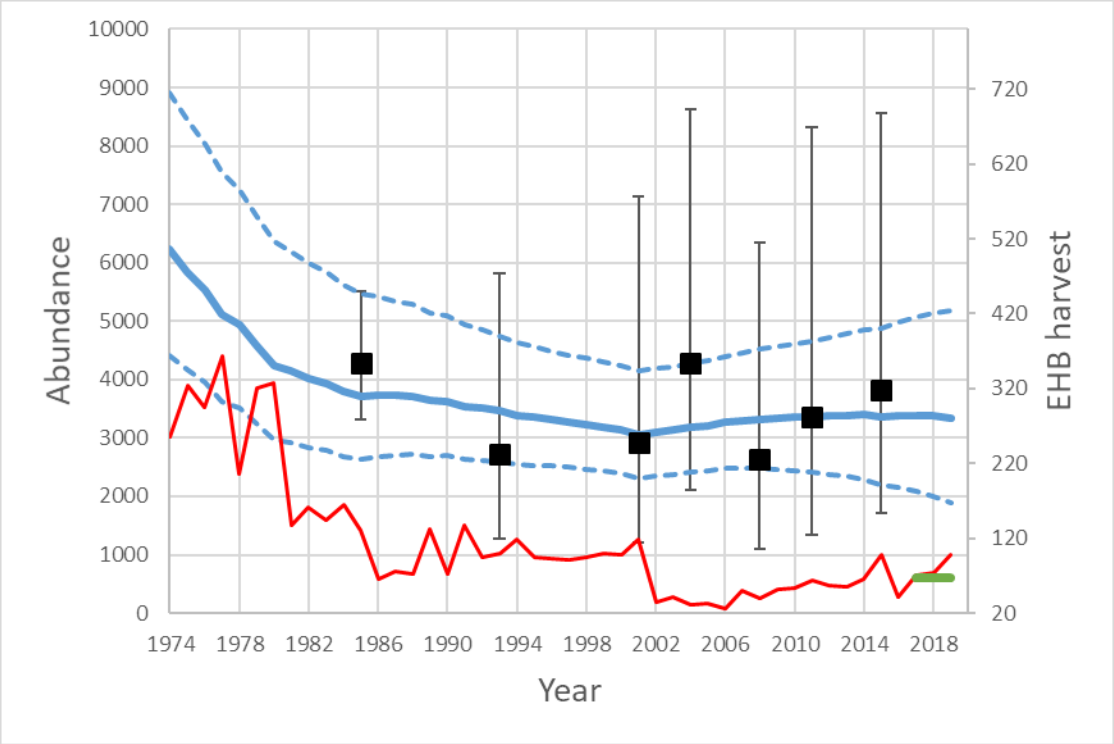

Figure 2. Model estimates of stock abundance for Eastern Hudson Bay beluga (EHB) (solid blue line ±95% CI), aerial survey estimates (black squares ±95% CI), estimated harvests of EHB beluga (red line) and Total Allowable Take (TAT) of 68 (green line) under the 2017-2019 management plan.

Harvest advice

The current approach to managing EHB beluga, is to identify catch levels that do not exceed a 50% probability of a population decline. The population model estimated a 2019 abundance of 3300 (95% CI: 1900 – 5200) belugas (rounded to the nearest 100), which is similar, but slightly lower than the estimated 3400 (95% CI: 2300 – 5400) animals from the last assessment and the population at the start of the last management plan. An annual landed harvest of 58 EHB belugas is estimated to have a 50% probability of a population being above 3400 animals after 5 years (Figure 3). These estimates for landed harvests account for whales struck and loss.

The Potential Biological Removal (PBR) was estimated. The Nmin from the model is 3108, with a CV of 0.25. Using an F_R of 0.25 the PBR is 14 animals.

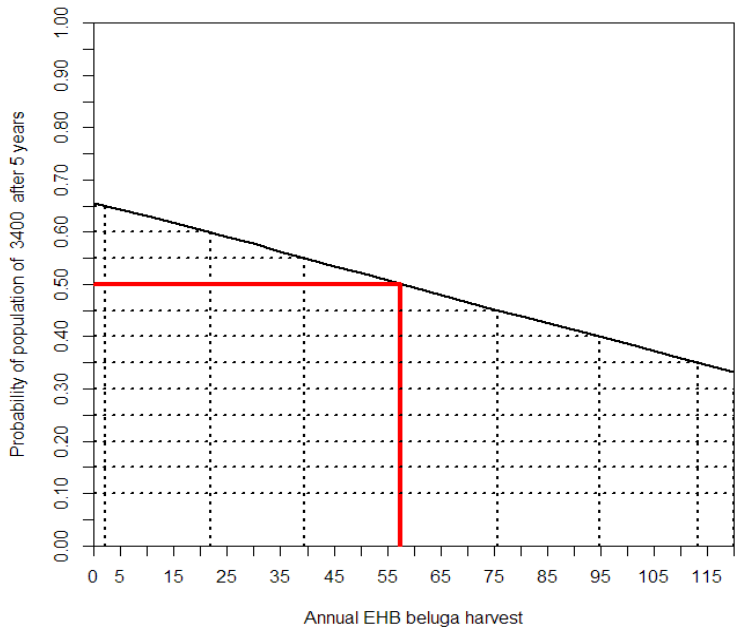

Figure 3. Probability of an estimated EHB beluga population of 3400 animals after 5 years (y-axis) for different levels of landed harvest (x-axis). The red line identifies a 0.5 probability of having a population of 3400 belugas after 5 years with a harvest of 58 animals.

Sources of Uncertainty

The stock designations for the management of beluga in the Hudson/James/Ungava Bay complex are based on the summer distributions of animals. The EHB stock has been characterized genetically by the mitochondrial haplotype frequency of samples obtained from hunters primarily near the Little Whale and Nastapoka rivers. It is assumed that animals seen during the summer surveys of the offshore EHB areas have the same genetic composition as animals sampled from animals harvested near the coast (Figure 1). If the genetic composition of animals seen in these offshore areas is not the same, then we may be underestimating the impact of the harvest on the EHB stock.

There is limited data on vital rates and age structure of beluga populations, which limits opportunities to model the dynamics of this stock.

Field observations of animals struck and killed, but not recovered, would help to reduce the uncertainty associated with this parameter.

CONCLUSIONS AND ADVICE

The current estimate of abundance of the EHB beluga stock is 3300 (95% CI = 1900 – 5200) animals. This is similar, but slightly lower than the estimated abundance of 3400 (95% CI: 2300 – 5400) from the last assessment in 2016 and the population size at the start of the last management plan. Annual harvests of 58 would have a 50% probability of the population returning to 3400 within 5 years.

OTHER CONSIDERATIONS

The current management approach does not allow for rebuilding of the stock or unusual mortality events. There is interest among hunters to replace the current system with one that involves more local and regional management of harvesting as allowed under the Land Claims

Agreement. At the same time, it is important to identify short, medium and long-term management objectives for this stock.

LIST OF MEETING PARTICIPANTS

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SOURCES OF INFORMATION

This Science Advisory Report is from the February 17-22, 2020 Evaluation of impacts of Total Allowable Take over-runs on Eastern Hudson Bay beluga. 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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