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Estimates of Total Allowable Removals for the eastern Canada/West Greenland population of Bowhead Whales

Estimation du total autorisé de prélèvements pour la population de baleines boréales de l'est du Canada /ouest du Groenland

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ABSTRACT

The total allowable human-induced removals of bowhead whales for eastern Canada/West Greenland, based on single shared Canada-Greenland stock was estimated using a Potential Biological Removal (PBR) approach. The results for two levels of recovery factor were examined for a range of population estimates. The estimated PBR for a fully-corrected estimate of abundance was 18 whales with a recovery factor of 0.1, and 90 whales with a recovery factor of 0.5. Until such time as the population estimates and accompanying correction factors have been refined through further scientific research, we recommend a precautionary approach be used (recovery factor of 0.1) to set removal levels for bowhead whales. Removals include all whales removed due to human induced causes which include ship collisions, entanglements, and all hunts.

RÉSUMÉ

Le total autorisé de prélèvements par l'homme de baleines boréales dans l'est du Canada / ouest du Groenland, fondé sur un seul stock partagé par le Canada et le Groenland, a été estimé au moyen de la méthode du taux de prélèvement biologique potentiel. Les résultats pour deux niveaux de facteurs de rétablissement ont été examinés avec un éventail d'estimations de la population. Le PPB approximatif pour une estimation de l'abondance entièrement corrigée était de 18 baleines avec un facteur de rétablissement de 0,1, et de 90 baleines avec un facteur de rétablissement de 0,5. D'ici à ce que l'estimation de la population et les facteurs de correction connexes aient été perfectionnés grâce à d'autres recherches, nous recommandons l'adoption de l'approche de précaution (facteur de rétablissement de 0,1) pour l'établissement des objectifs de prélèvement des baleines boréales. Les prélèvements comprennent tous ceux qui sont induits par l'homme, notamment les collisions avec les navires, les emmêlements et les captures dans le cadre de la chasse.

BACKGROUND

Bowhead in the eastern Canadian Arctic, have long been presumed to belong to two populations. At the International Whaling Commission (IWC) meetings in June 2007, the scientific sub-committee for bowhead whales concluded that a single shared Canada-Greenland population of bowhead whales in the eastern Arctic should be recognized as the working hypothesis. IWC subsequently granted a preliminary quota of two strikes per year to its member nation Greenland. This was based on a local abundance estimate of 1,229 (90% CI 3,161-16,900) for the winter and spring aggregation of bowhead off West Greenland, acknowledging that only a fraction of the population would be available for harvest and that catch limits should be based on local abundance.

Bowhead Abundance

The estimate of bowhead whale abundance for the eastern Canadian Arctic, originally reported by Cosens *et al.* (2006), was re-examined and revised by Dueck *et al.* (2008). The reanalysis provided abundance estimates using both a single observer and double observer (mark-recapture) approach. A double-observer analysis, fully corrected for diving whales and missed animals, resulted in a mean estimate of 14,400 whales. This is larger than previously estimated by Cosens *et al.* (2006). However, this represents only a single estimate for the population, and the low number of sightings and wide confidence limits (95% CI 4,810-43,105) illustrate the large uncertainty in this estimate. Potential biases in the estimate in both directions suggest that caution should be used in interpreting the abundance estimate (Dueck *et al.* 2008).

Calculation of Total Allowable Removals

The total allowable human-induced removals of bowhead whales for eastern Canada/West Greenland, based on single shared Canada-Greenland stock was estimated using a Potential Biological Removal (PBR) approach. Table 1 provides the results of the PBR calculations as applied to the bowhead abundance estimates using a recovery factor (F_R) of 0.1 and 0.5. The recovery factor is designed to ensure recovery, given the status of the population. By definition, F_R is set at 0.1 for a critically low population status, 0.5 for a depleted status (<Maximum Net Productivity Level) and 1 for a healthy status (Wade and Angliss 1997). While the current abundance estimate for Eastern Arctic bowhead whales is larger than previously estimated, it only represents a single estimate and has large confidence limits. In addition, the recovery target for this population, which is based on historic population levels, is currently being reexamined on the basis of a more complete history of whaling catches. Therefore, we recommend use of a recovery factor of 0.1, due to the uncertainties. Until such time as the population estimates and accompanying correction factors have been confirmed and refined through further scientific research, we recommend a precautionary approach be used to set removal levels for bowhead whales. While PBR is inherently conservative, conservative application of PBR will ensure population sustainability and speedier recovery.

The estimated PBR for a fully-corrected estimate of abundance, using a recovery factor of 0.1, is 18 whales for this population. This includes all whales removed due to human induced causes (e.g. hunting, entanglements, ship collisions). A *Total Allowable Harvest* for this population of bowheads would include all whales harvested in the waters of West Greenland, Nunavut and Nunavik. For large whales, like bowheads, a hunting

loss is considered the same as a strike. Few data are available for losses due to other causes such as net entanglements and ship collisions. In Canadian waters, three whales have been reported entangled in non-commercial fishing nets between 2005 and 2007. The expansion of the offshore marine fishery to more northerly locations in Baffin Bay is also likely to increase the possibility of net entanglements. Marine traffic is increasing as a result of renewed oil and gas exploration and may result in increased ship collisions. Some level of safety to account for these losses is recommended.

Table 1. A summary of bowhead PBR calculations for survey estimates of the Eclipse Sound, Prince Regent Inlet and Gulf of Boothia area based on population survey estimates of Dueck *et al.* (2008) and for recovery factors of 0.5 and 0.1.

Abundance estimate method	Mean estimate	CV	95% CI	N_{min}	PBR (F_R = 0.5)	PBR (F_R = 0.1)
Single platform, uncorrected for diving and missed whales	902	0.34	455 - 1789	683	7	1
Single platform, corrected for diving	3744	0.464	1518 - 9231	2581	26	5
Double platform, uncorrected for diving; corrected for missed whales	3469	0.5174	1335 - 9012	2302	23	5
Double platform, corrected for diving and missed whales	**14400**	**0.6061**	**4810 - 43105**	**8991**	90	**18**

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