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This document does not contain the entire DFO Recovery Potential Assessment report for the beluga whale. It contains information about the Cumberland Sound population. For the complete report, go to the following website: http://www.dfo-mpo.gc.ca/CSAS/Csas/Construction/Pub/sar-as/en/2005.htm

RECOVERY ASSESSMENT REPORT ON THE CUMBERLAND SOUND BELUGA POPULATION (*Delphinapterus leucas*)

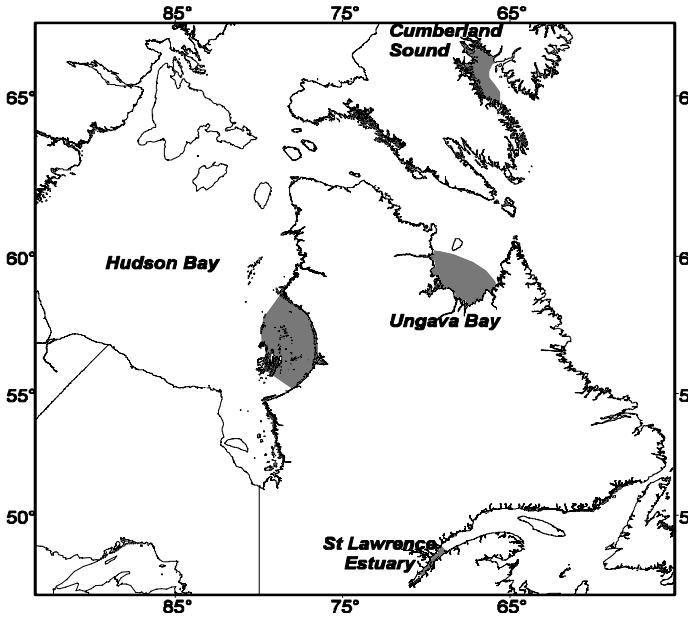

Figure 1. Summer distributions of Cumberland Sound, eastern Hudson Bay, Ungava Bay and St. Lawrence beluga populations.

Context

Beluga whales occur throughout the Canadian Arctic and in the St. Lawrence River estuary. Seven populations are recognized, of which the Cumberland Sound, Eastern Hudson Bay (EHB), Ungava Bay and St. Lawrence River Estuary (SLE) beluga populations are considered endangered or threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The Southeast Baffin

Island-Cumberland Sound population was designated Endangered in April 1990. In May 2004, the structure of the population was redefined and named “Cumberland Sound population”, and the Southeast Baffin Island animals were included as part of the Western Hudson Bay population. The status of the Cumberland Sound population was re-examined and designated as threatened in May 2004. The reason for designation is that numbers declined by about 1500 animals between the 1920s and the present. This decline is due to harvesting by the Hudson Bay Company until the 1940s and harvesting by the Inuit until 1979. Hunting has been regulated since 1979 and current quotas appear to be sustainable. Potential threats identified in COSEWIC Assessment Status Report include the increase of small vessel traffic, and the associated noise of outboard motors, as well as the fishery removals of Greenland halibut, a food of belugas.

SUMMARY

Cumberland Sound Beluga

- In Cumberland Sound, reconstruction of the historical population using the available catch information provides an estimated historical (pre-commercial whaling) population size of 8,465 (S.E. = 426). A Bayesian model estimated the 2002 population size to number 2,018 (95% C.L.: 1,553-2,623), or 24% of its estimated historical population size. The population is estimated to be on an increasing trend even with the quota- regulated local subsistence hunt.

- A recovery target at 70% of historical population size would correspond to 5,926 individuals. This target could be reached in 40, 55 and 90 years for harvest scenarios of 0, 20 and 41 (actual quota), respectively. The population would likely decline under a harvest scenario of 60.

- Subsistence hunting might be considered as a threat to the Cumberland Sound beluga population. Nevertheless, the actual carefully managed subsistence hunt, that inflicts a low mortality rate, does not seem to be an impediment to recovery over the long term.

DESCRIPTION OF THE ISSUE

Context for Interpreting Recovery under the Species at Risk Act (SARA)

The guidance on interpreting “recovery” in SARA, and as derived from the meaning of conserving biological diversity, taken from the Convention on Biological Diversity (1992), to which Canada is a signatory, clearly indicates that the intent of recovery should not be a population just marginally greater than criteria which would indicate

that the population is at risk of extinction. Rather the recovered population should be of a size that the ecosystem in which it occurs would have its normal structure and functions and the population would sustain human uses. These concepts are all consistent with an interpretation of the objectives of a recovery plan being a healthy population, and not one which is marginally not at risk of extinction.

Following that reasoning, and given the fact that no framework was available to determine minimum recovery targets (strictly based on biological and ecological grounds) and reasonable timeframes for recovery, the first part of the meeting included discussions on those aspects of recovery under SARA requirements. Those discussions permitted the development of interim descriptions of the biological properties of suitable recovery targets and recovery times that could be applied to the beluga populations until a formal framework is available. The following paragraphs only give the key aspects from those discussions that were used to conduct the recovery potential assessment for each beluga population (see DFO, 2005 for details).

Characteristics of a Recovered Beluga Population

The recovered state for a population might be a combination of many characteristics (fulfill historic role in the ecosystem, occupies some percent of historic range, subpopulation structure restored, etc.). Among them, a population that has reached some percent of its historic population size was considered a key criterion. For beluga populations, 70% of the historic (pre-commercial whaling) population size is considered to be consistent with patterns of natural variability for many species with life histories characteristics of cetaceans. This recovery target was used for the following assessments. It corresponds to the characteristics that the beluga populations were estimated, or thought to have had, when they were healthy. Well before those targets are reached the populations will be in conditions when they would no longer be at risk of extinction.

Recovery Times

The management measures necessary to achieve any recovery target (whether for a “healthy” population or some other) depend strongly on the time it will take to achieve the target. Unless a population is thought to be at imminent risk of extinction due to “small population” factors or severe threat, a biological basis for choosing one recovery time over another is hard to establish. However, the longer it takes for a population to recover, the longer it stays at risk, and the greater is the potential that some catastrophic event or change in conditions could jeopardize survival or recovery of the population.

Another consideration in selecting a recovery time as well as a recovery target is the ability to report with confidence that progress is being made towards recovery. Provision 46 of SARA requires that “the competent Minister must report on the implementation of the recovery strategy, and the progress towards meeting its

objectives, within five years after it is included in the public registry and in every subsequent five-year period, until its objectives have been achieved or the species' recovery is no longer feasible. The report must be included in the public registry". This, combined with the requirement (Section 24) that COSEWIC reassess each listed species at least every 10 years, give strong guidance that DFO is expected to be able to report on success or lack of success in achieving population recovery. This is a statistical issue, which depends on the precision of estimates of the population size as well as the rate of population growth.

The approach adopted at the meeting was to look at various options which assumed different levels of precision (CVs) in estimating population size and different potential growth rates of the populations. These options tables can inform decisions both about the value of investing in science to improve accountability on recovery, and on the consequences of giving human uses priority over population increases, when allocating surplus production from the population. The greater is the investment in population recovery and in monitoring, the sooner it will be possible to document that the population is actually recovering.

The results indicate that, if a beluga population was growing at 4% (maximum plausible population growth rate for beluga) and the CV of surveys was small (15%), we could detect beluga population growth with a power of 60% after 8 years of annual surveys with a statistical error probability (alpha) of 10% and after 10 years for an error of 5%. The number of years required increases (up to 21 for alpha =10% and 26 for alpha= 5%) if surveys are less frequent (3 year ≥ interval ≥ 5 year) and the survey CVs are large (35%). A growth rate of 2% would allow modest human-induced mortality but the number of years required to detect growth in the population increases.

Science can provide information on the level of survey effort needed to detect population growth under different harvest scenarios. However, it is a policy and strategic decision regarding the level of investment in science that can be done, and hence the minimum CV (and detection time) that can be expected. It is also a policy and strategic decision regarding the acceptable rate of recovery. Thus, the rest of this report will put emphasis on the recovery potential assessment of each beluga population of concern, i.e. their actual status compared to what is considered as their recovered state, and the time expected to reach this recovered state under various subsistence harvest scenarios.

Species Biology

Beluga whales have a circumpolar distribution. They are a medium-sized toothed whale with an average adult length of 280-370 cm and weigh an average of 360-810 kg, depending on the sex and population. Mating is thought to occur in March-April, with calving occurring mostly in mid-summer. The calves are born after a 14 month gestation and lactation lasts for roughly 18 months. The calving interval is one calf every 3 years. At birth, the calves have been described by different authors as being

brown or dark bluish in colour. As they mature, the skin becomes lighter in colour gradually turning to grey and then to white. Female belugas are sexually mature between 4 and 7 years of age assuming two growth layer groups (GLGs) in teeth per year. In the EHB population, 57% of the light grey animals may be sexually mature. Belugas have a lifespan of about 30 years, but maximum lifespan is difficult to determine owing to wearing of the teeth.

Belugas lack a dorsal fin, which is believed to be an adaptation to inhabiting ice covered waters. They are often associated with estuaries, which has led to the view that they are a shallow water species. However, aerial surveys and satellite telemetry indicate substantial movements offshore and diving to depths of over 600 m.

Belugas are generally separated into different populations based on the summer distribution of animals. Preliminary assessments show that Cumberland Sound belugas are different in their genetic composition when compared to all other Canadian stocks. Satellite-tracking also suggests that they remain in Cumberland sound year-round. Beluga that summer in Ungava Bay, along the eastern Hudson Bay coast, and the western Hudson Bay coast have been recognized as separate populations. Genetic analyses have supported the hypothesis that eastern and western Hudson Bay beluga belong to two separate stocks, while samples have yet to be obtained and analysed from beluga that summer in Ungava Bay and James Bay. Genetic analyses also indicate that St. Lawrence beluga form a separate population.

RECOVERY POTENTIAL ASSESSMENT

Cumberland Sound Beluga

In Cumberland Sound, beluga numbers were estimated to be in the low hundreds in the early 1980s, which lead to establishing a quota system to regulate harvests. Three aerial surveys flown in 1990 resulted in counts, not corrected for submerged animals of 454 to 497 belugas. Two surveys flown in 1999, resulted in counts of 720-777 animals. Correcting the 1999 estimate for submerged animals results in a total of 1,960 (SE=250) belugas in Cumberland Sound.

Bayesian estimation of parameters of a Pella-Tomlinson model of the Cumberland Sound beluga population dynamics resulted in a historical estimate of population size of 8,465 (SE=426) and an estimated 2002 population size of 2018 (SE=271). A complete closure of the harvest or a reduction in reported harvest levels to 20 would allow recovery (70% of historical population estimate) to be achieved in 2045 and 2060, respectively (Figure 2) while maintaining the harvest at the current quota of 41 would allow this target to be reached in 2095. The population would likely decline under a catch scenario of 60.

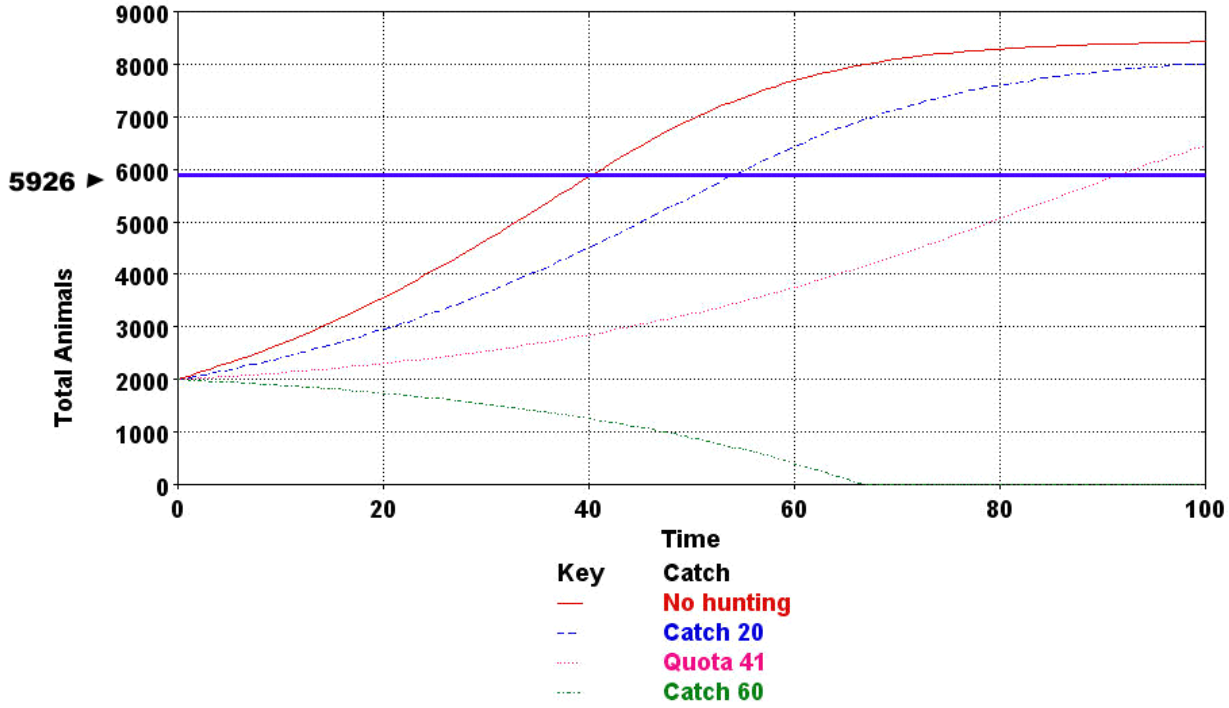

Figure 2: Time for Cumberland Sound beluga to recover to a population size of 5,926 (recovery target) under different reported harvest scenarios of 0, 20, 41 and 60 whales.

Subsistence hunt, if not managed properly, is considered as a demonstrated threat to the Cumberland Sound beluga population. Nevertheless, a subsistence hunt carefully managed can allow the population to reach its recovery goal (70% of historical population size) over the long term. Killer whale predation, contaminants, disease, ice and tidal entrapment, net entanglement and bycatch are also demonstrated threats although the immediacy and severity of each is still not fully understood. Other anthropogenic and environmental concerns have been identified as possible (speculative) threats to this population: climate change, competition for prey (e.g. turbot fishery), anthropogenic noise and disturbance, pollution and loss of habitat. Current conditions for recovery are considered as good but a lower harvest would allow a more rapid recovery.

Sources of uncertainty

Available data on exploitation and abundance of these stocks are neither unbiased nor sufficiently comprehensive to yield precise estimates. Owing to the combination of the small size, mobility and non-uniform distribution of animals and in the case of the northern Quebec beluga stocks, the large area that must be flown, estimates are very sensitive to the detection or failure to detect animals during the surveys. This may not be the case for Cumberland Sound belugas who are predictably more aggregated in Clearwater Fjord in summer. Estimates of the total population size are

very sensitive to the size and variability associated with the factor applied to correct aerial survey estimates for submerged animals. The maximum rate of increase is not known for beluga, but it is generally considered to be between 2-4% based on studies of other species of small whales. This lack of data on vital rates limits opportunities to model the dynamics of this population and contributes to the uncertainty of our predictions about future population trends. Information on the number of animals struck, but lost and not reported is also needed to reduce uncertainty associated with population status and trend.

CONCLUSIONS AND ADVICE

Cumberland Sound, Eastern Hudson Bay, Ungava Bay and St. Lawrence Beluga have all declined to current low levels as a result of over-harvesting. All initial declines were the result of commercial harvesting. Current harvest levels in Cumberland Sound are low enough to allow recovery.

Estimates of time to recover for the Cumberland Sound, Eastern Hudson Bay and Ungava Bay populations assume that harvesting is the only factor limiting recovery. Other factors (e.g. Allee effects), environmental variability (e.g. changes in food resources, natural predation, disease, etc.) could also be operating which would result in different recovery rates than forecast.

SOURCES OF INFORMATION

DFO, 2005. Proceedings of the meeting on recovery assessment under SARA for beluga populations identified as “At risk” by COSEWIC; April 5-7, 2005. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2005/011. Available at http://www.dfo-mpo.gc.ca/csas

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