Seasonal movements and migrations of belugas, *Delphinapterus leucas,* along the Nunavik coastlines: Evidence from harvest statistics, game reports, local knowledge and scientific studies.

by

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TABLE OF CONTENT

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

Abstract

There is direct genetic evidence that two dominant haplotypes of belugas, those of Eastern and Western Hudson Bay, occupy Nunavik waters during the fall and winter. The pattern of summer distribution suggests that as many as 6 possible stocks might exist in the Nunavik and adjacent areas (Ungava Bay, Eastern Hudson Bay, James Bay, Northern Ontario, Western Hudson Bay and North Hudson Bay). These come together in North Eastern Hudson Strait and Northern Ungava Bay during the winter. Belugas from this mixture of stocks are harvested during the spring and early summer on their westward migration and during their return to the east during the autumn. Genetic sampling and harvests during October in the South Western Hudson Strait area show a potential for overharvesting at least one Nunavik stock, that of Eastern Hudson Bay. Specific harvest sites such as Erik Cove, Digges Sound and Cape Smith appear to yield consistent high harvests at this time of the year. While reports from DFO community agents on harvests and sightings of belugas have greatly improved in the last 3 years, scientific studies using VHF tagged belugas and intensive genetic sampling of the October harvests are needed. The detailed information from such studies will allow the fine tuning of the management strategies to protect what appears to be a heavily exploited and possible overharvested Eastern Hudson Bay beluga stock.

Résumé

À ce jour, il y a des preuves génétiques qu'il existe deux haplotypes dominants de marsouins blancs, ceux de l'est de la Baie d'Hudson et de l'ouest de la Baie d'Hudson, qui occupent les eaux de Nunavik durant l'automne et l'hiver. Les mouvements et la distribution estivale suggère qu'il y a possiblement jusqu'à 6 populations qui existent sur le territoire de Nunavik et les régions environnantes (La Baie d'Ungava, l'est de la Baie d'Hudson, la Baie James, le nord de l'Ontario, l'ouest de la Baie d'Hudson et le nord de la Baie d'Hudson). Ces dernières se regroupent dans le nord-est du Détroit d'Hudson et au nord de la Baie d'Ungava durant l'hiver. Les marsouins blancs de ce regroupement de différentes populations sont récoltés durant le printemps et tôt à l'été, lors de leur migration vers l'ouest et, à l'automne, durant leur retour vers l'est. Les

résultats de l'échantillonnage génétique et les récoltes, durant le mois d'octobre dans la région du sud-ouest du Détroit d'Hudson, affichent un potentiel de surexploitation d'au moins une population, soit celle de l'est de la Baie d'Hudson. Des sites spécifiques pour la collecte tels qu'Erik Cove, Digges Sound et Cape Smith semblent produire, de façon régulière, des collectes élevées à ce temps de l'année. Quoique les rapports des agents communautaires du MPO sur les récoltes et les observations visuelles des marsouins blancs se sont beaucoup améliorés depuis les trois dernières années, des études scientifiques utilisant des marsouins blancs marqués avec des émetteurs radios et nombre d'échantillonnages génétiques des récoltes d'octobre sont requis. L'information détaillée, provenant de telles études, permettront de mettre à point les stratégies d'aménagement qui protégeront, ce qui nous semble, une population de marsouins blancs de l'est de la Baie d'Hudson sévèrement exploitée et possiblement surrécoltée.

Introduction

The Inuit of Nunavik harvest belugas, *Delphinapterus leucas*, from communities along the Ungava Bay, Hudson Strait and Eastern Hudson Bay coastlines. Behavioral, distributional and genetic evidence indicate that at least two, and potentially as many as 6 different beluga stocks, come together during the winter months, in Hudson Strait. During their spring and autumn movements these stocks pass by the coastal hunting communities where they are harvested by the Northern Quebec Inuit. Because of the severely reduced numbers of belugas in Ungava Bay (Smith and Hammill 1986, Kingsley and Doidge *in prep.*) this putative stock has been classified as endangered (Reeves and Mitchell 1989). The Eastern Hudson Bay stock which has been recently estimated to number about 2000 animals (Kingsley and Doidge *in prep.*) has also been classified as threatened and might be endangered by the current harvest levels.

A five year co-management agreement has been reached based on a consensual approach to annual community quotas, but it is felt that more precise information is needed on the level of harvests to which the different stocks are exposed. A combination of increased information on the genetic identity of the harvested animals and detailed information on migration from satellite tagged belugas from the various summer locations, should provide management with the necessary knowledge needed to formulate plans which would prevent overharvesting of any stock threatened by overexploitation (Smith 1997).

This report details the information available on seasonal harvests and sightings of belugas from recent field observations by scientists, community agents and published local knowledge. It also examines game harvests statistics available prior to the first co-management attempts to introduce quotas in 1986 and cites pertinent historical studies dealing with catch statistics and original population estimates. The objectives are to detail the timing of movements of belugas and to identify the location of the most important harvest areas. This will set the stage for future scientific efforts seeking to more precisely delimit the timing and pathways of beluga migrations in Nunavik.

Early Exploitation of Nunavik Stocks

Of interest in the historical accounts of catch history of belugas is the detailing of location of harvests and the depletion of major concentrations of belugas over a very short number of years (Finley *et al.* 1982). In Ungava Bay the Mucralic River estuary saw aggregations of up to 400 whales at a time, as late as the 1950's (George Koneak, Kuujjuaq,. to T. G. Smith *pers.com.* 1983). Reeves and Mitchell (1987a) document the removals of belugas from this area during the period from 1860 to 1920.

In Hudson Strait, where there was not the same intense commercial effort on belugas made by the Hudson Bay Company and other trading companies, the records of past catches are not as detailed. Nonetheless it is evident that areas such as Ivujivik, Sugluc (Salluit) and Wakeham Bay (Kangiqsujuaq) were all important beluga whale hunting sites. Nuvuk Point and Digges Sound apparently averaged 60 whales a year in the 1950's and 1960's (Evans 1958, Roy 1971) and in some years harvests could be as high as 300 from the Wolstenholme area (Reeves and Mitchell 1987). The peak catches were made in the late September through October in nets, but also quite frequently by driving large numbers of belugas into natural "traps" which were small coves in Digges Sound and on the coasts of islands. Further east, at Salluit, Evans (1958) estimated 50 belugas were taken each year and at Wakeham Bay the annual average was estimated as 80 in the 1950's.

In Eastern Hudson Bay the Great Whale River, Little Whale River and Nastapoka River were all major areas of beluga aggregation during the months of July and August. Both the Great Whale and Little Whale rivers were harvested by catching belugas behind barrier nets used to trap the whales in the rivers.

Over the period 1856 to 1868 a total of 5600 belugas were removed from the Great Whale River in about 10 major netting events. The largest single catch was of 1511 in 1860. The catches drop off drastically after this, and to this day the Great Whale River, situated beside the village of Kuujjuarapik, is infrequently visited by belugas.

The Little Whale River was exploited in a similar way during the period 1854-1868 with 3000+ belugas also caught in 10 netting events; the largest single catch being 743 belugas in 1859. Whales continue to frequent this estuary but now rarely more than 40 belugas are sighted there at one time (DFO Quebec, files, community agents' reports 1995-1997).

The Nastapoka River, which is now closed to hunting during the month of July, is still frequented by belugas and at present shows the largest concentration of belugas during the summer in Eastern Hudson Bay. In the early 1980's Caron and Smith(1990) saw up to 200+ belugas there at a time in July and August. Reports from community agents during July and August (1995-97) mention sightings of 40-60 animals at a time during the hunting season. This estuary was not amendable to being shut off completely by a barrier net and most of the early catches were made by harpooning (Reeves and Mitchell 1987b). This resulted in much lower yields than in the Great Whale and Little Whale rivers.

One other river, possibly the Nowliakpik River, near Inukjuak (Port Harrison), was frequented by belugas and used as a netting site by Inuit (Reeves and Mitchell 1987). Sometime in the 1950's or 1960's a large catch of whales was made there during a drive fishery. Approximately 60 whales were taken in one drive and few whales have been seen there since (Elie Weetaltuk, Inukjuak, to T.G. Smith *pers.com.* 1981).

While the estimation of original population size is fraught with uncertainties, it is evident that the numbers of belugas in Ungava Bay and Eastern Hudson Bay were much greater in the past than they are now (Table 1). What is most striking is that significant areas of summer abundance in river estuaries which were heavily netted or where drive fisheries were conducted, are no longer occupied by large numbers of belugas. Of particular note are the Mucralic River in Ungava Bay and the Great Whale River in Eastern Hudson Bay.

Annual Beluga Harvests

Statistics on total annual harvests of belugas in Nunavik are available from several sources in some detail since 1974 to the present (Table 2). Prior to that date some area economic studies (Evans 1958, Roy 1971) provided fairly accurate estimates of annual harvests from the specific communities in which the investigators worked.

I have examined the harvests from 1974 to 1985 separately from those from 1986 to the present, since it was in 1986 that a co-management approach was put into place, which established village quotas, closed seasons, and closed areas for beluga hunting.

Prior to co-management and establishment of catch limits the highest proportion of the annual catches came from the three villages of Kangiqsujuaq, Salluit and Ivujivik in Hudson Strait and Inukjuak in Eastern Hudson Bay (Table 3). After 1985 this changed to include Puvirnituq as the third most important catch. It should be noted that this community did not report catches until 1986. Akulivik, which prior to 1985 harvested only 0.014 of the total take increased its catch to 0.058. Both Puvirnituq and Akulivik might have increased their take of belugas by having acquired large fishing boats, which enabled them to travel north to the Ivujivik hunting area to hunt belugas in late autumn.

Harvest Trends

Only catch statistics prior to the establishment of quotas have been used to examine harvest trends. Not only did the management measures appear to fix catches to the quota level, they changed the location from which communities catch their whales. It is also apparent that in Ungava Bay and communities such as Ivujivik there is some incomplete reporting of the catch.

I have broken out the annual catch for all areas into different groupings in Table 4. In the Ungava Bay communities for the years 1974 to 1985 there is a clear trend toward reduced annual harvests (Figure 1,a). Most of the harvest taken during these years was during the summer months.

Hudson Strait also shows a marked trend toward reduction of catches for the period from 1974 to 1985. This is particularly evident after 1977 (Figure 1,b). Slight increases in the early 80's might be explained by the acquisition of several new fishing boats in the Hudson Strait villages.

In Eastern Hudson Bay a similar decrease in catch is seen during the same period (Figure 1,c). Because of the proximity of the concentration of belugas in the Nastapoka estuary to both Inukjuak and Kuujjuarapik, the trend is not as magnified, but catches from 1981 to 1985 are noticeably lower than earlier in the period.

Ungava Bay had obviously suffered a marked depletion of the beluga population summering in that area. Both the harvest trends and recent aerial surveys (Smith and Hammill. 1986, Kingsley and Doidge *in prep.*) show this very clearly. Since 1986, the total quota of 10 belugas for each Ungava village (5 in and 5 out of the area after August 31) shows no trend whatsoever (Table 4). Location data on the summer kills is poor except for 1996 and 1997, and is of insufficient quantity to identify recent trends in catches within Ungava Bay.

Interpreting trends in catches of belugas from the communities of Ivujivik, Akulivik and Puvirnituq is problematical because of lack of data for both Ivujivik and Puvirnituq prior to 1983 and 1985 respectively. The fact that most of the catches made by all 3 communities are taken from large boats operating in the late autumn in the same hunting area near Ivujivik adds to the confusion and incomplete reporting. Additionally it is evident that Ivujivik deliberately under-reports catches. An example is that the excessive high catch of 118 in 1989 was followed by no reporting in 1990 and years of low or no reports in 1992 and 1993. Recent reports from this village must be viewed with suspicion. In fact it is likely that Ivujivik has continued to harvest as many belugas as it can take in any year, probably averaging about 60 whales (Table 4 for years 1980 to 1988). This corresponds well to the annual harvest estimates given for Ivujivik by Evans (1958) and Roy (1971) for the 1950's and 1960's.

It is also interesting to note that Akulivik took very few belugas prior to about 1990 (Table 4). Increased access to the hunting area near Ivujivik by large boats seem to be the reason for their present higher catches.

Management appears to be functioning in Eastern Hudson Bay (Inukjuak and south) better than in other regions. The establishment of the village of Umiujaq near summer beluga concentrations in the Nastapoka and Richmond Gulf does not seem to have added unreasonably to the overall annual catches from this region. The total quota of 54 appears to be respected in most years.

Seasonal Distribution of the Harvest

Beluga are taken from Nunavik communities primarily between June and November (Appendix 1). A few are taken in some years in May mainly by Ungava Bay villages, but these are not a significant proportion of the annual harvest.

Ungava Bay harvests the majority of the belugas in July and August. Prior to the quotas and complete closure of the Mucralic (Unguniavik) area to hunting, a large part of the Ungava Bay harvest was taken there. Presently the regulations stipulate no hunting in August in Ungava Bay, and the Mucralic is completely protected. While the intention is to oblige Ungava residents to harvest outside Ungava Bay (i.e. at Quaqtaq in the fall) the majority of the annual harvest (55%) is taken in July and August and only 18% in October (Table 5). It is unclear from the inconsistent reporting on location of kills how many whales are actually taken within Ungava Bay during the summer closed period.

Hudson Strait communities catch significant numbers of belugas in the early and late part of the season. August and September are the low months indicating that beluga stocks have apparently passed through the area and are occupying their summer ranges. The break up pattern of ice in the spring appears to favor catches at Kangiqsujuaq and Salluit more than at Ivujivik, which appears to be occasionally blocked from access to the whales by near-shore ice at this time of year. Quaqtaq, at the east end of the Strait, also makes good catches in June. July catches at Quaqtaq,

Kangiqsujuaq and Salluit remain high, but drop off in August and September, as do those of Ivujivik. Catches increase significantly in all Hudson Strait communities in October with Ivujivik taking the largest proportion (44%) of the harvest (Table 5). This proportion might in fact be higher since the harvests from Purvirnituq and Akulivik appear to be largely taken in the Ivujivik area.

In Eastern Hudson Bay the majority of belugas (67%) are taken during July and August (Table 5). A large proportion of those animals are taken in the vicinity of the Nastapoka Estuary and the Richmond Gulf.

Weekly Sightings of Belugas from Community Agents' Reports

It is only since 1995 that sightings appear to have been included in more than a sporadic way as part of the community agents reports. These are based on informal interviews and radio communication with the hunters and are not corroborated in any way by other sources. The main problem in attempting to use these data is the apparent inconsistent effort from one community to the other in gathering this information. Communities such as Inukjuak and Umiujaq appear to report sightings consistently throughout the season as evidenced by strong correlation between harvests and sightings in the months when the harvests are most abundant Others such as Ivujivik, Akulivik and Purvirnituq are inconsistent or almost absent in reporting during the months of maximum harvests.

I have grouped several communities together to attempt to gain a general picture of beluga distribution from sightings (Table 6). In Ungava Bay occasional sightings of large pods of belugas are made as early as mid-June. Sightings increase throughout August and drop off in September and October. In November occasional large pods are again seen. The sighting data might be a more reliable indication of the seasonal distribution than the harvests reported for Ungava Bay villages, given that the management rules force the Ungava Inuit to hunt outside of Ungava Bay during the month of August. The large pods seen there in June and November probably reflect the presence of belugas from other stocks occupying the ice free waters during the winter.