

Small Whale Co-management in the Eastern Canadian Arctic: A Case History and Analysis

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ABSTRACT. This paper explores the problems and challenges of co-management of beluga and narwhal populations in the Eastern Arctic region of the Northwest Territories. The political and regulatory context of co-management has changed in the last 14 years. Regulations were amended in 1980 and 1990 to limit harvest and the conditions of harvest. The Nunavut Land Claim Settlement Agreement-in-Principle of 1990 created a new framework for wildlife management. The 1990 Supreme Court decision in the Sparrow case was a strong admonition for native involvement in management of their fisheries resources. Canada and Greenland formed a joint commission for conservation and management of shared stocks of narwhals and belugas. The history of Southeast Baffin beluga co-management, our case study, is one of informal and incomplete co-management, because hunters did not have full participation in the research pertaining to the evaluation of stock status, nor did they have the power to decide on the management of the stock. The decision of Fisheries and Oceans to severely limit beluga hunting created a crisis, which eventually led to the creation of a formal complete beluga co-management committee. We conclude that complete co-management, with full participation of Inuit hunters, is necessary for effective conservation and management of eastern Canadian small whales. Nevertheless, the vast area through which narwhal and beluga populations range, the large number of people and communities that would be involved in such a co-management process and the difficulty in determining stock status are important challenges to co-managers.

Key words: Southeast Baffin, Baffin Bay, High Arctic, Greenland, hunters, harvesting, conservation, protection, Nunavut, Sparrow

RÉSUMÉ. Dans cet article, nous discutons des problèmes et défis de la co-gestion des populations de bélugas et de narvals de la région est arctique des Territoires du Nord-Ouest. Le contexte politique et juridique de la co-gestion a changé durant les quatorze dernières années. Les règlements ont été amendé en 1980 et 1990 pour limiter le niveau ou les conditions de chasse. L'accord de principe de 1990 sur la revendication territoriale du Nunavut a créé un nouveau cadre pour la gestion de la faune. La décision de la Cour Suprême sur le cas Sparrow a été une forte exhortation en faveur de la participation des autochtones dans la gestion de leurs ressources halieutiques. L'historique de la co-gestion du béluga du sud-est de la Terre de Baffin, notre sujet d'étude, en est un de co-gestion informelle et incomplète, parce que les chasseurs n'avaient pas pleine participation dans les recherches visant à l'évaluation du statut de ce stock ou le pouvoir de prendre des décisions de gestion. La décision de Pêches et Océans de sévèrement limiter la chasse aux bélugas a créé une crise qui a éventuellement menée à la création d'un comité officiel de complète co-gestion du béluga. Nous concluons qu'un système de complète co-gestion est nécessaire pour la conservation et la gestion des petites baleines de l'est de l'Arctique canadien. Cependant, l'immensité de la répartition des bélugas et des narvals, le grand nombre de gens et de communautés impliqués dans un tel processus de co-gestion et la difficulté d'évaluer l'état des populations sont d'importants défis pour les co-gestionnaires.

Mot clés: sud-est de Baffin, baie de Baffin, haut Arctique, Groënland, chasseurs, récolte, conservation, protection, Nunavut, Sparrow

INTRODUCTION

Co-management agreements, described by Pinkerton (1989) as systems of shared decision making between resource users and governments, are often born in crises because they are creative ways of solving difficult management problems. Many co-management agreements are incomplete and unsuccessful because parties to the agreement do not share every management function. Such incomplete co-management systems are not necessarily static; some may be evolving toward more comprehensive co-management systems. Pinkerton (1989) found the comparison of successful and unsuccessful co-management systems useful in determining what conditions are needed to have successful agreements that engender a high degree of collaboration between resource users and government and ultimately yield appropriate, efficient and equitable management systems. In this paper, we present the context of small whale co-management in the Eastern Canadian Arctic, an area that includes the Keewatin and Baffin regions of the Northwest Territories (Fig. 1). Drawing from the experience in co-management of the Southeast Baffin beluga, we try to identify those conditions that favour co-management of Eastern Canadian Arctic small whales and those that do not.

Four putative stocks of belugas and two of narwhals are currently recognized for management purposes in the Canadian Eastern Arctic region. The population numbers given below are underestimates, because they are based on sample counts made

of surface or near-surface animals. There is presently no way of determining the exact population size of these stocks, but these numbers are useful as indices of relative population size. The Baffin Bay (or Canadian High Arctic) beluga stock, which summers in western Lancaster Sound, Barrow Strait, Prince Regent Inlet and Peel Sound and most probably winters in eastern Davis Strait (Smith *et al.*, 1985; McLaren and Davis, 1982; Finley and Renaud, 1980; Sergeant, 1979; Heide-Jørgensen, 1990), numbers at least 10 000 belugas. The Western Hudson Bay beluga stock, which summers along the west and south coasts of Hudson Bay and is thought to winter in the pack ice of Hudson Strait and southwest Davis Strait, numbers at least 23 000 belugas (Richard *et al.*, 1990). The Eastern Hudson Bay stock, summering along the east coast of Hudson Bay and James Bay, numbers at least 2000 belugas (Smith and Hammill, 1986; Reeves and Mitchell, 1987, 1989) and is also thought to winter in Hudson Strait and southwest Davis Strait. The Southeast (SE) Baffin beluga stock, which summers in Cumberland Sound, Frobisher Bay and along the south coast of Baffin Island and is thought to winter in the pack ice of southwest Davis Strait and eastern Hudson Strait, numbers at least 500 belugas (Richard and Orr, 1986; Richard *et al.*, 1990; Richard, 1991a). Belugas are seen in other areas in summer, such as northern Hudson Bay and Ungava Bay, but their stock identity is unclear (Richard *et al.*, 1990). The Ungava Bay belugas could be a remnant of the Ungava Bay stock, which has all but been extirpated (Smith and Hammill, 1986; Reeves and Mitchell, 1989).

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POLITICAL AND REGULATORY CONTEXT OF EASTERN ARCTIC REGION SMALL WHALE CO-MANAGEMENT

No discussion of co-management is possible without a description of the political and regulatory context in which it is evolving. Belugas and narwhals are considered "fish" under the Fisheries Act of 1867. Beluga and narwhal management in Canada is therefore a responsibility of the Department of Fisheries and Oceans (DFO). The department enacted the Beluga Protection Regulations under the Fisheries Act in 1949 and they were last amended in 1990. Narwhal Protection Regulations were enacted in 1971 and last amended in 1980. Both regulations provide for the protection of habitat, management of the species and control of the harvest. The Beluga Protection Regulations limit beluga hunting without a license to Inuit or Indian natives of Canada. Community quotas for narwhal catches were developed after consultation in the 1970s with narwhal hunting communities. The objective was to set a quota for each community that would ensure subsistence needs but control the expansion of narwhal hunting for commercial purposes. This was the DFO's earliest attempt to consult users on the management of Eastern Canadian Arctic small whales.

The Inuit Land Claim of the Eastern Arctic, negotiated between the Tungavik Federation of Nunavut and the Government of Canada, has a paramount importance in influencing the development of co-management of Eastern Canadian Arctic small whales. The Nunavut Land Claim covers the Eastern Arctic region and part of the Central Arctic region of the Northwest Territories and has been negotiated over the last two decades. An agreement-in-principle was signed in April 1990 (Anonymous, 1990); the final agreement was signed on January 1992 (Anonymous, 1992a) and is planned to be ratified in 1993. Under the agreement, local hunters and trappers organizations (HTOs), extant in every community as hunters and trappers associations (HTAs), will be officially responsible for day-to-day management and local allocation decisions, an official recognition of a system already in place. For example, HTAs presently control the distribution of narwhal tags to hunters. Regional wildlife organizations (RWOs), such as the Baffin Regional Hunters and Trappers Committee, consist of representatives from all local HTAs. The RWOs will make allocation decisions at the regional level, an example being the allocation of narwhal tags among communities.

The Nunavut Wildlife Management Board (NWMB) is a co-management organization defined under the terms of the land claim agreement. It is to consist of four representatives from the RWOs and four representatives from federal and territorial government departments. Among other responsibilities, the board will forward its decisions with regard to all matters related to wildlife harvesting in Nunavut to the appropriate federal and territorial ministers. Under the terms of the land claim agreement, the Minister of Fisheries and Oceans must accept and implement decisions of the NWMB, except when they conflict with the principles of conservation, the harvesting rights of others, the purpose and policies of parks, sanctuaries and conservation areas or with public health and safety. The Minister may also reject decisions that are not supported by or consistent with the evidence available to the NWMB. The Nunavut Wildlife Management Advisory Board (NWMAB), composed of Inuit and government members, was created in 1989 as an interim co-management board so that a working wildlife management system would be in place by the time of ratification of the

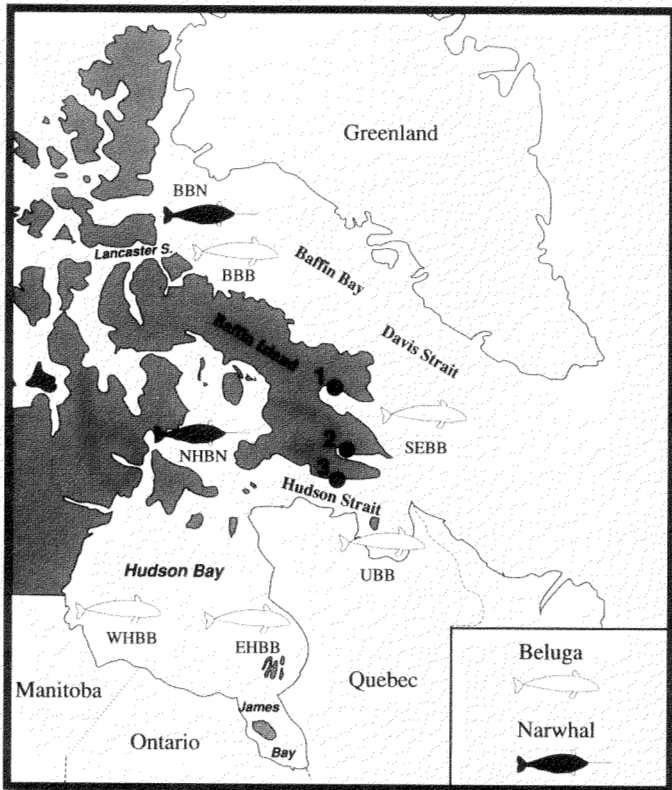


FIG. 1. Stocks of beluga and narwhal in the Eastern Arctic region of the Northwest Territories (shaded land area) and other stocks from adjacent areas referred to in text. (Note: figure shows their summer distribution.) Legend: BBN: Baffin Bay narwhal; BBB: Baffin Bay beluga; SEBB: SE Baffin beluga; UBB: Ungava Bay beluga; NHBN: Northern Hudson Bay narwhal; WHBB: Western Hudson Bay beluga; EHBB: Eastern Hudson Bay beluga; 1-Pangnirtung; 2-Iqaluit; 3-Lake Harbour.

The North Hudson Bay narwhal stock, which summers in the Repulse Bay and Frozen Strait areas of northwestern Hudson Bay and may winter in eastern Hudson Strait, is estimated to number at least 1300 narwhals (Richard, 1991b). The Baffin Bay (or Canadian High Arctic) narwhal stock, which summers in Eclipse Sound, Admiralty Inlet, Prince Regent Inlet, Peel Sound and Jones Sound (Mansfield *et al.*, 1975; Strong, 1988) and winters in Davis Strait south of Disko Island (McLaren and Davis, 1982; Heide-Jørgensen, 1990), is estimated to number at least 18 000 narwhals (Strong, 1988).

Inuit of the Canadian Eastern Arctic have hunted these belugas and narwhals for several hundreds of years and still rely heavily on them as a food, economic and cultural resource. The historical impact of subsistence hunting on these populations is unknown, but it is worth noting that some of the stocks of belugas that have been subjected to the combined effects of subsistence and commercial whaling have suffered large declines to the point of being classed "threatened" or "endangered." Hunting for local subsistence need alone is not known to have caused population declines. The stocks that have suffered obvious declines are the SE Baffin stock of the Northwest Territories and the Ungava and Eastern Hudson Bay stocks of northern Quebec, which were subjected to heavy commercial harvests (Kemper, 1980; Brodie *et al.*, 1981; Mitchell and Reeves, 1981; Richard *et al.*, 1990; Reeves and Mitchell, 1987, 1989).

Nunavut Land Claim Agreement and the formal creation of the NWMB. It had limited funding, enough to hold regular meetings but not enough to do community consultation and, as we found out later, to fully establish itself with the users as a credible organization.

In May 1990, a unanimous Supreme Court decision on an appeal on behalf of a British Columbia native fisherman named Ronald Sparrow against DFO substantially altered the relationship between Canadian native resource users and government administrations (Supreme Court of Canada, 1990). The decision implies that the constitutionally protected aboriginal right to fish resources cannot be limited by government unless such limitation is necessary for the conservation and protection of the resource and is thereby consistent with the protection of the aboriginal right. Proof that an aboriginal harvest of a fish resource threatens its conservation, and consequently the future right of aboriginals to harvest, is therefore necessary before that harvest can be restricted. The court did not specify which species of fish are subject to this decision, but it is being interpreted as any fish species traditionally fished by aboriginals and, given the Fisheries Act's definition of "fish," this includes marine mammals. The Supreme Court sent a clear message that a trust-like, non-adversarial relationship must exist between the government and aboriginal people in dealing with fish resource issues. This decision constitutes a strong admonition for native participation in the management of their fish resources.

The fact that the Baffin Bay beluga and narwhal populations are exploited both by Eastern Canadian Arctic Inuit and West Greenlanders is obviously of considerable importance. Recognizing that fact, the Department of Fisheries and Oceans of the Government of Canada and the Ministry of Fisheries and Industry of the Greenland Home Rule Government signed a Memorandum of Understanding (Anonymous, 1989) in December 1989 establishing a Joint Commission for the Conservation and Management of Narwhal and Beluga that migrate between the waters of Canada and Greenland. The joint commission is responsible for the exchange of information and the coordination of joint research projects and involves resource users through its Inuit commissioners and delegation from Inuit organizations. The joint commission has established a scientific working group to submit proposals concerning scientific research and recommendations respecting the conservation and management of stocks to the responsible governments (Anonymous, 1991, 1992b). The scientific working group has been instructed to take account of resource user knowledge in developing its advice. Decisions and recommendations of the joint commission are made by consensus and submitted to both governments for approval.

CO-MANAGEMENT OF THE SE BAFFIN BELUGA STOCK: A CASE STUDY

The past 14 years of management of the SE Baffin beluga stock illustrate some of the problems that must be overcome before a working system of cooperative management can become a reality. It is the history of an incomplete co-management system. Much of what occurred during these years predated the signing of the Nunavut land claim or the Supreme Court decision in the Sparrow case. The context is therefore one of transition presently taking place between a government-controlled regulatory system and the system of co-management.

As is often the case (Pinkerton, 1989), attempts at creating a co-management process arose from a crisis: the perception that the stock was experiencing rapid depletion. There had been a well-documented decline in this stock since the early 1920s, due initially to a commercial whale harvest at Pangnirtung (Kemper, 1980; Brodie *et al.*, 1981; Mitchell and Reeves, 1981). The stock size, estimated at more than 5000 animals prior to commercial exploitation, was reduced to a fraction of that number by the 1960s (Mitchell and Reeves, 1981). The population size is thought to have been stable during the 1960s and early 1970s. However the revival of the commercial fishery in the late 1970s to market muktuk for inter-settlement trade led to a further decline (Brodie *et al.*, 1981). DFO biologists and managers became concerned that this harvest was too high to be sustained by the population when only about a few hundred could be counted (Kemper, 1980; Brodie *et al.*, 1981).

These concerns were conveyed to the Pangnirtung Hunters and Trappers Association (HTA), which agreed to stop inter-settlement trade and limit harvest to domestic purposes (Brodie *et al.*, 1981). In 1979, DFO conducted a boat and cliff survey and held a public meeting to report on the results. DFO representatives expressed their concerns and, after much debate, the meeting resulted in a vote to limit harvest to 40 belugas for the Pangnirtung area. In exchange, the department agreed to raise the narwhal quota from 15 to 40 (Brodie *et al.*, 1981). These new quotas were enacted in amendments to the Beluga and Narwhal Protection Regulations in 1980.

Between 1980 and 1986, boat or aerial surveys of the head of Cumberland Sound were done annually by DFO biologists (Richard and Orr, 1986). In 1985 and 1986, aerial surveys were done over the entire summer range of the herd (Richard *et al.*, 1990). Inuit from Pangnirtung were present in all surveys. They served as guides during the ground-based surveys and were taken as observers on the aerial surveys. Meetings with the Pangnirtung HTA were held before the surveys to explain what was planned and solicit suggestions and again some months after the surveys to explain the results. However, Inuit felt they had no real influence in planning the surveys and that their observations were not used in deriving population estimates. Most hunters remained unconvinced that there was any need to reduce hunting pressure on the stock. The meetings nevertheless resulted in initiatives by the Pangnirtung HTA to control and monitor the hunt, and in 1985 it banned all hunting in Clearwater Fiord, the main summer concentration. The value of the quota system was often questioned during these meetings. Some hunters complained that the existence of a catch limit promoted a sense of competition among hunters, who got as many belugas as possible before the quota was reached. Others thought that it might even cause the quota to be reached when it otherwise might not have been under a no-limit system. Finally, some hunters suggested that the Cumberland Sound belugas were also hunted by Iqaluit and Lake Harbour hunters after they left the sound. They felt that it was unfair that Pangnirtung hunters were the only ones limited in their beluga catch. For these reasons, many hunters advocated a no-limit system, a return to their system of self-limitation.

A review of DFO and other surveys showed the variation in seasonal range of belugas in SE Baffin waters (Richard and Orr, 1986). This review gave support to the suggestion by some Pangnirtung hunters that the belugas that concentrate in Cumberland Sound in summer were probably also hunted by

Iqaluit and Lake Harbour hunters at other times of the year. This led the DFO to create in 1986 the Beluga Management Committee (BMC), formed of representatives of the DFO and of HTAs from those three communities.

This first BMC was unsuccessful in achieving consensus between the Inuit hunters and DFO representatives. DFO biologists and managers expressed their concern over the apparently small size of the population stock and the relatively large catch to which it was subjected. They urged reductions in catches in all three communities because of their perception that the stock would ultimately decline to extinction in relatively little time (Richard, 1991a). Hunters from all three communities expressed their resentment at being told by non-native government employees what to do with a resource they had been using for centuries and which in their opinion showed no signs of a decline.

Being purely informal and advisory, the BMC did not have a defined structure or any real authority to effect changes. Consequently, the community representatives did not feel they were really part of the process, since they were not directly involved in the research and, despite the consultation, they felt they were not part of the final decision making. They also perceived that the DFO representatives at the BMC were not the decision makers. The BMC was nevertheless instrumental in implementing a sampling program, a program well supported by the communities because it involves hunters directly in data acquisition by employing them to do the beluga measuring and sampling.

Other developments precipitated this problem to the level of a crisis. In 1988, the department's Arctic Fisheries Scientific Advisory Committee (AFSAC) recommended a total cessation of the hunt in Pangnirtung and Iqaluit and a seasonal closure in Lake Harbour (Cosens *et al.*, 1990). The stock was subsequently designated "endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1989 (Richard, 1991a). The DFO presented its position on SE Baffin belugas to the NWMAB in January 1990. The NWMAB heard opposing arguments from DFO representatives and from hunter representatives and recommended a temporary quota of five belugas for each of the three communities, to be in effect for two years. It further recommended that the DFO conduct another survey in 1990 to update the stock's status. The Minister of Fisheries and Oceans accepted the recommendations, and the new quotas were added to the Beluga Protection Regulations in June 1990.

There was a reaction of dismay and hostility towards these quotas in the three SE Baffin communities. The fact that the new quotas were recommended by the NWMAB, a joint management body with equal Inuit representation, carried very little weight. Few hunters had ever heard of the NWMAB and the new quotas were considered an assault on the harvesting rights of Inuit at a time when the Nunavut Land Claim Agreement-in-Principle specifically recognized these rights (Anonymous, 1990). The new quotas were widely ignored over the summer of 1990, and the year ended with a catch of about 50 belugas over quota. Following a seizure of muktuk from a beluga killed after closure had been posted, the DFO office in Iqaluit was occupied by a group of hunters demanding restitution of the muktuk. Various demonstrations were also held in Iqaluit that captured the attention of the local media.

The recommended surveys were carried out during the second week of August 1990 throughout SE Baffin coastal waters with

an emphasis on the population's concentration area in upper Cumberland Sound. Inuit from the three communities participated in the surveys in their area. During the same period, counts from cliffs overlooking Clearwater Fiord and a boat survey of western Cumberland Sound were conducted by Pangnirtung HTA members. The aerial surveys showed no statistically detectable difference from the 1986 count. It is unknown if the population has remained stable or has continued to decline since 1986 because the low precision of the estimates and the counting biases do not allow sufficient statistical power to detect even a large change in population size (Richard, unpubl. data; Gerrodette, 1987). It is clear, though, that the rapid decline predicted earlier (Richard and Orr, 1986; Richard, 1991a) has not taken place. Hunters interpreted the results of no discernible decline as proof that the DFO was wrong in predicting any decline. They also felt that their role in the surveys had been insufficient and the survey results were widely rejected. Local groups, frustrated with DFO staff, lobbied the Minister of Fisheries and Oceans directly to have the quotas removed.

In view of the impasse, the Minister accepted an offer by the Iqaluit member of the Northwest Territorial Legislative Assembly to create an *ad hoc* group led by the Science Institute of the Northwest Territories. This group would look at ways of integrating scientific and local knowledge for the effective management of the stock. The committee was composed of one representative from each of the three SE Baffin communities, a DFO resource person and the director of the Science Institute as facilitator. The report of this committee was submitted to the Minister in June 1991 (Ikkidluak *et al.*, 1991). It states that the Inuit believe that belugas harvested by the three communities do not belong to the same stock and that the current harvest does not threaten the beluga stock. The quota of five per community is described as a cruel act, causing a great deal of uncertainty akin to the "grief associated with the loss of a loved one" (Ikkidluak *et al.*, 1991:1). The Inuit express a sense of loss of purpose, loss of control over their lives, and a sense that "democracy did not work for them," resulting in "thoughts to disobey the law" (Ikkidluak *et al.*, 1991:2). They fear for the loss of culture that would ensue if belugas cannot be harvested and decry the lack of recognition of "traditional (Inuit) conservation practices which forbade mass slaughter of any wildlife" (Ikkidluak *et al.*, 1991:2).

In the interest of achieving "a positive relationship that will lead to better information and to improved long-term beluga management" (Ikkidluak *et al.*, 1991:3), the report makes several recommendations. It recommends that the 1991 quota for each community be set at 35 and that a formal co-management structure be set up to "design, plan and conduct beluga management studies" with a long-term focus on "integrating traditional and scientific knowledge" to "establish and review sustainable harvest quotas with confidence" (Ikkidluak *et al.*, 1991:15). The Minister accepted the recommendations, and additional discussions between the DFO and committee members led to an agreement that Pangnirtung, Iqaluit and Lake Harbour would have interim quotas respectively of 35, 35 and 20 (note: Lake Harbour's quota of 20 applies from spring to fall; hunting in winter is unrestricted). In addition, DFO and community representatives would work to establish a co-management structure and the department would commit substantial funding to beluga studies in 1992 and 1993. The Planning Committee for the Co-management of Beluga Whales in SE Baffin was

created in November 1992 and charged with developing a co-management structure and proposing a long-term plan for research and management of the SE Baffin belugas by May 1993.

DISCUSSION

What lessons can we draw from the SE Baffin experience? There are obvious problems with language, as well as cultural differences, compounded by a changing membership in the HTA and government representation at meetings dealing with this issue. But there are more important problems that go to the heart of the matter. First, it is clear in this case that incomplete co-management did not work. The DFO had regulations in place limiting beluga hunting practices before hunters were involved in the research in a way that could have made them feel part of the process leading to a management decision. It was not sufficient to inform HTAs about our findings and our conclusions on the status of a stock, note their reactions and then make a regulatory decision. Hunters want to be equal partners in decision making in a consensual manner more consistent with their culture. Participation in the first BMC was reluctant because they had no sense of being equal partners in decisions, so their approach to the BMC process was largely adversarial. Consequently, when the Minister accepted the NWMAB quota recommendations, SE Baffin hunters felt completely disenfranchised.

In a similar vein, the hunters' initial interest in the surveys and other aspects of the research was minimal, either because they did not clearly understand the methods used, or perhaps doubted the effectiveness of these methods, or were confused about the purpose of our work. That changed when they realized the full implications of our results. Finally, a major mistake on our part was to simplify our message to convince them of our point of view. By simplifying the information we brought to them, de-emphasizing the imprecision of our methods and over-emphasizing the certainty of our conclusions, we did ourselves a disservice. Had we shown the detail of the results and acknowledged the imprecision and uncertainty, we could have explained that our alarm at the status of the stock is an educated guess based on various sources of data, not on certainty, and that the precision of the methods may not allow certainty until it is too late. This failure at openness about the detail of our results and the thought process behind our conclusions and dire predictions had a very negative consequence. When the 1990 survey results did not yield positive proof of a decline, the assessment methods and conclusions were dismissed entirely.

The will to manage their hunt does exist among hunters. SE Baffin hunters showed their willingness to make changes to their hunting practices when they accepted quotas and protected Clearwater Fiord from hunting. The stalemate occurred when the people directly affected felt cut off from the decision process for reasons that they did not fully understand. To be effective, co-management structures need to achieve a greater degree of power sharing between hunter and government representatives. But in addition, managers must maintain direct contact with each community and involve hunters in all aspects of the research.

The SE Baffin beluga case has been an experience of relevance to future Eastern Canadian Arctic small whale co-management. It provides a practical example of what can go wrong in an

incomplete co-management process and points the way toward resolving such problems in the future. The future Nunavut Wildlife Management Board established under the Nunavut Land Claim and the Canada/Greenland Joint Commission for the Conservation and Management of Narwhal and Beluga will have to address issues related to the other Eastern Canadian Arctic small whale stocks. What are their chances of success?

Many of the conditions favourable to co-management proposed by Pinkerton (1989) appear to exist with Eastern Arctic beluga and narwhal co-management. First, the future Nunavut Wildlife Management Board and the extant Canada/Greenland Joint Commission are formal co-management agreements and the former is legal and long term and will be supported financially under the terms of the land claim agreement. It is hoped that they will profit from the lessons of the SE Baffin experience. Second, those who stand to benefit from the success of the co-management process, the hunters, have a cohesive social system and that success can contribute to conserve and enhance their cultural system by maintaining a resource on which it depends.

On the other hand, while each hunting community can effectively define its boundaries, belugas and narwhals have extensive ranges and are migratory. Consequently, a single population can be hunted by several hunting communities. In the case of Baffin Bay narwhals and belugas, these populations may be hunted by ten communities or more in Canada and West Greenland. Getting consensus among so many different groups may prove to be difficult.

Co-management of belugas and narwhals would probably operate better if it were possible to determine precisely trends in population size and the factors affecting these trends. Unfortunately, whale populations are difficult to assess even with the use of modern techniques of survey and sampling designs. Trends may not be detected until large changes in population size have occurred, and this is exacerbated by the SE Baffin beluga stock's small size. Locally concentrated whale populations such as the SE Baffin population may appear abundant to local observers until they suddenly decline to a point at which it is often too late to conserve the population. A good example of this problem is the recent near extirpation of the Ungava Bay beluga population (Finley *et al.*, 1982; Smith and Hammill, 1986; Reeves and Mitchell, 1989). Management biologists will often prefer to estimate the size of populations conservatively and reduce the risk of depletion, as was the case for the SE Baffin beluga. In contrast, hunters may prefer the high side of estimates because restrictions mean less opportunity to experience an important cultural activity and a highly valued food. Consequently, agreement on stock status is not an easy goal to achieve.

Finally, co-management probably operates best if all parties can agree on common objectives for management and on the effective means to achieve these goals. As we have seen in the SE Baffin beluga example, a common problem in discussions between resource users and managers is that they avoid dealing with implicit objectives of both sides, yet these unspoken objectives are often central to the understanding of the problem (Walters, 1986). To enhance its effectiveness, a co-management body would be well advised to establish simple rules of decision making on the status of the stock relative to its objectives and appropriate management responses. These rules should be widely accepted by users if they are to allow timely changes in management regime.

In conclusion, the challenges for co-management of Eastern Canadian Arctic beluga and narwhal are:

a) to ensure effective communication of information among hunters and government biologists and managers, despite the vast geographic setting and large and dispersed number of groups involved. This cannot be achieved without a streamlined co-management organization at the regional, national and international levels, or without substantial long-term funding.

b) to jointly develop and extend a common knowledge base on beluga and narwhal incorporating traditional and scientific knowledge, despite cultural differences and recognizing the difficulties of directly assessing stock status. Again, this cannot be accomplished without effective communication among the parties involved in data gathering and long-term funding.

c) to develop common objectives for co-management and identify means of achieving them, including simple rules of decision making that would allow timely response to stock status information, particularly that which suggests a declining trend.

Co-management of small whales has a long way to go before it becomes effective and before new relationships fundamental to its success develop between governments and users. Given that the alternative to co-management — namely, enforcement without the support of a majority of resource users — is unlikely to be effective and could result in situations detrimental to all Eastern Arctic beluga and narwhal stocks, we have no alternative but to take up the co-management challenge if we want to conserve these populations for future generations.

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REFERENCES

- ANONYMOUS. 1989. Memorandum of Understanding between the Department of Fisheries and Oceans of the Government of Canada and the Ministry of Fisheries and Industry of the Greenland Home Rule Government on the Conservation and Management of Narwhal and Beluga. December 1989. Unpubl. ms. Available from Director General, Biological Science, Ottawa, Ontario, Canada K1A 0E6.
- ANONYMOUS. 1990. Agreement-in-Principle between the Inuit of the Nunavut Settlement Area and Her Majesty in Right of Canada. Ottawa: Indian and Northern Affairs. 373 p.
- ANONYMOUS. 1991. Report of the First Meeting of the Joint Commission on Conservation and Management of Narwhal and Beluga. Ilulissat, 16-17 January 1991. 5 p. + appendices. Unpubl. report. Available from Director General, Biological Science, Ottawa, Ontario, Canada K1A 0E6.
- ANONYMOUS. 1992a. Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty in Right of Canada. Yellowknife: Inuit Ratification Committee. 229 p.
- ANONYMOUS. 1992b. Report of the Second Meeting of the Joint Commission on Conservation and Management of Narwhal and Beluga. Iqaluit, 26-28 April 1992. 18 p. + appendices. Unpubl. report. Available from Director General, Biological Science, Ottawa, Ontario, Canada K1A 0E6.
- BRODIE, P.F., PARSONS, J.L., and SERGEANT, D.E. 1981. Present status of the white whale (*Delphinapterus leucas*) in Cumberland Sound, Baffin Island. Report of the International Whaling Commission 31:579-582.
- COSENS, S.E., CRAIG, J.F., and SHORTT, T.A. 1990. Report of the Arctic Fisheries Scientific Advisory Committee for 1988/1989. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2063. iv + 40 p.
- FINLEY, K.J., and RENAUD, W.E. 1980. Marine mammals inhabiting the Baffin Bay north water in winter. Arctic 33:724-738.
- FINLEY, K.J., MILLER, G.W., ALLARD, M., DAVIS, R.A., and EVANS, C.R. 1982. The beluga (*Delphinapterus leucas*) of northern Quebec: Distribution, abundance, stock identity, catch history and management. Canadian Technical Report of Fisheries and Aquatic Sciences 1123. vii + 63 p.
- GERRODETTE, T. 1987. A power analysis for detecting trends. Ecology 68:1364-1372.
- HEIDE-JØRGENSEN, M.-P. 1990. Small cetaceans in Greenland: Hunting and biology. North Atlantic Studies 2:55-58.
- IKKIDLUAQ, J., PAPATSIE, J., EVIC, L., KILABUK, M., KOLOLA, M., KOSHINSKY, G., and HEYLAND, D. 1991. A report to the minister of Fisheries and Oceans on the beluga around southeast Baffin Island Northwest Territories. April 1991. 18 p. Unpubl. report. Available from Librarian, Fisheries and Oceans, Freshwater Institute, 501 University Crescent, Winnipeg, Manitoba, Canada R3T 2N6.
- KEMPER, J.B. 1980. History of use of narwhal and beluga by Inuit in the Canadian Eastern Arctic including changes in hunting methods and regulations. Report of the International Whaling Commission 30:481-492.
- MANSFIELD, A.W., SMITH, T.G., and BECK, B. 1975. The narwhal, *Monodon monoceros*, in eastern Canadian waters. Journal of the Fisheries Research Board of Canada 32:1041-1046.
- McLAREN, P.L., and DAVIS, R.A. 1982. Winter distribution of arctic marine mammals in ice-covered waters of eastern North America. Report prepared for the Offshore Labrador Biological Studies (OLABS) Program by LGL Ltd. 151 p. Available from Librarian, Fisheries and Oceans, Freshwater Institute, 501 University Crescent, Winnipeg, Manitoba, Canada R3T 2N6.
- MITCHELL, E., and REEVES, R.R. 1981. Catch history and cumulative catch estimates of initial population size of cetaceans in the Eastern Canadian Arctic. Report of the International Whaling Commission 31:645-682.
- PINKERTON, E. 1989. Introduction: Attaining better fisheries management through co-management — Prospects, problems, and propositions. In: Pinkerton, E., ed. Cooperative management of local fisheries: New directions for improved management and community development. Vancouver: University of British Columbia Press. 3-33.
- REEVES, R.R., and MITCHELL, E. 1987. History of the white whale (*Delphinapterus leucas*) exploitation in eastern Hudson Bay and James Bay. Canadian Special Publication of Fisheries and Aquatic Sciences 95. 45 p.
- REEVES, R.R., and MITCHELL, E. 1989. Status of white whales, *Delphinapterus leucas*, in Ungava Bay and eastern Hudson Bay. Canadian Field-Naturalist 103:220-239.
- RICHARD, P.R. 1991a. Status of the beluga, *Delphinapterus leucas*, of southeast Baffin Island, Northwest Territories. Canadian Field-Naturalist 105:206-214.
- _____. 1991b. Abundance and distribution of narwhals (*Monodon monoceros*) in northern Hudson Bay. Canadian Journal of Fisheries and Aquatic Sciences 48:276-283.
- RICHARD, P.R., and ORR, J.R. 1986. A review of the status and harvest of white whales (*Delphinapterus leucas*) in the Cumberland Sound Area, Baffin Island. Canadian Technical Report of Fisheries and Aquatic Sciences 1447. iv + 25 p.
- RICHARD, P.R., ORR, J.R., and BARBER, D.G. 1990. The distribution and abundance of beluga, *Delphinapterus leucas*, in eastern Canadian waters: A review and update. In: Smith, T.G., St-Aubin, D.J., and Geraci, J.R., eds. Advances in research on the beluga whale, *Delphinapterus leucas*. Canadian Bulletin of Fisheries and Aquatic Sciences 224:23-38.
- SERGEANT, D.E. 1979. Summary of knowledge on populations of white whales (*Delphinapterus leucas Pallas*) and narwhals (*Monodon monoceros L.*) in Canadian waters. International Whaling Commission working document IWC/31/SM5. 6 p. Unpubl. ms. Available from P. Richard, Fisheries and Oceans, 501 University Crescent, Winnipeg, Manitoba, Canada R3T 2N6.
- SMITH, T.G., and HAMMILL, M.O. 1986. Population estimates of white whale, *Delphinapterus leucas*, in James Bay, eastern Hudson Bay, and Ungava Bay. Canadian Journal of Fisheries and Aquatic Sciences 43:1982-1987.
- SMITH, T.G., HAMMILL, M.O., BURRAGE, D.J., and SLENO, G.A. 1985. Distribution and abundance of beluga, *Delphinapterus leucas*, and narwhals, *Monodon monoceros*, in the Canadian High Arctic. Canadian Journal of Fisheries and Aquatic Sciences 42:676-684.
- STRONG, J.T. 1988. Status of the narwhal, *Monodon monoceros*, in Canada. Canadian Field-Naturalist 102:391-398.
- SUPREME COURT OF CANADA. 1990. Judgment on the appeal of Ronald Edward Sparrow versus Her Majesty the Queen and interveners, 31 May 1990. 40 p.
- WALTERS, C. 1986. Adaptive management of renewable resources. New York: Macmillan Publishers. x + 374 p.