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The Role of Regional Government in Sustainable Use of Common Pool Resources: the Case of Polar Bear Management

Abstract
This paper examines the role of three regional governments in the management of polar bears. In Nunavut, Canada a quota system has been used to control harvest, but the increasing de facto role of harvesters, who do not unanimously subscribe to conservation concerns, threatens the management structure. In Nunavik, Canada, no controls of polar bear harvest levels were instituted by higher levels of government and nor have grassroots organization developed such controls. In Greenland, Denmark, the conservation and economic need for quotas to be implemented by regional government has been recognized and quotas were introduced in January 2006. These three case studies show that regional governments must accept three roles for the sustainable use of polar bears. The first two are coordinating and the third is fostering. The coordinating roles are to provide a biologically appropriate level of management and to provide legal harvest control incentives to all resource users in order to offset economic incentives to over harvest. The fostering role is first to create local institutions, since these are not likely to develop as grassroots organizations, and then to assist harvesters in both understanding the conservation challenges and creating solutions.

Introduction
In recent decades there has been a strong push internationally for more local control of wildlife resources based both on failed conservation initiatives at higher levels of government, and also in response to the question of local rights to resources (Berkes 2002; Gibson and Marks 1995; Mayaka 2002; Naughton-Treves 1999; Peluso 1993). Criticism of community-based conservation initiatives show that they have also often failed to meet the goals of conservation and sustainable development (Bajracharya, et al. 2005; Edmonds 2002; Mayaka 2002; Morrow and Hull 1996; Walters 2004). The philosophy of community-based approaches is still considered sound, but the underlying assumptions and implementation process have caused problems, including continued loss of biodiversity (Kaltenborn, et al. 2005; Mayaka 2002). One of the factors influencing the outcomes of different approaches to wildlife management is the role of various levels of government. Both local and super-local governments can play important roles in resource management. Super-local governments (including national, regional or sub-regional) can provide legal frameworks, local institutional support, enforcement and monitoring, and expertise regarding large scale management issues (Pinkerton 1987; Pomeroy and Berkes 1997). At the same time, local governments and various other local institutions are recognized as being crucial to sustainable resource use, since it is at this level that harvesting takes place and many problems are first noticed (Pinkerton 1987; Pomeroy and Berkes 1997). Local institutions are the subject of much common property research, but super-local government and its relationship to the local is less studied

(Berkes 2002). The question then arises as to what role can best be played by super-local governments in order to maximize conservation objectives. Such a question is beyond the scope of a single paper, therefore the focus here will be on the role of regional governments and their relationship to local institutions.

Like the management of many other large mammals, the management of polar bears has involved national, regional and local levels of government. The five range countries of this species (Canada, Denmark/Greenland, Norway, Russia and the United States) have all developed different approaches to management. Canada devolved management to its provinces and territories, while the Greenland Home Rule government has taken over authority from Denmark. Thus, in these two countries polar bears are managed as part of the mandate of regional governments.

In both Canada and Greenland co-management systems are also in place to promote indigenous viewpoints and better connect the various types of governance. The co-management systems fall along the continuum described by Pomeroy and Berkes (1997) between centralized government management and community self-management, but each represents a different approach. Greenland has regulations imposed by the Home Rule Government, but little local governance. Québec (a province in Canada) has lost its responsibilities for polar bears to native groups due to a land claim agreement, and thus has little involvement in management unless a conservation issue arises. Canada's Northwest Territories (NWT) and later Nunavut Territory (NU, which separated from the NWT in 1999) follow a regional governance approach with a strong co-management system and delegation to local bodies. Interestingly, all three of these regions are now considering moving further along the continuum described by Pomeroy and Berkes, in the case of Greenland and Québec towards more centralized control and in the case of Nunavut towards more community self-management, which will be considered here as community-based management.

This paper adopts a top-down perspective to wildlife management by examining the role of regional governments in common pool resource management in the areas of law making, management of large scale conservation issues and supporting local institutions. The role of these governments in economic development of polar bear exploitation for the market will also be discussed, because the user group, (the Inuit), relies on a mixed economy with an historically poorly developed market component and has received government support in this area. Furthermore, the use of polar bears in the market economy has had profound effects on the development of management institutions. Three case studies will be examined to explore the management efforts of the regional governments of NWT/Nunavut, Québec (focusing on the Inuit area of Nunavik), and Greenland. Following the case studies, the discussion focuses on balancing local and regional government responsibilities for wildlife by asking what roles the regional government should play in conservation. This analysis assumes the continuation of the hierarchical forms of government that exist in the two countries under study, and thus does not focus on changing that structure, but rather on how to maximize conservation benefits within it.

Background

Polar Bear Conservation

For centuries the Inuit and other northern aboriginal groups have been engaged in subsistence economies and the market economy through a mixed livelihood strategy. For most of this time, they did not have state-recognized ownership of their traditionally exploited resources, and visitors were legally free to harvest wildlife, including polar bears, for several centuries. The harvest of polar bears by both indigenous and other peoples increased during the mid-twentieth century due to rising fur trade prices and increased access to hunting technology, such as snowmobiles and firearms (Schweinsburg 1981; Wenzel 2005).

At the same time, world population estimates for polar bears were vague, with different researchers making estimates between 5000 and 19000 animals (Delegates 1966). Declines in some polar bear stocks by the late 1960s were attributed to over-hunting (for example on the west coast of Spitsbergen, Norway; Greenland and the Soviet Arctic), and in others declines were thought to be due to climatic fluctuations (Delegates 1966). Stricter management regimes were put in place after public outcry focused on the high level of harvest by 'sportsmen' in Alaska, USA and Norway and their unsportsmanlike hunting techniques (Fikkan, et al. 1993). In Alaska for example, in the 1950s and 1960s, 85-90% of the polar bear harvest was by aircraft-assisted trophy hunters (this technique was banned in 1972) (IUCN 1976). Concerns about polar bear conservation led to bans on foreign or non-local hunters and to a series of international meetings between the 5 polar bear range states during the 1960s and early 1970s (Delegates 1966; IUCN 1968, 1970, 1972). Polar bears were placed in Appendix II of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) which came into effect in 1975 and requires a permanent record be kept of all imports and exports of polar bear products (Calvert, et al. 1986a). The polar bear meetings eventually resulted in the International Agreement on the Conservation of Polar Bears and Their Habitat (hereafter the 'International Agreement'), which came into effect in 1976 (Stirling 1986). This secured the exclusive harvest rights of native or local people by stating in Arcticle III that

> "any Contracting Party may allow the taking of polar bears when such taking is carried out… by local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party; or wherever polar bears have or might have been subject to taking by traditional means by its nationals." (Article III 1.d and 1.e (Lentfer 1974).

During the mid-twentieth century a gamut of conservation strategies were explored by the polar bear countries and their various regional governments. These strategies include (with examples of jurisdictions instituting them): complete hunting bans (USSR in 1955) creating protected areas (Kong Karls Land, Norway since 1939), banning the harvest of certain age classes of bears (in areas of Greenland, beginning in 1950 in Northwest Territories, Canada by 1965), instituting quotas (Northwest Territories 1968), developing bag limits for local hunters (used briefly in Alaska; and Yukon Territory, Canada in 1971), restricting hunting technology (by 1965 in Greenland), and the least restrictive system: simply limiting harvesting to native people (Alaska after 1972, Québec after

1971) (Delegates 1966; Fikkan, et al. 1993; Lentfer 1972; Stirling and Macpherson 1972).

Two main harvest-limiting strategies have survived. The first is the institutionalization of hunting quotas. The second involves various systems of harvest restriction which shall be grouped under the term 'traditional methods', which may include technological constraints or simply allowing indigenous controls to continue or develo. These strategies are different interpretations of Article III of the International Agreement and also include various other restrictions based on the International Agreement (such as protection of cubs). The NWT (and later Nunavut) is the only jurisdiction, since the International Agreement was signed, to solely utilize the quota approach. Several other governments, including Québec and Denmark/Greenland have minimized their involvement with polar bear management by instituting 'traditional methods' approaches. The outcomes of these strategies have had different impacts on local institutional involvement in conservation, which serve to highlight the roles of both regional and local management institutions.

Since NWT/Nunavut and Québec/Nunavik are both part of Canada, a brief examination of Canada's legal framework for polar bear conservation will precede the case studies. The framework of Denmark/Greenland will come under the Greenland case study.

Legal Framework in Canada

In Canada wildlife is owned by the Crown and hunting regulations are under provincial or territorial jurisdiction. Thus, during negotiations for the International Agreement, Canada rejected the inclusion of specific harvesting rules (Fikkan, et al. 1993). Canada instead set up two committees which meet annually, the Federal-Provincial-Territorial Polar Bear Administrative Committee and Polar Bear Technical Committee (in 1969 and 1970 respectively) to coordinate research and management within the Canadian jurisdictions, (Fikkan, et al. 1993).

Canada ratified the International Agreement in December 1974, and CITES in April 1975, which resulted in the implementation of several rules in all jurisdictions. Both of the Canadian case study areas are also part of Comprehensive Land Claim Agreements between the Federal government and Inuit. The James Bay and Northern Québec Agreement (JBNQA) involving the Inuit of Nunavik came into effect in 1975, while the Nunavut Land Claim Agreement came into effect in 1993. Nunavik functions as a region of the province of Québec, while Nunavut is both a land claim and a territory (since 1999).

Since the 1960s Canada has focused much time and energy on economic development for Aboriginal Canadians (Saku 2002). During the first international polar bear meeting in 1965, the Delegates from Canada acknowledged the economic importance of polar bears to the Inuit when they reported:

> "Polar bears are hunted mainly for their skins. Revenue from pelts can greatly augment the income of Canadian Eskimos [now referred to as Inuit]; it may be particularly valuable during poor trapping periods. Eskimos in the Northwest

> Territories retain about 20 percent of the pelts for personal use, selling the remainder" (Delegates 1966:12).

Inuit also clearly value polar bears for cultural reasons (Wenzel 1983, 2005), but this use was not seen as particularly important from the government perspective at the time. During the discussions around the development of the International Agreement, Canada stressed the right of native people to hunt and derive income from polar bears through the sale of polar bear parts and trophy hunts, should they wish to develop such an industry (Fikkan, et al. 1993).

In 2001 Canada instituted the Species at Risk Act (SARA) to assess the status of species at risk in Canada and protect species classified as extirpated, endangered or threatened. The designations are applied by the federal Minister for the Environment following a report on the biological status of a species by the Committee on the Status of Endangered Wildlife in Canada. Protection would prohibit harvest, destruction of habitat components and provide the federal government with the authority to develop and implement recovery and action plans (Lunn, Atkinson, et al. 2002).

Quota Strategy
Northwest Territories/Nunavut Territory

Polar Bear Management System

In 1965 the indigenous hunters of the NWT were responsible for approximately 90% of Canada's polar bear harvest (Delegates 1966), and today the people of the NWT and NU continue to harvest the most polar bears of any jurisdiction internationally (Lunn, Schliebe and Born 2002). These territories have played a key role in polar bear management and research since the 1960s, and are the only areas to institute a regional governance strategy of utilizing quotas to control harvesting. The quotas were implemented in 1968, and some have argued that since the species was not under threat at the time, the quotas constituted an unnecessary and colonial imposition on Inuit rights (Mulrennan 1998). The question of rights continues to be discussed and negotiated today.

At the first international meeting in 1965, Canada recommended a combination of conservation measures of the 'traditional methods' type. These included a restriction on motorized transport, and a bag limit (Delegates 1966). By 1967 the NWT had changed its strategy to the quota system. Apparently the quotas were put in place as a conservation measure, given that the harvest of bears by indigenous people had increased rapidly through the 1960s with the advent of high fur prices and the increasing availability of snowmobiles (Schweinsburg 1981). While it was likely not known at the time, there is evidence that some populations of polar bears in Canada were being over-harvested by the late 1960s and 1970s, such as the Beaufort Sea population (Stirling 2002). The 1968-69 quota for the NWT was set at 375, roughly half the level of the 1966-67 reported harvest of 726, but within the range of harvests for the prior 15 years (the actual harvest levels were likely higher, since not all hides were traded, and thus not recorded) (Schweinsburg 1981; Stirling 1986). These quotas were based on the fur trade records of each community and were refined after completion of biological studies on

population size and productivity, or, in some cases, due to political pressure from Inuit hunters.

Given the steadily rising harvest of the 1960s, biologists would today, based on the precautionary principle, still defend the implementation of the quota system in 1968, but two other factors were important as well in deciding on a quota strategy. In light of the calls from the public and other polar bear countries to ban all hunting until studies could be completed (Delegates 1966), the decision of the government of the NWT to control the harvest involved a political compromise whereby conservation concerns would be allayed and the harvesting and economic rights of indigenous people would be upheld and their economy allowed to develop by proving to the market that the harvests were sustainable. Thus, to suggest that the implementation of quotas was a baseless colonial act would be naïve. Furthermore, though conservative, the initial quota level has proven remarkably accurate after population studies have been completed and the quotas adjusted to sustainable biological levels (combined quota levels for NWT and Nunavut have remained within the 400 to 500 range). This indicates that traditional harvests (pre 1950) likely were sustainable, but that market opportunities in the 1960s drove up the harvest level considerably, resulting in an unsustainable harvest by 1967 of over 700 animals.

During the 1960s and 70s, GNWT developed an open communication system with Inuit hunters, which eventually became instituted as a co-management system. The creation of Nunavut Territory from the eastern part of the NWT in 1999 provided an opportunity to further develop a co-management strategy for wildlife and polar bears in particular. User views of wildlife management in Nunavut are expressed through several channels that reflect different levels of involvement along the co-management continuum. Local institutions (Hunters' and Trappers' Organizations, HTOs) are officially involved in co-management through consultations with government decision makers, while the territorial co-management body, the Nunavut Wildlife Management Board (NWMB) has a partnership role with the government. The NWMB is made up of representatives from the government of Nunavut, each of Nunavut's three regions and also various Federal government departments. The mandate of the NWMB is the wise use and protection of wildlife for Inuit and all Canadians. The NWMB makes wildlife decisions that can be overruled by the territorial Minister for the Environment only in the case of threats to public safety or conservation. The political climate in Nunavut, however, gives more de facto power to the NWMB, because consensus is viewed as key to decision making. The decisions of the NWMB reflect a very strong emphasis on local views. For example, at a recent meeting on research fund disbursement, many scientific research proposals were rejected, despite advice of the NWMB's staff and visiting specialists, which resulted in much of the money not being assigned (George 2006). Reasons for rejection included the desire not to allow animals to be tranquilized, marked or have transmitters attached to them, and a belief that proposed studies would be used to put animals under federal SARA protection.

The final big player in wildlife management in Nunavut is the land claim organization, Nunavut Tunngavik Incorporated (NTI). This organization is generally viewed as an

unofficial government partner or advisor in decisions (Wenzel 2004), although its official role under the land claim in the area of wildlife management is very limited. NTI has further gained power by arguing that since local and regional Hunters' and Trappers' Organizations (set up by the government for local wildlife management) are beneficiary organizations under the land claim, NTI represents them and should be present at discussions regarding wildlife. Thus, NTI, with no mandate for conservation, attempts to fulfill its advocacy role during such discussions, while the other groups attempt to fulfill their conservation mandates.

Economic development

Inuit have traditionally hunted polar bears for their meat and hides. Since the advent of market interactions in the NWT, traditional uses of polar bear hides have decreased and been replaced by use for cash income through market sales. Polar bear hunting itself and the distribution of meat continues be valued in the subsistence economy (Wenzel 1983, 2000).

The governments of the NWT, and later NU, have supported economic development using polar bears as a market resource in several ways. First, the sale of hides is facilitated by the governments. Hides may be sold to government staff for a large fraction of the estimated value. The hides are then sold at auctions and the difference returned to the hunter (Smith and Jonkel 1976). Market use of polar bears is also supported through sport hunting. Beginning in 1970 the GNWT allowed communities to use their polar bear tags for sport hunting, if they desired (IUCN 1984). Certain regulations were also included to ensure economic benefits of the sport hunt would go to Inuit, such as mandating an Inuk guide be employed, a community fee be paid by the sport hunter and non-mechanized transport be used (dog sleds). A few communities outfitted sport hunters during the 1970s with government assistance (IUCN 1984), but it was not until the renewable resource economy was affected by the seal skin economy crash in 1983 and loss of income from narwhal ivory sales, that the NWT sport hunt industry grew to more than 10 hunts per year (Wenzel 2005). During the mid 1980s the GNWT invested in infrastructure development and instituted sport hunt guide training programs to assist the industry, which grew through the 1980s and 1990s and has now stabilized at about 20% of the quota of NWT and NU (Wenzel 2005).

It would be economically efficient for Inuit to invest their entire quota in the sport hunt, however reasons for not doing so are mainly cultural. The freedom of the Inuit to decide how best to use polar bears allows them to seek a balance between cultural and market interests (Dowsley in press). These uses are also not wholly incompatible, since meat from the sport hunt harvest is used in the subsistence economy and the skins of bears hunted for subsistence can be sold in the fur trade.

Research and Monitoring

The government of the NWT (GNWT) took seriously its role in polar bear management during the 1960s and set up a research program. It has participated in, and initiated studies on, such topics as ecological relationships affecting polar bears, contaminants, the development of computer models for estimating population levels and sustainable yields,

and has assisted in the development of a national polar bear database (Calvert, et al. 1986b; Lunn, Schliebe and Born 2002). Perhaps the most important contribution of the GNWT is that it developed an intensive research program to determine the population parameters of polar bears, which was needed to develop and refine the quota system. Population ecology studies using mark-recapture and radio telemetry techniques were carried out in various areas (Schweinsburg, et al. 1982; Taylor, et al. 2005), often at the request of hunters for quota increases (IUCN 1976), or for other reasons such as during preparations for oil exploration (Jonkel and Stirling 1976; Stirling, et al. 1980). Eventually a rotational strategy of surveying each area every 15 years was developed, the entire territory was covered and the boundaries of polar bear populations were determined (Taylor and Lee 1995). Management zones were established and refined with the increasing population information and today quotas are set for the population and then divided amongst the resident Inuit communities. Both the Northwest Territories and Nunavut continue to work in cooperation with other jurisdictions nationally and internationally to develop better techniques for management (PBTC 2005).

The GNWT and GN (government of Nunavut) have also developed strict harvest reporting. According to the IUCN Polar Bear Specialist Group (PBSG), the monitoring of the harvest and other removals is considered to be 'good' (the highest ranking) for polar bear populations only hunted within NWT/NU (Lunn, Schliebe and Born 2002). The accuracy of population estimates varies among the populations because studies are done on a rotating basis and old data is considered less accurate than recent studies, so in this regard the populations of NWT/NU are rated from poor to good (Lunn, Schliebe and Born 2002).

Support for Local Institutions

The GNWT acquired jurisdiction over wildlife from the federal government in 1948 and developed a Game Ordinance in 1949, although administration and enforcement staff were not based in the territory until 1967 (Clancy 1990). A public review of the Game Ordinance began in 1975 and resulted in the government-initiated development of local Hunters' and Trappers' Associations (HTAs) to advise the Game Management Service as non-governmental organizations (Clancy 1990). These local-level bodies developed into administrative bodies as programs were decentralized or devolved to the local level. In Nunavut today, HTAs have been renamed HTOs (Hunter's and Trappers' Organizations) and consist of all hunters in the community. They are run by democratically elected boards and have the right to be consulted by territorial wildlife managers, but possess no actual authority in legal decision making regarding polar bears. They do have the authority to divide the community quota among hunters and have complete control over decisions regarding the sport hunt.

Despite their lack of authority over quota setting, the HTAs/HTOs and harvesters themselves have influenced NWT/NU policy since the quota system began. For example, a closed season during the summer, when pelts are of poor quality, was instituted at the hunters' behest in the early 1970s (Stirling and Macpherson 1972). Quota increases were also requested and granted several times for economic reasons. Some requests were to support the subsistence economy (Stirling, et al. 1984), while others were for acquiring

hides for sale in the market (Davis 1999). When scientific information on population maximum sustainable yields became available, most biologically unwarranted quotas were modified. Research has also been guided by local interests, particularly for quota changes (IUCN 1976).

The Move to More Community-based Management

The development of polar bear management in NWT/NU has in many ways paralleled the development of conservation in Africa (see Songorwa, et al. 2000), although starting with a less protectionist approach and more recognition of local people's rights to wildlife. During the 1970s and 1980s the GNWT used an approach similar to the 'Community Conservation Services' approach, whereby locals are seen as beneficiaries, but rather passive actors (Songorwa, et al. 2000). The GNWT did this through compensating Inuit for harvest restrictions by organizing sport hunting and even offering cash compensation for quota reductions that were deemed biologically necessary at the time (Davis 1999). (The philosophical and financial problems of this second action were quickly realized and compensation for quota reductions is no longer considered.). Like many conservation initiatives in Africa the GNWT and the GN have now moved towards more inclusion of local stakeholders in decision-making, and both territorial governments now use co-management systems to deal with management issues.

The move towards greater community involvement in Nunavut has continued with the 2005 development of a new quota setting system, based for the first half of the 15-year management period on science and for the second half of the period on population trend observations and conclusions provided by 'Inuit *Qaujimajatuqangit*' (IQ) (Inuit ecological and cultural understandings, but see Wenzel (2004) for a more in-depth discussion). While IQ is highly respected in Arctic Canada, its use in quota setting is not without its critics, including World Wildlife Fund and Humane Society International (Minogue 2005) and the IUCN/SSC Polar Bear Specialist Group (IUCN in press). The GN has continued on its course to incorporate IQ into management, increasing quotas in 2005 by 71 animals to 518, based on IQ.

New information from two of the populations for which quotas were raised based on IQ, Western Hudson Bay (WH) and Baffin Bay (BB) (see figure 1) indicate the polar bear populations are being over harvested. In WH the population parameters have been affected by climate change and the population has decreased due to the combination of these changes and hunting pressure (IUCN in press; Stirling, et al. 1999) and in BB by over harvesting on the Greenland side of the population area (climate change impacts are also suspected in changing bear distribution in BB) (Born 2005; IUCN in press). In both cases neither the government nor the NWMB have initiated a process to reduce the quotas, because they lack community and NTI consent and because of lack of agreement within the NWMB that a problem exists (Dowsley and Taylor 2006a, b, M. Taylor pers. comm). This reluctance on the part of NWMB and the GN is proof of how much de facto power now lies with the HTOs and the land claim organization. Both WH and BB have been reduced below 90% of their target population levels, in which case the GN is legally entitled to impose a harvest moratorium regardless of the views of co-management partners. The United States, a key supplier of sport hunters, is currently considering

banning sport hunt trophy imports from WH due to this conservation issue and the lack of political will to address it (importation of BB sport hunt trophies to the US is already banned due to Greenland's over harvest) (PBTC 2006).

Conclusion

Since the quota system was introduced, it has served as a key legal framework which has allowed the economic use of polar bears to develop in the fur trade and through sport hunt outfitting, while meeting research and conservation objectives. The weakness of the system was originally a lack of power at the local level for making management decisions, but the situation is reversed today. The Nunavut Wildlife Management Board has a strong legal voice which it exercises to limit research that may lead to stricter conservation measures, and the land claim organization (NTI) and the community HTOs have strong de facto roles in regional governance. The demands for more involvement by Inuit political leaders has been acknowledged and accommodated to the degree that it may now in fact threaten the economic structures set up to promote high-value economic use of polar bears as well as the conservation of polar bears and other species.

Traditional Methods Strategy

During the negotiations for the development of the International Agreement, the main conservation concerns involved commercial and sport hunting by Norwegians and sport hunting by Americans (Fikkan, et al. 1993). Thus, while interested in curtailing these harvests, several other jurisdictions did not face similar conservation issues and therefore did not see the utility of imposing restrictions on their aboriginal hunters, who had long used the resource in apparently sustainable ways. The possibility of over harvest due to market influences and new technology that were dealt with through the development of quotas in NWT, were also recognized as issues during the meetings by other jurisdictions. Developing a quota system is a financially and potentially politically expensive undertaking and so, not surprisingly, both Québec and Denmark chose a minimal approach to governance, basically allowing local people to continue hunting using 'traditional methods', as a harvest control. The particular ways in which they did this are outlined in the final two case studies.

Québec/Nunavik

Polar Bear Management System

Québec secured the tenure of its indigenous residents to be the exclusive hunters of polar bears in 1968 (Macpherson and Jonkel 1970). Nunavik is a region in northern Québec with a population of roughly 10,000 in 14 Inuit majority communities (Peters 2003). Nunavik was recognized as the result of a modern land claim, the James Bay and Northern Québec Agreement (JBNQA), signed in 1975. Although Nunavik has a regional government, the Québec government continues to hold most of the authority (Inuit Committee on National Issues 1987; Saku, et al. 1998). The JBNQA created a joint committee of representatives from the indigenous groups and the federal and provincial governments, which deals with wildlife harvesting (Saku, et al. 1998). This co-management committee, the Hunting, Fishing and Trapping Coordinating Committee (HFTCC established in 1976), divides up an annual hunting support subsidy from the

land claim (Saku, et al. 1998), makes recommendations to the government (Peters 2003) and may regulate hunting. Makivik Corporation, the land claim organization, like NTI in Nunavut, has also become a key player in polar bear management.

Under the JBNQA, Nunavik Inuit have a guaranteed annual harvest level of 62 for polar bears that is based on the 1976-1980 harvest levels ((Lunn, Schliebe and Born 2002)). The Government of Québec retains the right to limit harvest for conservation measures but has not yet done so ((Lunn, Schliebe and Born 2002)). Harvest monitoring is only through the number of tags given to hunters to allow for the commercial sale of polar bear hides. Personal use of polar bear skins is not subject to any reporting. However, nearly all hunters wish to sell their hides and therefore the tag system is considered an accurate report of the harvest ((Lunn, Schliebe and Born 2002)).

Regulations have, in general, developed more slowly in Québec than in other Canadian jurisdictions (Stirling, et al. 1984; Stirling and Smith 1976). A quota system was instituted briefly before the JBNQA, using a conservation justifications because the Inuit were increasingly hunting for market sales of hides (Stirling and Smith 1976). It was hoped at the time that the JBNQA would facilitate quota implementation and other legislation (Stirling and Smith 1980), but it in fact retarded the development of a conservation framework. The lack of regional legislation left a hole in the management regime that both higher and lower levels of government have since struggled to fill. The Polar Bear Specialist Group of the IUCN has made resolutions asking Québec to develop conservation legislation several times (IUCN 1986; Lunn, Schliebe and Born 2002) The Nunavik hunters' organization, Anguvigak (which became the Hunting, Fishing and Trapping Association (HFTA) in 1997) is made up of representatives from community Hunters' and Trappers' Organizations. This organization worked on the problem at the local level and in 1984 made resolutions to protect females with cubs and bears in dens. These resolutions are not legally binding, but are followed by general consensus (Lunn, Schliebe and Born 2002).

Québec has been pressured by the PBSG of the IUCN several times to bring its legislation into line with the International Agreement. At the 9th meeting of the PBSG in 1985 both Alaska and Canada were chided for not protecting females with cubs and denning bears, although Québec was the only Canadian jurisdiction not following this rule (IUCN 1986). In 1993 Canadian representatives admitted they were in non-compliance with the International Agreement due to Québec:

> "A principal area of non-compliance in Canada lies in Québec where, because of the James Bay Agreement, there are no quotas, seasons or protection of females and young. These shortcomings are addressed by local resolutions of the Hunters and Trappers in North Québec. In past years, Makivik has conducted harvest studies in Québec but the data collection has been sporadic and has declined in recent years. So far, there has been little willingness to join with other jurisdictions that share polar bears populations to negotiate a management agreement. Only a fraction of the kill is reported and the data and specimens collected are variable in the information they provide." (Wiig, et al. 1995)

By the 12th meeting, in 1997, Québec had enacted legislation to protect denning females and family groups (Derocher, et al. 1998). At the 13th PBSG meeting, native organizations and the Province of Québec agreed that a hunting season, protection of females with cubs and protection of bears in summer refugia were sufficient to meet conservation needs and that no further regulations would be imposed (Lunn, et al. 2002). At the same meeting, the PBSG passed a resolution recommending that Québec/Makivik instituted a quota system to regulate the take of polar bears. This is recognizing the right of local people to hunt and complementing Québec and Makivik on their much improved harvest recording system. The resolution further recognized that the development of co-management plans between Greenland and Canada for the shared populations was not able to proceed without a mechanism to regulate harvest (Lunn, Schliebe and Born 2002). Neither Québec nor Makivik have so far developed a quota system.

Economics

Québec does not allow sport hunting of polar bears. However, like other Inuit, Nunavik Inuit have long engaged in the fur trade. Hunters in Nunavik generally sell polar bear hides to local stores or co-operatives. Smith and Jonkel (1976) evaluated the prices paid for Canadian polar bear hides in 1972-73 and found that hunters who sold their hides to a store were generally paid less than hunters who sold their hides through auction houses. At this time Québec hunters were more likely to sell to the local store, whereas NWT hunters sold through the government program which offered the hides at auction. Québec hunters were also harvesting bears in the summer (something NWT hunters had decided not to do) which resulted in lower prices due to the poorer quality of fur (Smith and Jonkel 1976). This situation illustrates the much more 'hands-off' approach taken by the government of Québec towards its Inuit citizens in terms of increasing economically efficient use of polar bears compared to the GNWT.

At their 12th meeting, the PBSG passed a resolution stating that the sport hunts conducted in Canada were not a conservation threat due to their control under the quota system (Derocher, et al. 1998). Thus, the precedent was set that sport hunts should occur under quota systems developed from research on population size and demographic parameters. In 2005 Québec revealed to the Federal-Provincial-Territorial Polar Bear Technical Committee an interest in making some changes to allow sport hunting. The meeting minutes state:

> "Québec is interested in developing a sport hunt in SH [Southern Hudson Bay population area, see Figure 1]. The question of whether Québec's guaranteed harvest level is equivalent to a quota was again raised...Québec would ensure a sport hunt would be sustainable, but approval is far from final, as some revision of James Bay Agreement might be required." (PBTC 2005:7)

There are two problems here. First, the guaranteed harvest is not a quota since it is the minimum harvest that must be allowed, which in fact prevents a lower quota from being imposed. The second problems is that the JBNQA only covers the land territory of northern Québec. The sea ice, where most polar bear hunting takes place, is considered a part of Nunavut, although enforcement of this has never occurred. A Nunavik sport hunt industry would require considerable changes to the current management situation. Makivik corporation has made claims to the offshore areas and acknowledges the

Nunavik polar bear harvest is focused there. This claim must be settled and a quota system introduced before a sport hunt industry can develop in Nunavik.

Research and Monitoring

The Canadian delegation to the Polar Bear Specialist Group stated in 2002 that "since most hunting of polar bears occurs in Nunavut, and polar bears are not considered by provincial authorities to be of management concern, scientific research in northern Québec (Nunavik) is limited." (Calvert, et al. 2002:59). Aerial surveys and disease studies have been completed, and harvest data collection is coordinated between communities and the provincial Department of Wildlife and Parks (Calvert, et al. 2002; Calvert, et al. 1991b). Both Québec and Makivik provide financial and logistical support for Nunavut's population surveys in their shared populations.

The status of harvest monitoring for the three polar bear populations hunted by Québec Inuit (and shared by Nunavut) are considered good, good and fair (Davis Strait, the one labeled fair is also harvested by Greenland (Lunn, Schliebe and Born 2002). The population estimates for these are good, fair, and fair (Lunn, Schliebe and Born 2002)

Local institutional development

Similar to NWT/NU, Inuit communities in Nunavik have Hunters' and Trappers' Organizations. The regional hunter's organization (HFTA) is made up of representatives from these local bodies and may make hunting regulations, although these are not legally binding. Harvest reports and samples are submitted by the communities to the provincial government (Calvert, et al. 1991a) but no legal structure for monitoring of the harvest or the report of it is in place. Local institutional development has not been fostered by the Québec government, although Makivik has done some work, such as developing an improved harvest monitoring system

Conclusion

Québec has secured tenure for Inuit and legislated some regulations, but has in general allowed the Inuit to develop their own regulations that, though not legally binding, are generally followed. One weakness of the system has been a lack of interest in developing the resource economically at the provincial level and a lack of institutional and legal capacity at the local level to do so. Conservation has also suffered from weak institutions in Québec in the slow development of legislation and the lack of monitoring or control of the harvest. Monitoring has improved due to the Inuit organizations, but how complete it is remains unknown. Perhaps more importantly for conservation, harvest levels continue to be uncontrolled.

The interest in developing a sport hunt requires further control and monitoring of the harvest as well as the settlement of Makivik's claim to hunting rights on the sea ice. Québec or Makivik must take more regional governance responsibility in order to deal with these issues. The seriousness of Québec's interest in pursuing the required changes is questionable, given that they did not send a representative to the most recent Federal-Provincial-Territorial Polar Bear Technical Committee meeting (PBTC 2006). Makivik corporation did send a representative and has in general taken on a regional government

role through its monitoring program and support for the local institutions. Perhaps the development of conservation of polar bears in Québec is best undertaken at the level of Nunavik through Makivik and the local communities involved.

Greenland

Polar Bear Management System

Greenland is divided into 17 municipalities and has a total population of roughly 56 000 people, 88% of whom are Inuit (Pars, et al. 2001). The first regulations on polar bear hunting were introduced in 1965 and focused on the area north of Scoresbysund on the east coast, an area which later became a national park (Delegates 1966). Regulations for all of Greenland were developed in 1975 in preparation for ratification of the International Agreement (Born 1995). During negotiations for the development of the agreement, Denmark did not see polar bear conservation as a priority issue, and was the last country to ratify, in December, 1977 (Fikkan, et al. 1993).

Two national parks in Greenland provide habitat protection for polar bears. The area north of Scoresbysund was designated as a park in 1974. It was originally intended to provide complete protection of polar bears, particularly during denning and the summer season. Since 1976 however, hunters from the neighbouring municipalities of Ittoqqortoormiit/Scoresbysund and Avanersuaq may catch bears in the park subject to some special regulations (Born 1995). In 1980 a second park, the Melville Bay Nature Reserve was established on the west coast of Greenland to protect denning polar bears (Born 1995), but hunting of some bears is also allowed following certain regulations (Jessen 2002).

Greenland Home Rule was established in 1979 which allows Greenland to adopt legislation and administer its own affairs except in the areas of police, the judiciary and national defense. In 1984 the Home Rule Ministry for Fisheries, Hunting and Agriculture took over responsibility for compiling and publishing harvest data (Born 1991). Denmark had instituted a voluntary reporting of wildlife harvests called the Hunter's List of Game. A decline in the number of reports submitted from 1974 to 1985 caused the Home Rule Government to increase the harvest numbers using estimates of the unreported harvest (Born 1991). In 1993 a new system was implemented called *Piniarneq* (the Catch), whereby hunting licenses would not be issued if the previous year's harvest were not reported (Born 1995). Though this appears to improve the harvest reporting system, it is difficult to ensure the accuracy of such reports due to the occurrence of both under-reporting and multiple reporting (where hunters shared a bear) (Jessen 2002). Beginning in May, 1994 each polar bear killed required a special form be filled out, but many reports were still not filed (Born 1998).

The right to hunt polar bears was limited to full-time hunters in the 1960s (Rosing 1998) and now is further restricted by the need to also hold a valid hunting license from the Home Rules government (Born 1995). Only traditional transportation methods (which now include small motorized watercraft) are permitted, and females with cubs under one year of age are protected everywhere. In the areas where polar bear harvests are highest (the municipalities of Avanersuaq and Upernavik in northwest Greenland and

Ittoqqortoormiit/Scoresbysund and Tasiilaq in eastern Greenland) cubs between the ages of 1 and 2 years may be killed, whereas they receive protection in the other municipalities (Born 1995). A closed season on females and cubs occurs in summer, but adult males are hunted year round.

In 2000 the Home Rule Government decided in principle to develop quotas and other catch-regulating mechanisms for the polar bear hunt (Jessen 2002). In the fall of 2000, a Memorandum of Understanding was signed between the Greenland Home Rule and the Government of Canada indicating an interest in cooperating in manage their shared populations of polar bears (Jessen 2002). Most recently, a new executive order was passed by cabinet in 2005 outlining quota introductions for January 2006 (Department of Fisheries and Hunting 2005). The quota will be based on international agreements, biological advice, user knowledge and consultation with the Hunting Council. It will be administered by local authorities and all catches must be reported. Sanctions for over harvesting state that individuals can lose their hunting licenses and the local quota could be reduced.

Economics

Reported trade in polar bear skins has occurred between Greenland Inuit and Royal Greenland Trading Department stores for over 200 years. Traditional uses have also persisted, in particular hides are used for making trousers for men and boys in the northwest municipalities of Avanersuaq and Upernavik and the eastern area of Ittoqqortoomiit/Scoresbysund (Born 1991). The Great Greenland tannery is the main purchaser of hides, although private sales also occur and account for approximately 1/3 of the hides harvested in eastern Greenland (Born 1995; Rosing 1998). Other polar bear parts, including claws and skulls, are also allowed to be sold. Greenland also has a wildife meat market, however, polar bear meat is generally not circulated in this way (Born 1991).

Like Québec, Greenland is also considering allowing sport hunting of polar bears which requires control of harvesting and monitoring. The reason for an interest in this industry is economic. Quotas on several species, including narwhal, beluga and now polar bears, are being introduced due at least in part to international pressures. Greenland hopes to offset some of the income lost to hunters through these developments by developing sport hunting (Greenland Home Rule 2006). However, Greenland has recognized the need for a better harvest monitoring system before sport hunting can occur (Wiig, et al. 1995).

Research and Monitoring

Greenland took over de facto research responsibilities for polar bears from Denmark when it initiated work through the Greenland Fisheries Research Institute in 1991 (Born 1995). Biological samples are collected and are paid for, mainly from the Ittoqqortoormiit/Scoresbysund area, and only a few have come from Avanersuaq (Born 1998). Studies in various contaminants have been carried out, and Greenland has completed joint population and movement studies with other countries (Born 1998; Taylor, et al. 2001; Taylor, et al. 2005).

Greenland's harvest reporting system continues to be a conservation concern. From May 1994 it became mandatory to report every kill of a polar bear. From 1994 to 1997 the eastern municipality of Ittoqqortoormiit/Scoresbysund was submitting reports, but there was a nearly complete lack of reporting from the northwest municipalities of Upernavik and Avanersuaq, the two most important bear hunting areas, where, at the time, harvests were estimated at 50 bears per year from several population shared with Canada, in particular Baffin Bay (Born 1998).

The vital conservation importance of developing harvest control mechanisms can be seen in the situation of the Baffin Bay polar bear population (BB). This population was surveyed from 1994 to 1997 in a joint Nunavut-Greenland effort, and population estimates of 2200 are still considered fair by the Polar Bear Specialist Group Lunn, Schliebe and Born 2002). During roughly the past decade, Nunavut has been estimating Greenland's take from the BB population at 18-25 animals/year in their maximum sustainable yield calculations, and from these determined that a combined Nunavut/Greenland catch of 60-80 bears/year was sustainable (Taylor, et al. 2005). New harvest information from Greenland was submitted to the 2005 meeting of Canada's Federal-Provincial-Territorial Polar Bear Technical Committee which indicates that the Greenland harvest of polar bears in BB was in fact between 60 and 100 bears between 1993 and 2000 and rose to over 200 in 2003 (Born 2005). Using the average of the past 5 years' harvest from Greenland (2000-2004) of 129, and the new harvest quotas for Nunavut's BB harvest (105), a total of 234 bears per year are estimated to be harvested from BB, which has a maximum sustainable yield of 120 (Dowsley and Taylor 2006a). Simulation models estimate the current population to be down from 2200 in 1996 to 1550 in 2006, and project extinction of the population in less than a decade if the harvest is held at an annual rate of 225 animals (Dowsley and Taylor 2006a). Greenland has set municipal harvest quotas 2006, allowing 100 bears for all of west Greenland which harvests from 3 populations, including BB. Nunavut has held community consultations on the issue, but no requests for a quota reduction have come from either the NWMB or the GN, thus the quota of 104 will stand for 2006. The implementation of a quota by Greenland is a vital first step in controlling the BB over harvest situation, but 2006 expected harvests are still above the sustainable yield which now rests at less than 120.

Greenland harvests polar bears from four populations. It shares 3 with Nunavut, (and one of these with Québec as well). The certainty of the population estimates for these are considered fair (due to Nunavut's population survey rotation) and the monitoring of harvests and other removals is also considered fair. For the East Greenland polar bear population (where Greenland is the only harvester) monitoring is considered fair and the certainty of the population estimate is considered poor (Lunn, Schliebe and Born 2002). The estimation of population for East Greenland is based on the assumption that the annual harvest of about 80 bears (based on voluntarily reported kills) is sustainable and thus the population must be about 2000 animals. Of course, with no data to back up the assumption, the sustainability of the harvest is actually unknown.

Local Institutions

Local governance in Greenland is at the municipality level and is mainly administrative, such as through the issuing of hunting licenses and the collection of harvest data. While general regulations are in place for all of Greenland, there is some flexibility at the municipality level. An example of this is the decision by the major bear hunting municipalities to allow the taking of cubs between one and two years of age and/or their accompanying mothers. Hunters are also able to influence Greenland-wide regulations through their association, KNAPK. They have been successful for example, in removing the hunting season for adult male bears. Their argument was that males kill cubs and young bears and so removing adult males helps conservation (Born 1991).

In 2001 a community-to-community meeting held between Inuit from Grise Fiord, Nunavut and Qaanaaq, Avanersuaq municipality, Greenland, which share polar bear populations. Information about hunt statistics, methods and regulations and use of polar bears was exchanged. The Greenlanders emphasized their traditional hunting methods and traditional use of the hides for clothing (Jessen 2002).

Conclusion

The Danish and then Greenland Home Rule Government have instituted numerous regulations to meet the conservation goals of the International Agreement, but have not control nor adequately monitored the harvest. The implementation of a quota system in 2006 recognizes the weaknesses of the previous 'traditional methods' system. It would appear that economics has also played an important role in the switch to a quota system since it is deemed necessary by the PBSG to conducting sport hunts for international clients.

Discussion

The case studies have illustrated that international pressures through the International Agreement, CITES and the Polar Bear Specialist Group of the IUCN/SSC have played a very important part in developing polar bear conservation by pressing for basic conservation legislation, setting standards for economic use of polar bears through sport hunting and requiring export permits from the range countries. The lack of enforcement of the International Agreement has allowed flexibility in its interpretation, but the spirit of the agreement has generally been followed through pressure within the group to conform. The economic incentive structure at the international level is perhaps the most important in the development of polar bear conservation. It is through sport hunting that the incentives to develop sound management of polar bears are seen to outweigh the costs of doing so.

The actions of national governments have had mixed results for polar bear management. In both Alaska and Québec, the national governments passed legislation effectively removing any regional controls on polar bear harvesting other than the race of the hunter, which voided the nascent conservation efforts of the regions and retarded legislative development (Calvert, et al. 1986a; IUCN 1980). This was done through the JBNQA land claim in Québec and the Marine Mammal Protection Act in the United States which

removed enforcement of monitoring and harvest data collection as well as quotas. The reasons for these changes included recognition of native rights, but left a s hole in the government hierarchy between the national level and resource users that is yet to be filled through bottom-up development.

The more successful conservation system of NWT/NU includes both regional and local institutional development. As NU moves towards devolving more power and authority, and Québec and Greenland contemplate stronger management institutions at the regional and local levels, the question arises of what roles a regional government should play to support conservation objectives and local institutions. Three topics which should be considered in answering this question are biological principles, incentive structures and the likelihood of grassroots institutional emergence.

In terms of biology, the community level of governance is too small a unit for large mammal management. Management should be based on ecologically appropriate units and requires technical skills to study and manage (Berkes 2002; Mayaka 2002). Polar bears occur in discrete populations with varying demographic parameters and thus respond differently to harvesting. Canada now researches and manages them at the population level (Taylor and Lee 1995) and the PBSG has also accepted this level as the most appropriate for determining conservation status (Wiig, et al. 1995). Local level institutions are not able to determine how much of regional resources to harvest because they do not know the total population, nor the harvest levels of other users (Berkes 2002). Thus for sound conservation, regional institutions should be used for polar bear harvest level determination.

Incentive structures are affected by level of government as well. For example, complete devolution of responsibility to users or their grassroots institutions would remove legal incentives. The hunters must then assess the marginal value of harvesting against the marginal cost of the wildlife, as in property damage or physical danger. Johannesen and Skonhoft (2004) have shown that unless the cost is low compared to the benefits, community based management will not produce more wildlife than open access systems. Regional governments are in a position to coordinate these costs at the polar bear population level, something local institutions cannot do. An example in Nunavut is the current challenges of climate change. As climate change forces polar bears onto the land and away from their traditional food sources for longer periods of time, Inuit have been incurring rising costs associated with property damage and safety issues (Dowsley and Taylor 2006a, b). Community institutions have asked the government of Nunavut to institute a compensation program for damages and to improve safety, and although the government agreed in early 2005 to do so, a program has not yet been implemented. The regional government has two choices in this situation, it can modify the economic incentives by either increasing penalties for poaching, or decrease costs of damage through compensation. If the government does not adapt the legal incentive structure to the rising costs of living with polar bears, poaching is likely to increase. This manipulation of incentive structures by the regional government ensures all harvesters play by the same rules.

Despite the problem of biological research and incentive structures, many Inuit in Nunavut have championed a complete removal of government controls, while Inuit in Greenland and Nunavik have been very reluctant to allow controls, and are particularly recalcitrant about further management, especially regarding harvest levels. If we ignore for a moment the problem of biological principles, and take the position that the legal incentive structures are not important, we come to the third concern, the likelihood of grassroots institutional emergence. Let us pretend for the sake of argument, that all current and past management of polar bears imposed on Inuit disappeared. Let the Inuit of the three case study jurisdictions have the benefit of the scientific information that has thus far accumulated. And then let us consider the possibility of grassroots organizations developing to manage the resource at a sustainable level through time.

Discussions of community-based conservation in Africa have pointed out a key problem in devolving full control to the community level:

> "..proponents [of community-based management] argue that from their pre-colonial practices, local communities have accumulated the knowledge and gained the capability to manage wildlife. They argue further that before the communities were alienated they practiced *active* wildlife management, but this is not necessarily the case. In pre-colonial times African communities did not manage wildlife as such. They only harvested it depending upon availability and according to local beliefs, customs, and taboos. Most of these beliefs, customs, and taboos were not intended as conservation measures. There was little or no over-exploitation only because the harvesting technologies were inefficient and human populations were small." (Songorwa, et al. 2000:608)

Improved technology and economic incentives (both for the market and the growing subsistence needs of a growing population) have increased Inuit wildlife harvesting in general (Born 2005; Hammill, et al. 2004; Sejersen 2001; Witting and Born 2005), and market incentives are known to have increased polar bear harvests (Schweinsburg 1981). Thus harvest control is the most pressing conservation issue for grassroots institutions to address. In order for local level institutions to evolve to manage their resources, individual users must do four things. They must see a problem, recognize human causes and effects on that problem, recognize that they can take action to correct the problem and also decide that it is worthwhile to do so (McCay 2002).

Do Inuit perceive a conservation problem related to polar bears? Many Inuit in Nunavut and Greenland are seeing more bears in their hunting areas (on the land and shore-fast ice, which, along with pack ice are also habitat for polar bears) (Born 2005; Dowsley 2006; Dowsley and Taylor 2006a, b). This has resulted in an increased harvest of polar bears in Greenland and was used as a reason to increase quotas in some areas of Nunavut (notably Western Hudson Bay and Baffin Bay) (Born 2005; Dowsley and Taylor 2006a, b; Sandell and Sandell 1996). Scientific studies from Western Hudson Bay indicate bears are forced on land by melting ice for longer periods of time each year (IUCN in press) and observations in other areas also suggest this is a growing problem (Born 2005; Dowsley and Taylor 2006a). So, although many Inuit feel the sighting of more bears might mean a population increase, and thus less need for management, some worry that climate change is affecting bear behaviour and distribution. This worry is an indication

that some Inuit perceive a conservation problem, but it is not pervasive (Dowsley 2006; Dowsley and Taylor 2006a, b).

The second question is do Inuit have an understanding that hunting could influence polar bear populations? Hunting was, and still is, considered a personal relationship between humans and animals. This understanding of hunting includes the beliefs that animals should be hunted if they present themselves (Fienup-Riordan 1990; Wenzel 2005). Having quotas upsets the human-animal relationship by bragging that hunters could catch the specified number of bears and that they would be so arrogant as to refuse further interactions with bears if they had already taken that number. Such behaviour is thought to cause bears to avoid such people and go to more respectful hunters (Wenzel 2005).

Like other people dealing with mobile wildlife populations (McCay 2002), Inuit have struggled with the idea that hunting could decrease populations, and in some cases already has:

> "As modern technologies have been adopted to pursue traditional activities [such as beluga hunting], there has been a failure to understand or recognize the accompanying larger-scale impacts of increased hunting capacity on a shared community resource." (Hammill, et al. 2004:193)

There are however, examples of a growing understanding of the concept that humans can influence polar bear populations. These can be seen in the support for quotas stated by Inuit in Nunavut (Dowsley 2006; Dowsley and Taylor 2006a) and in statements about the possibility of over hunting:

> "There are two reasons held by Gjoa Haven hunters to explain why there are fewer polar bears in the study area -bear mobility and harvest quotas. One explanation is that polar bears have moved away due to changes in their habitat or disturbances caused by human activity. The other is that hunters from three communities (Cambridge Bay, Taloyoak and Gjoa Haven) have been consistently filling all the tags allocated in their quotas and this is not allowing male bears to mature." (Keith, et al. 2005:142).

If current governance structures were removed, community management objectives would likely change to incorporate Inuit cultural objectives, including improving the relationships between humans and animals through more respectful hunting practices, however the community defined them; but, there is not yet adequate proof that sufficient numbers of Inuit would connect over hunting to a conservation problem.

The third question is, would Inuit, having recognized a problem that has human action as a cause, then recognize something could be done about it? This question is much harder to answer. Inuit are concerned about polar bears (Dowsley and Taylor 2006a, b) and in Nunavut have accepted quota reductions to deal with conservation issues in the past. Unfortunately, the degree to which Inuit accepted these management changes for the sake of conservation versus pressure from the government is not clear (Davis 1999). However, if our grassroots organization has had the experience of management changes to deal with conservation issues, it will at least know this is a possibility. It is also possible that recognition of a human-caused problem would result in radically different

ideas about how to solve it, such as hunting more respectfully by removing harvest constraints.

And finally the fourth question: if the answers to the other questions were positive, would Inuit think it is worthwhile to do something about the conservation issue? During community consultations, in WH on climate change, and in the BB communities of Nunavut regarding Greenland's over harvest, Inuit communities chose not to act immediately on the issues, despite the scientific data on declining populations (Dowsley and Taylor 2006a, b). This may not indicate a lack of concern about the problems, but rather the employment of an 'economics of flexibility' approach to problem solving whereby people stall in order to evaluate the magnitude of the problem (McCay 2002). Nunavut Inuit must weigh the costs and benefits of listening to the scientists. Unfortunately, with a species such as the polar bear that occurs at low densities and is highly mobile, the expected strategy of 'seeing for themselves' by making their own observations of the species, may not occur until much further into a population decline (Dowsley and Taylor 2006b). Thus, even if Inuit are thinking about how to solve the problem, they must still rely on scientists to tell them about it, or risk discovering it too late. Inuit must also evaluate the conservation problem in light of their economic and cultural incentive structures, something that would be difficult to do in one meeting. The answer to questions 3 and 4 then might come in the next few years as Nunavut Inuit are faced with conservation problems in WH and BB and have the de facto power to either deal with them or ignore them.

The answers to the four questions regarding the likelihood of grassroots institutional evolution, do not indicate a strong possibility that Inuit would, in the near future, develop their own institutions to control their harvest of polar bears in order to mitigate population declines caused by hunting or climate change. The current lack of grassroots development of institutional controls on the harvests of Nunavik and Greenland is testimony to this (as are lack of controls on several other species including beluga, and walrus (Hammill, et al. 2004; Sejersen 2001; Witting and Born 2005). Combining this conclusion with the two earlier conclusions about biological principles and legal incentives, the need for regional government is essential to meet the conservation goal of sustainable harvests. But, as illustrated in the Canadian case studies, local level institutions can play an important role in polar bear management as well. Local institutions developed by Inuit with the assistance of higher levels of government have had some successes in wildlife management (Armitage 2005; Brower, et al. 2002). Indeed the development of these institutions and their linkages to higher forms of government are key to successful common pool resource management (Berkes 2002). Thus, the role of regional governments in sustainable managenement must include three things. They first must provide legal incentives and a biologically appropriate level of management, which are both coordinating roles. Third, they must also take a role in the creation of local institutions and engage in a long period of fostering to develop the capacity of the harvesters to understand the conservation issues and create solutions. As local institutions develop, the regional government must also transfer appropriate levels of authority to them without forgetting its first two roles of regional coordination.

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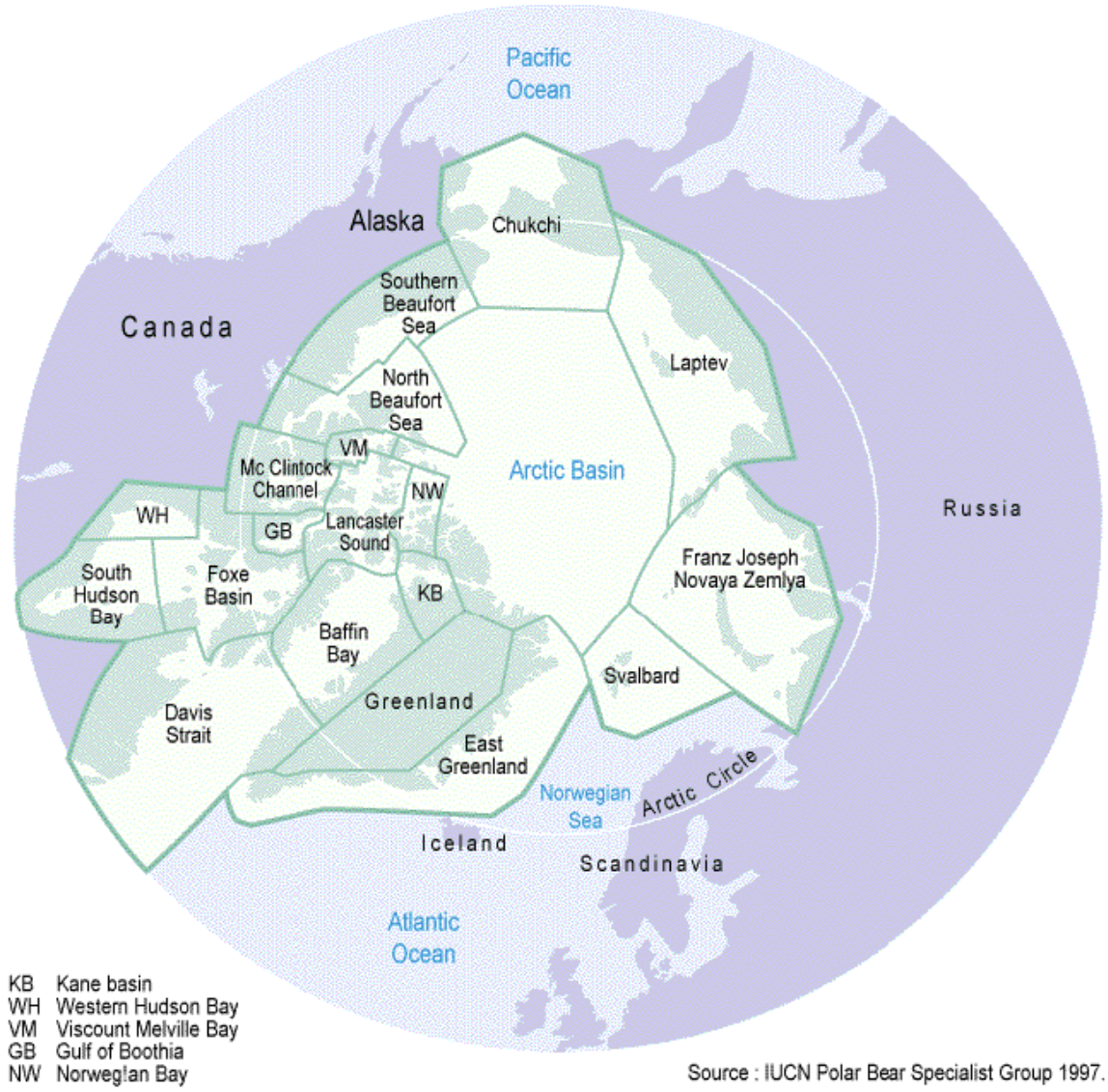

Figure 1. Polar Bear Population Areas.