

**Update of traditional knowledge on polar bears
at Inukjuak and Puvirnutuq, Nunavik**



Report 12-493 submitted to

Aboriginal Species at Risk Fund
Environment Canada
Quebec Region

by

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INTRODUCTION

The International Agreement of the Conservation of polar bears limits harvesting to local people, which in Canada is interpreted as meaning Aboriginal peoples. Management is a provincial responsibility, and in Nunavik, falls under the James Bay and Northern Quebec Agreement (JBNQA). Under this legislation, the province can limit the harvest of polar bears if there is a conservation concern. If a hunter wishes to sell the hide, he must obtain a license from the Quebec Government.

In Canada, polar bears are classified as “of special concern” by COSEWIC (2002). The status of the 13 polar bear populations is reviewed at the annual meeting of the Polar Bear Technical Committee (PBTC) by federal and provincial bear biologists (Stirling and Taylor 1999). Aboriginal groups also participate as traditional knowledge is increasingly being used in polar bear management decisions.

The Nunavik Research Centre has been gathering TEK since Makivik Corporation established a Research Department after the signing of the James Bay and Northern Quebec Agreement in 1975. Since that time, the method of gathering TEK has changed. The present study to update the database of hunter’s knowledge in the Inukjuak / Puvirnituk area used a new method for gathering TEK at the community using an internet mapping system (IMS).

The three populations of polar bears which occur in Quebec are shared with adjacent jurisdictions (Fig. 1). These are: Davis Strait (Newfoundland and Labrador, Nunavut), Foxe Basin (Nunavut, and Southern Hudson (Nunavut and Ontario). The distribution of these populations is based on radio and satellite tagging studies conducted during the 1980s and 1990s (Taylor and Lee 1995). The delineations of these boundaries had to be arbitrary for management purposes. The northern boundary between Southern Hudson (SH) and Fox Basin (FB) populations lies between the communities of Inukjuak and Puvirnituk, an area in which our TEK study focuses.

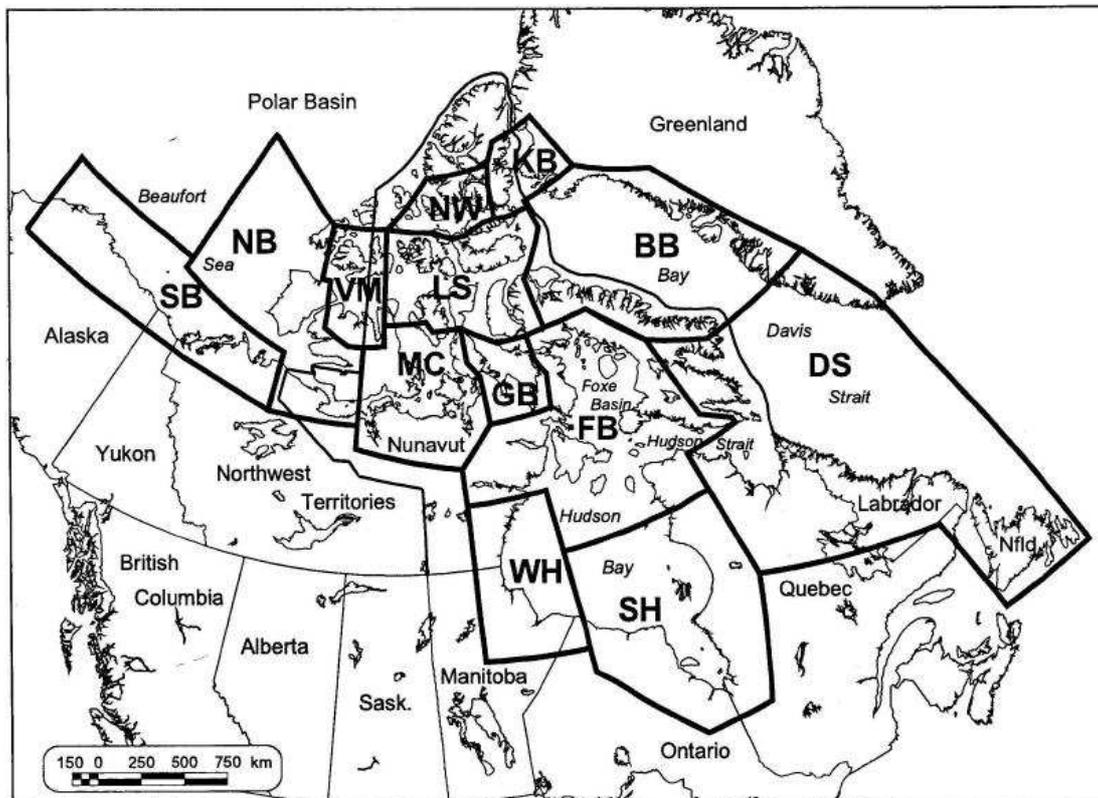


Figure 1. Canadian polar bear populations recognized by the PBTC based on Taylor and Lee (1995).

The Fox Basin population was estimated to number 2,119 (SE=349) by Taylor and Lee (1995), but, based on Inuit knowledge from Nunavut, has thought to have increased to 2300 since then. The Southern Hudson Bay population of polar bears has shown little detectable change from 1984-86 mark-recapture estimates of 1058 ± 220 to those of 2003-2005 of 1025 ± 230 (Obbard 2006). Harvest data is reported to the PBTC by representatives of the provinces and territories. Since harvesting is primarily in winter, it is recorded from Spring year to year For the years, 2000-2001 to 2003-2004, for which harvest data is available for Quebec, an average of 2.25 polar bears are reported taken by Quebec hunters from the Foxe Basin population and 10.25 from the Southern Hudson. Together, on average, aboriginal hunters from Quebec, Ontario and Nunavut reported an annual harvest of 39 bears from SH and 97.25 from FB (Table 1.).

Table 1. Reported harvest of polar bears 2000-2004, from South Hudson and Foxe Basin populations.

		Season					
		00-01	01-02		02-03	03-04	AVG
South Hudson	QC	6	18	SH	6	11	10.25
	ON	7	9		8	8	8.00
	NU	8	25		25	25	20.75
	Total	21	52		39	44	39.00
Foxe Basin	QC	1	4	FB	4	0	2.25
	NU	98	95		92	95	95.00
	Total	99	99		96	95	97.25

METHODS

Conventional technique

Previously TEK was collected throughout Nunavik via interviews of individuals, considered knowledgeable by the community about wildlife. These interviews began in the late 1970s using an interview template for elders and another for non-elders, with the two interview templates facilitating the collection of both historical (pre 1970) and current data (Kemp and Brooke 1995).

Each template consisted of a series of questions asked in Inuktitut about hunting practices which were recorded on standard cassette tapes, and later transcribed into English and stored in ASCII text files. Both spatial and non-spatial questions were posed during the interview. Responses to spatial questions were recorded on a mylar/map combination for later digitization. The TEK interview process is comparable to a semi-directive interview (Huntington, 1998) with hunters encouraged to expand on topics, but directed through a series of pre-arranged questions. Community booklets were created from the digitized data and returned to the communities for verification of accuracy and interpretation

After finishing TEK interviews, map and mylar combinations were digitized using a digitizing tablet. This task can be very time consuming, first records must be digitized then the attribute information must be filled in the database. Records in the database were coded by time period (as either historical or current), by community, type of record, and season. The overall database contains 86,693

spatial records in the form of points and lines representing species (e.g. polar bear, beluga, seal), routes, ice conditions, ecology, and sites.

A total of 427 hunters have been interviewed to date. Of those interviews, 205 hunters have given both historical (pre 1970s) and current (post 1970s) interviews for a total of 286 historical and 346 current interviews.

Internet mapping system

Internet mapping services are now available from geomatics software providers. In 2003, Makivik Corporation purchased the license for ERSI's ArcIMS. The core software does not allow data to be produced or collected via the Web, its main function is online visual map presentation and query. However, functionality can be added to ArcIMS using a variety of programming languages. A server side solution was chosen which means that most of the "work" is done on the host server at Makivik's St-Laurent office which allows the system to work on Nunavik's relatively slow internet connection. Adam Lewis worked with Ms. Karen Robine (Robine GIS Inc of Golden, Colorado, USA) to create the system.

The mapping service was initially designed for online interviews that would update the TEK database on polar bears - it has now been expanded to a wide number of species. The application allows hunters to draw areas on an online map, then fill in an attribute form to describe the areas drawn (i.e. what season, what type of activity, hunter ID, time period). Data is then stored on the host server and can be updated while the interview is being completed. The coordinates of the polygon, all the attribute data, the date of the interview, and the time of submission (which will assist in timing the interview to facilitate payment to the hunter) are recorded on the server. No manual digitization or entry of attributes is required – the information is ready in the GIS database in appropriate form.

A key feature of this internet mapping service on a website is that interviews can be performed at anytime. The cost for travel and accommodation to perform interviews is eliminated. The large volume of paper maps and mylar are no longer needed and do not have to be digitized. Although the software license is expensive, interview costs and the time to complete a TEK project is reduced by the system.

A list of potential interviewees was compiled from previous TEK interviews (1980s) and from a list of hunters that had applied for Quebec Government tags for selling their polar bear hides. Exclusion of deceased hunters reduced the potential number of the previous TEK interviews of 44 to 27 in Inukjuak; 7 hunters were on record for acquiring tags. In Puvirnituk, hunters had not previously been interviewed. Announcements were made on the local FM radio that people who wished to participate should come to the Municipal Office.

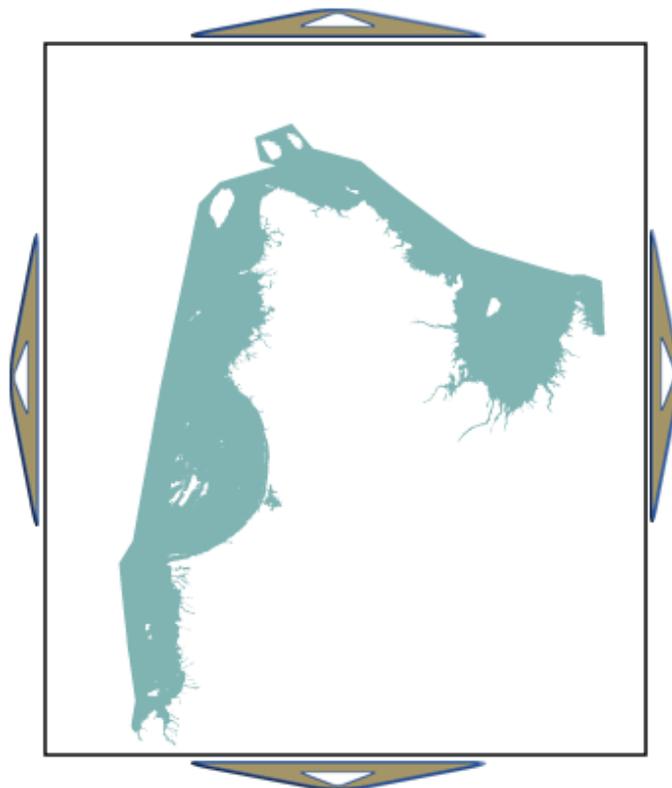
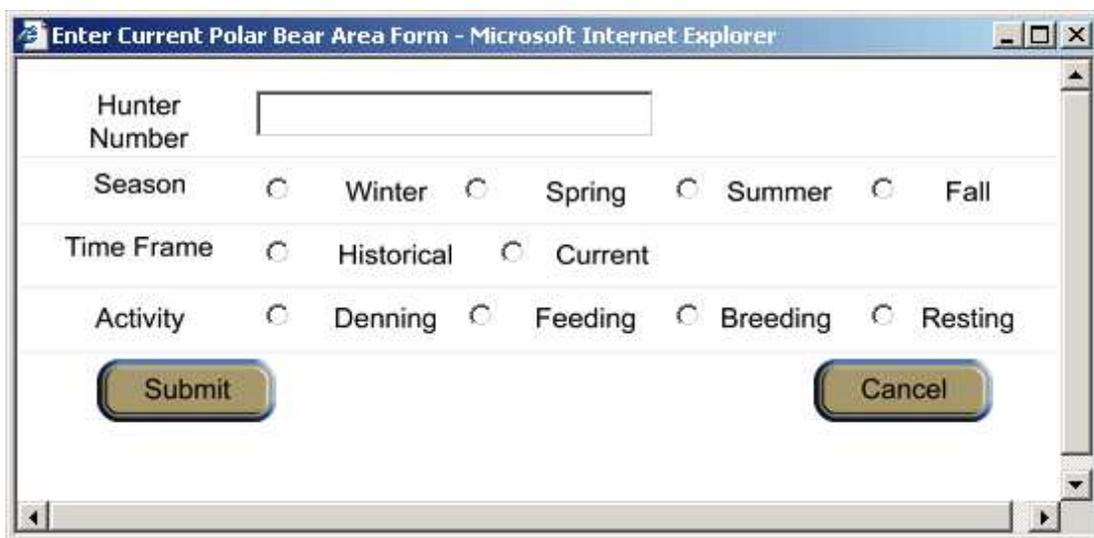


Figure 2. Opening display page of the Internet mapping portal for gathering TEK on polar bears.

Nunavik Data Collection System – Phase 1 Polar Bears

The online mapping system allows users to zoom and pan on the displayed map (Figure 2). The map of Nunavik is based on a 1:50,000 scale so that relatively small habitat areas can be delineated. By using the zoom buttons (+/-) the user is able to select the appropriate scale for the data type that is being entered.

The users select the draw polar bear button (Bear with a polygon) to begin outlining an area on the map. Corrections can be made with the next button to the right (Bear with polygon with small eraser).



The screenshot shows a web browser window titled "Enter Current Polar Bear Area Form - Microsoft Internet Explorer". The form contains the following elements:

- Hunter Number:** A text input field.
- Season:** Radio buttons for Winter, Spring, Summer, and Fall.
- Time Frame:** Radio buttons for Historical and Current.
- Activity:** Radio buttons for Denning, Feeding, Breeding, and Resting.
- Buttons:** "Submit" and "Cancel" buttons.

Figure 3. Display for entering attribute data of area outlined in Fig. 2.

Once an area (polygon) is drawn, the attribute table pops up (Fig. 3) The user enters a hunter ID number and checks the appropriate boxes to enter information. Once that is completed, the submit button is pressed which then sends the information to Makivik's Server in St-Laurent. The opening map is then redisplayed (Fig.2) for further data entry. The user can exit at anytime by closing the webpage.

RESULTS

Sandy Suppa traveled to Montreal on February 22, 2006 and received a one day training session on the software by Adam Lewis before traveling to Inukjuak on February 24, and then on to Puvirnitug on February 28. Eight hunters were interviewed between February 24th and 29th - four from each community. In total, 23 areas were identified as polar bear, denning, feeding, and resting habitat. A breakdown of the data can be seen in Table 2. All data collected were in the current context (post 1970s until present). No hunters were old enough to have information before then. Place names, when known, were manually recorded for each site and entered manually into the GIS database.

Table2. Summary of areas identified as polar bear habitat.

<i>Activity</i>	<i># Areas Identified</i>
Denning	10
Feeding	8
Resting	5
Total	23

Habitat

Denning areas were identified on small offshore islands along the coast (Fig. 4) and are likely maternal dens. Short-term resting places or stopovers used by males in winter are identified in the Inuktitut version of the attribute page as “Resting” in the English version. A large area on the sea-ice, between Puvirnitug and Akulivik, is resting habitat (Fig. 5). The sea-ice, west of Inukjuak, as well as small islands were areas identified as areas used by bears to hunt seals (Figure 6). Polar bears use some of the islands for more than one function (Table 3).

Table 3. Polar bear habitat on islands in eastern Hudson Bay near Inukjuaq and Puvirnitug.

Place	Latitude	Longitude	Denning	Resting	Feeding
Qirkirtajuaq	60° 47'	78° 25'	yes	yes	
Allijivik	59° 07'	78° 40'	yes	yes	yes
Qikirtakallaapik	58° 48'	78° 57'	yes	yes	yes
Waters Island	59° 03'	80° 36'			yes
Ivigituit	60° 12'	77° 41'			yes

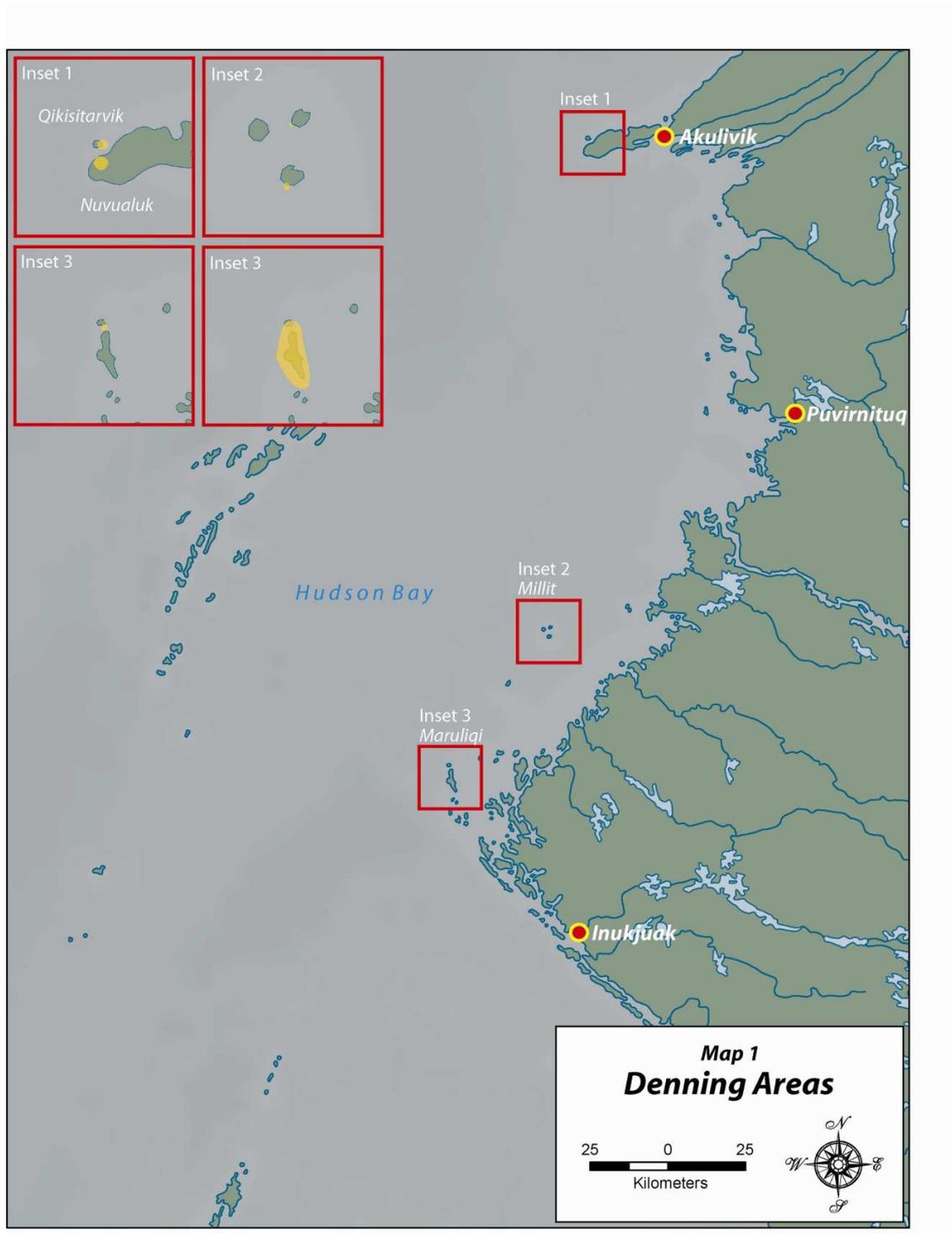


Figure 4. Polar bear denning habitat identified by hunters from Inukjuak and Puvirnituk. February 2006.

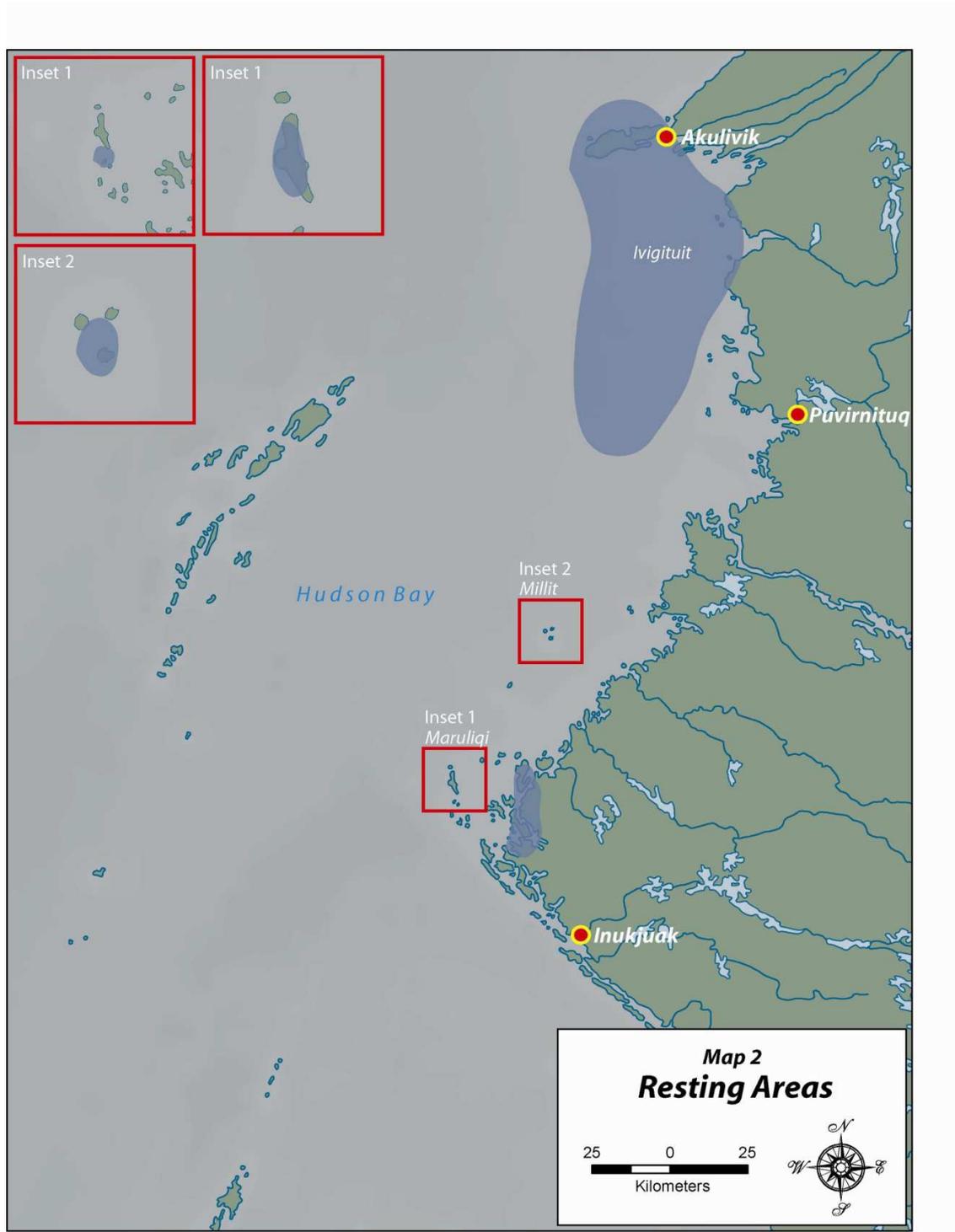


Figure 5. Habitat used by polar bears to rest. Identified by hunters from Inukjuak and Puvirnituk, February 2006.

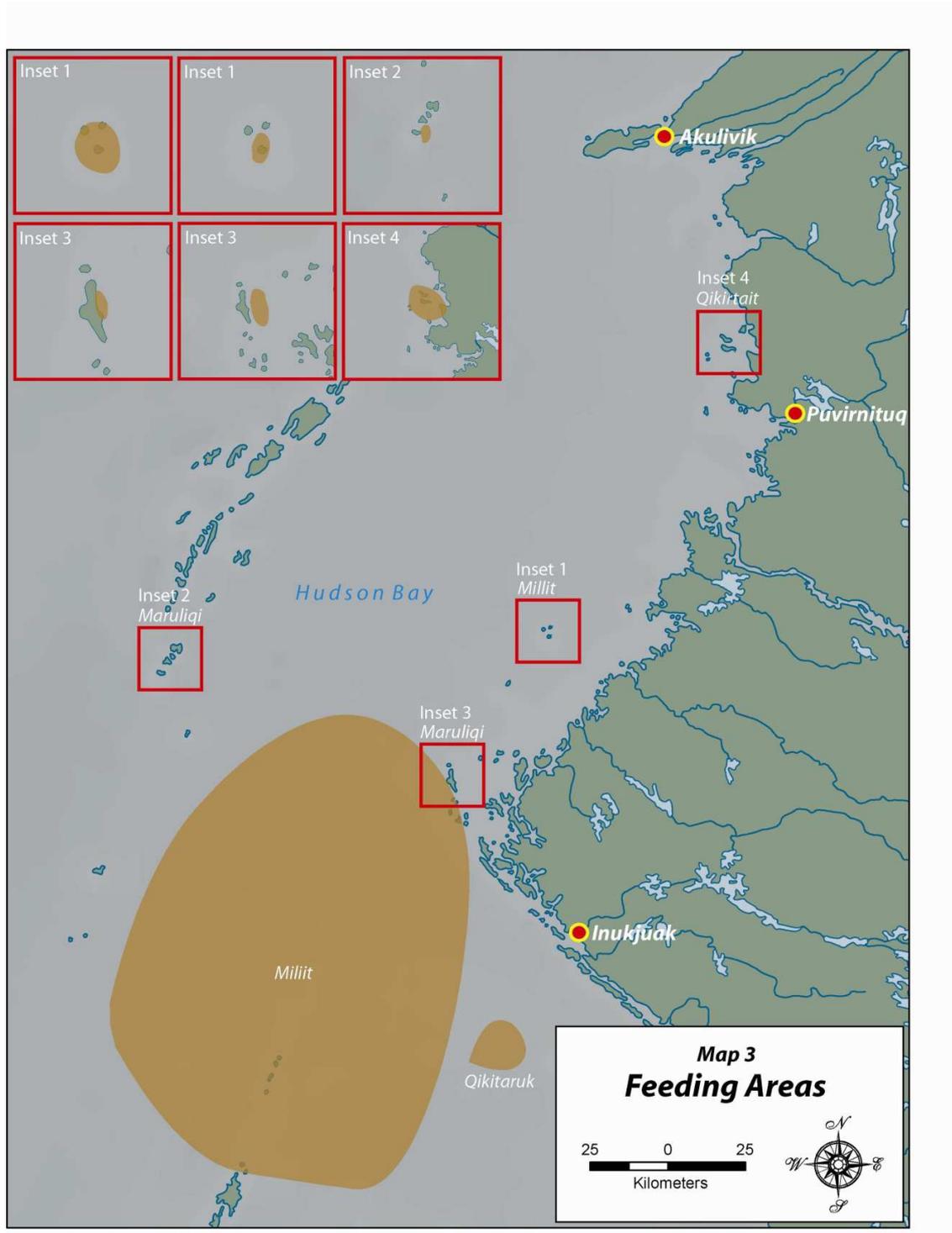


Figure 6. Feeding habitat of polar bears based on interviews of hunters at Inukjuak and Puvirnituaq, February 2006.

DISCUSSION and CONCLUSIONS

To understand changes in the environment over time, a long-term set of data is required. Much historic knowledge is being lost as the generation of elders that lived intimately with the land has passed away. The number of active polar bear hunters also appears to be diminishing in Inukjuak and Puvirnituk – 27 of the 44 hunters interviewed in the late 1970s for earlier TEK interviews are deceased. None of the eight respondents in our small pilot study had historical (pre1970) information to share. A well defined record of available TEK information about bear habitat is needed today as a benchmark for the future.

A number of islands in eastern Hudson Bay have been identified as denning areas. In some cases this information was specific to one location, or it may cover a whole island (Fig 3. two Insets #3 for Qikirtakallaapik). The feeding areas identified are also presumably good ringed seal habitat. A further step in GIS analysis is to overlap this habitat use with sea-ice conditions. Something we plan for the future once the data base is expanded. Such analysis will be pertinent to climate change assessment.

The Inuit have a history of adapting new technology to their use. The use of modern GIS techniques to record traditional knowledge of polar bears in this project is an example of this. The arrival to Nunavik of the internet and the development of IMS interfaces now make the gathering of this information both easier and less expensive. While the small number of individuals interviewed was disappointing, the data collection portal has proved itself technically and we anticipate more TEK will become available, without it being necessary for NRC staff to visit the communities. Additional TEK interviews are planned using an interface which includes most wildlife species in Nunavik (<http://maps.makivik.org/DataCollector/default.aspx?language=english>). Thus the project to gather TEK on polar bears in two Nunavik Communities has provided the spark for a larger more general system (Lewis and Doidge, In prep.).

ACKNOWLEDGEMENTS

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