1. Project Number: NWSF 2-10-15

2. Project Title: Inuit Qaujimajatuqangit of Polar Bear Distribution and Habitat in Foxe Basin

3. Summary:

Inuit Qaujimajatugangit (IQ) of polar bear distribution, habitat (denning, summer retreat and sea ice) and seasonal sea ice habitat availability will be collected for the Foxe Basin polar bear population (FB). This information will be used to map and describe the environmental characteristics of denning, summer retreat and sea ice habitats. The results will be used as variables in habitat models; habitat models which will be explored as a new approach for incorporating IQ in research and management.

4. Introduction:

Polar bears and their management are high priority for Nunavut Wildlife Management Board (NWMB) and Nunavut Department of Environment (GN-DOE). Both organizations are responsible for implementing the community polar bear management agreements and the Nunavut Land Claims Agreement, which both emphasize the use of and integration of IQ in wildlife research and management. Inuit have called upon scientists and resource managers to use IQ in research and decision making. This call has been repeated recently in relation to polar bears and their management in Nunavut and in the species-at-risk assessment.

Some studies have been conducted on the Inuit knowledge of polar bears in Foxe Basin and Hudson Bay (Schweinsburg, c. 1970s, unpublished data); Hudson Bay (Mcdonald et al. 1997); Alaska (Kalxdorff 1997); northern Baffin Island (Dowsley 2005) and Gjoa Haven (Keith 2007). In addition, information on polar bears was collected by the GN DOE as part of its coastal resources inventory (Anon 2008, J. Kennedy, pers. comm. 2009). However, there remain significant gaps in the documentation of IQ of polar bears.

5. Project Objectives:

To use IQ to complement and inform research using standard scientific approaches

- To collect IQ of polar bear use of sea ice habitat and seasonal trends in sea ice
- To collect IQ of polar bear denning and summer habitats
- To map IQ of polar bear seasonal distribution and habitat use
- To create predictive habitat models integrating IQ and scientific information

6. Materials and Methods:

Data Collection

We will continue to use the semi-directed interview approach (Grenier 1998, Huntington 2000) to collect Inuit knowledge of Foxe Basin polar bears. This approach consists of using a set of questions to guide the discussion and help the participant focus on their area of expertise within the research topic. Semi-directed interviews provide flexibility to explore other avenues of thought and understanding not previously considered by the researcher. This research approach has been found to be effective in Nunavut, Canada and internationally (e.g. Grenier 1998, Berkes 1999, Pearce *et al.* 2009). The interview

guide questions will be revised for the 2010 follow-up research based on the information collected in 2009.

Two types of data collection will continue to be used: individual interviews and focal group discussions. HTOs and GN DOE conservation officers will be asked to recommend participants. Participants should be considered people with long term, in-depth, expert knowledge of polar bear distribution, behaviour and habitat use.

Before an interview or focus group discussion begins the consent form is reviewed with each participant. The form is provided in Inuktitut and English, and the review is conducted in the language of preference. When the researcher and participant are satisfied that there is agreement to participate in the research the consent form is signed and the researcher retains the form.

- Individual Interviews: Each person will be provided with a list of questions (in the language of their preference) and a map. The duration of the interview will be flexible and depend on the endurance and knowledge of each participant. The interview will be audio-taped using a digital recorder and a tape recorder, hand notes will be taken and maps annotated. Video recording will occur if the participant is provides consent.
- Focus Group Discussions: Two to four participants will be invited to each focus group discussion. The meeting duration will be 2 hours and will occur at a time of day that is convenient to the participants. Questions and maps will be provided in advance. The discussions are recorded as above.

Digital copies of the digital audio recordings are completed immediately after the interview. Video recordings are transferred to digital media and copies made upon returning to Edmonton at the University of Alberta. Copies of all audio and video recordings have been made and are currently held by Vicki Sahanatien, University of Alberta. Transcripts of all interviews and focus group discussions are completed in English and Inuktitut as soon as possible. Copies of all materials will be deposited for archiving at the Igloolik Research Centre (Nunavut Research Institute).

All participant hand annotated maps will be digitized in ArcGIS©. Metadata and data structures will be developed in consultation with the GN DOE and Kivalliq Inuit Association (KIA) GIS personnel. The spatial information will be provided in ArcGIS format to GN DOE, KIA, and NWMB.

Data analysis

Invivo© software is being used to complete content analysis of the interviews. Based on the 2009 interviews it appears that there will be sufficient polar bear sea ice habitat information to create a spring habitat model. The framework for using IQ in habitat modeling is that based on the premise that Inuit traditional ecological knowledge is expert knowledge (Berkes 1999) thus can be used in models. Expert knowledge and opinion have been used to create models in medicine, transportation, economics and recently in ecology (e.g. image analyses, population status, species distribution). Specific to this research it has

been demonstrated that Inuit have significant sea ice knowledge and expertise (e.g. Oozeva et al. 2004, Laidler and Elee 2008, Laidler et al. 2009). The habitat modeling approach has not been selected at this time but there are several approaches to choose from: fuzzy logic (Mackinson 2001, Patterson et al 2007, Peloquin and Berkes 2009); and habitat suitability index/resource selection (Johnson and Gillingham 2004).

7. Results:
Field work to be completed in February – March 2011. Results to be reported on after that time.

8. Discussion:
N/A at this time.

9. Management Implications:
This project addresses NWMB's and GN's priorities by actively involving Inuit and HTOs in polar bear research, and, testing a method for incorporating *Inuit Qaujimajatuqangit* in wildlife research and management.

Polar Bear Habitat Protection
This study will delineate important sea ice, denning and summer retreat habitat and report on the environmental characteristics of each habitat type. This information can be used by land-management agencies to enhance protection, and to prepare guidelines for best management practices to mitigate impacts of mineral exploration/development, tourism and community activities.

Community Participation in Polar Bear Research
Polar bears are an important cultural and economic species to Nunavummiat. To date there has been little collection of IQ of polar bears in the Foxe Basin region. This research represents a significant contribution to IQ documentation. Information will be available to managers, researchers, communities and schools.

10. Reporting to Communities/Resource Users:
In-person reporting:

- Results from 2009 interviews to HTOs (February – March 2011)
- Verification discussions with interviewees (February – March 2011)
- School presentations - project overview during community visits (2011)

Materials to be provided to communities:

- DVD compilations of 2009 and 2011 interview video recordings (2011)
- Inukitut and English transcripts of all interviews (2011)
- Summary reports by subject of all interviews (2011)
- Bilingual poster summarizing project and results (2011)
- Published articles (2011-2012)

Materials and reporting to date:

- Bilingual poster describing this project (2009)

- In-person reporting at HTO meetings (2008, 2009, 2010) as part of the Foxe Basin polar bear study updates
- School presentations (2008, 2009)
- Annual Foxe Basin polar bear study progress reports (2008, 2009, 2010)

11. References:

Anon, (2008) Nunavut Coastal Resource Inventory – Iglulik Pilot Project. Indian and Northern Affairs Canada & Nunavut Department of Environment. Iqaluit, Canada.

Berkes, F. (1999) Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Taylor & Francis, Philidelphia, USA.

Dowsley, M. (2005) Inuit knowledge regarding climate change and the Baffin Bay polar bear population. Report to Nunavut Department of Environment. Igloolik, NU.

Grech, A., and Marsh, H. (2008) Rapid assessment of risks to a mobile marine mammal in an ecosystem-scale marine protected area. *Conservation Biology*, **22**, 711-720.

Grenier, L. (1998) Working with Indigenous Knowledge A Guide for Researchers. International Development Research Centre, Ottawa Canada.
Huntington, H.P. (2000) Using traditional ecological knowledge in science: methods and applications. *Ecological Applications*, **10**, 1270-1274.

Johnson, C.J. and Gillingham, M.P. (2004) Mapping uncertainty: sensitivity of wildlife habitat ratings to expert opinion. *Journal of Applied Ecology*, **41**, 1032-1041,

Keith, D. (2007) Inuit Knowledge of Polar Bears. CCI Press, Edmonton, Canada.
Kalxdorff, S.B. (1997) Collection of local knowledge regarding polar bear habitat use in Alaska. Marine Mammal Management, Fish and Wildlife Service, AK. USA

Laidler, G.J. and Elee, P. (2008) Human geographies of sea ice: freeze/thaw processes around Cape Dorset, Nunavut, Canada. *Polar Record*, **44**, 51-76.

Laidler, G.J., Ford, J.D., Gough, W.A., Ikummaq, T., Ganon, A.S., Kowal, S., Qrunnt, K., and Irngaut, C. (2009). Travelling and hunting in a changing Arctic: assessing Inuit vulnerability to sea ice change in Igloolik, Nunavut. *Climatic Change*, **94**, 363-397.

Mackinson, S. (2001) Integrating local and scientific knowledge: an example in fisheries science. *Environmental Management*, **27**, 533-545.

Mcdonald, M, Arragutainaq, L, and Novalinga, Z. (1997) Voices from the Bay. Canadian Arctic Resources Committee, Ottawa, Canada.

Oozeva, C., Noongwook, C., Noongwook, G., Alowa, C., and Krupnik, I. 2004 Watching Ice and Weather Our Way. University of Washington Press, USA.

Patterson, B, Jarre, A., Moloney, C.L., Fairweather, T.P., vander Lingen, C.D., Shannon, L.J., and Field, J.G. (2007) A fuzzy-logic tool for multi-criteria decision making in fisheries; the case of the South African pelagic fishery. *Marine and Freshwater Research*, **58**, 1056-1068.

Pearce, T.D., Ford, J.D., Laidler, G.J., Smit, B., Duerden, F., Allarut, M., Andrachuk, M., Baryluk, S., Dialla, A., Elee, P., Goose, A., Ikummaq, T., Joamie, E., Kataoyak, F., Loring, E., Meakin, S., Nickels, S., Shappa, K., Shirley, J., and Wandal, J. (2009) Community collaboration and climate change research in the Canadian Arctic. *Polar Research*, **28**, 10-27.

Peloquin, C. and Berkes, F. (2009) Local knowledge, subsistence harvests, and social-ecological complexity in James Bay. *Human Ecology*, **37**, 533-545.

Interim Financial Report

1. Original Project Budget and Contributions:

BUDGET 2010-2011

Expenditures	**2010/11**
Verification Discussions: 30 hr x $30/hr	900
Chesterfield Inlet & new FB interviews: 60 hrs x $30/hr	1,800
Inuktitut Interpretor - 90 hr x $90/hr	8,100
Inuktitut Translation ~ $65/pg	2,000
Transcription: 90 hr tape x 2 hrs/tape x $50/hr	9,000
HTO special meeting costs	2,000
Video tapes - purchase	700
Transfer video tapes to CD	800
Travel & accommodation - (2010: 1 Kivalliq trip + 1 Baffin trip)	15,500
Food	1,000
Print maps for use in interviews - $15/map	900
Print & mail project posters - $30/map	300
Student stipend - V Sahanatien	25,000
Total	**68,000**

CONTRIBUTORS

Organization	**2010/11**	**In-Kind**
GN DOE	15,000	Annually: office space; 4 pd project advice and review; poster and report distribution
NWMB	23,000	
Parks Canada	5,000	
Garfield Weston Foundation	10,000	
University of Alberta	15,000	Annually: office space, laptop computer, software licences, printing
HTO - in kind		HTO office managers provide crucial project advice, support & office space. Approximately 1 pd/community visit.
Total	**68,000**	

2. Interim Financial Report 2010-2011

All interviews and meetings are scheduled for February 14 – March 09, 2011. Data analyses and reports to follow quickly after that time.

Budget Item	Budgeted	Disbursed	Variance	CarryOver
Verification Discussions: 30 hr x $30/hr	900		0	
Chesterfield Inlet & new FB interviews: 60 hrs x $30/hr	1,800		0	
Inuktitut Interpretor - 90 hr x $90/hr	8,100		0	
Inuktitut Translation ~ $65/pg	2,000		0	
Transcription: 90 hr tape x 2 hrs/tape x $50/hr	9,000		0	
HTO special meeting costs	2,000		0	
Video & audio cassette tapes – purchase	700		0	
Transfer video tapes to CD	800		0	
Travel & accommodation (Kivalliq & Baffin 7 FB communities) cost estimated	15,500		0	
Food	1,000		0	
Print maps for use in interviews - $15/map	900		0	
Print & mail project posters - $30/map – delayed to next fiscal	300		300	300
GIS Contract - digitize maps, create final maps [1]	0		1,500	1,500
Student stipend - V Sahanatien	25,000	25,000	0	
Total	**68,000**	**25,000**	**1,800**	**1,800**

[1] The GIS contract is a new expenditure that will speed along the production of reports. There should be some surplus (~1,500) in the travel/accommodation item as I am travelling to all communities in one trip rather than two trips.