POLAR BEAR INTERACTION PLAN FOR EXTENDED CONTINENTAL SHELF *HEALY* CRUISE IN THE ARCTIC OCEAN
6 September – 1 October, 2008

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I. Summary

In support of Law of the Sea studies, a joint two-ship experiment will be conducted by Canada and the United States in September, 2008 in portions of the western Arctic Ocean north of Alaska and west of the Canadian continental margin. In tandem, USCGC *Healy* will collect multibeam bathymetry and gravity data and CCGS *Louis S. St. Laurent* will collect seismic reflection and single-beam bathymetry data. This polar bear interaction plan was requested by FWS for *Healy* operations. Chief Scientist aboard *Healy* will be Jon Childs, U.S. Geological Survey. *Healy* will leave and return from Barrow, AK. Data collection will be outside of the U.S. 200 nautical mile limit. The vessel is self contained with the crew living aboard the vessel for the entire cruise. There are no on-ice operations planned. The strategy outlined in this polar bear interaction plan parallels the Canadian approaches for marine mammal monitoring and mitigation so that the MMOs are using consistent approaches in their work. Canada uses a one kilometer safety zone around the ship as a critical distance for modifying scientific operations. The *Healy* science crew will abide by the experimental approach and MMO responsibilities set forth in this document.

II. Introduction

During September, 2008, The USCGC *Healy* will participate in a joint Canada-U.S. program to support delineation of U.S. and Canadian Extended Continental Shelves in the Arctic Ocean. The extended continental shelf is sea floor and sub-sea floor that extends beyond 200 nautical miles for which coastal nations have certain sovereign rights. The criteria for defining the limits of the extended continental shelf are contained in Article 76 of the United Nations Convention on the Law of the Sea. Bathymetric and seismic data are the most common data-types used in delimitation. These data types will also be used to understand the tectonic evolution of the Canada Basin, a part of the Arctic where few data exist and multiple hypotheses have been proposed to explain the limited geological and geophysical observations.

For the 2008 field season in the Arctic, *Healy* will work with CCGS *Louis S. St. Laurent (“Louis”)* in a 2-ship experiment. The use of two ships offers opportunities for additional data collection that enhances both extended continental shelf and scientific studies. Chief Scientist aboard *Healy* will be Jon Childs, U.S. Geological Survey. *Healy* will leave and return from Barrow, AK. Data collection will be outside of the U.S. 200 nautical mile limit. The vessel is self contained with the crew living aboard the vessel for the entire cruise. There are no on-ice operations planned. Descriptions of the *Louis* data acquisition systems are given in Attachment A. Descriptions of the *Louis* polar bear overviews and general monitoring and mitigation strategy is given in Attachment B. *Louis* is operating in compliance with Canadian law and is permitted by the Canada Department of Fisheries and Oceans for its work. This polar bear interaction plan addresses *Healy* work during the experiment. Because Canadian and U.S. approaches to marine mammal observing, monitoring, and mitigation are similar, this polar bear interaction plan largely parallels the Canadian plan, so that consistent in approaches are used by the Canadian marine mammal observers required on *Louis,* and U.S. marine mammal observers being voluntarily included on *Healy*. In this way, both vessels can anticipate similar responses and respond accordingly when polar bear are encountered.

III. Description of the Field Study

The two-ship experiment will take place in the northern Canada Basin completely outside of the U.S. 200-nautical mile limit (Figure 1). *Louis* will be collecting data along transects for approximately 16 days as a single-ship operation prior to being joined by *Healy* (yellow lines, Figure 1). The Healy cruise is 26 days (6 September – 1 October). The two-ship component of the experiment will consist of long transits in ice-covered regions (red lines, Figure 1). In general, *Healy* will be the lead ice breaker and collect multibeam bathymetric, high-resolution Chirp subbottom profiler, and gravity data. *Louis* will follow *Healy* and collect multichannel seismic reflection and seismic refraction data. There is also the possibility that at certain locations (for example, near the Canadian continental margin), *Louis* will be the lead ice breaker, and *Healy* will follow. The planned track lines total 3115 km (1682 nautical miles).

Healy scientific equipment is completely hull-mounted (multibeam bathymetric mapping echosounder – Seabeam 2112 12 kHz system, subbottom Chirp profiler – Knudsen 320B/R 3.5 kHz system) or contained within the ship (gravity meter). At the beginning of the cruise, a conductivity-temperature-depth (CTD) profile will be collected using the CTD rosette. At intervals of one to several days, when not interfering with the geophysical experiment, water samples to depths of approximately 30 m will be taken with the CTD rosette. Generally once per day an expendable bathy-thermograph will be deployed to monitor water column structure, and, if warranted, a complete CTD will be taken. These physical oceanographic measurements will be the only over-the-side measurements of the cruise. The Louis helicopter will land periodically on Healy for day-only personnel exchanges. The systems on Healy have been used on three previous extended continental shelf mapping cruises in this part of the Arctic Ocean (Gardner et al., 2006, Mayer and Armstrong, 2007).

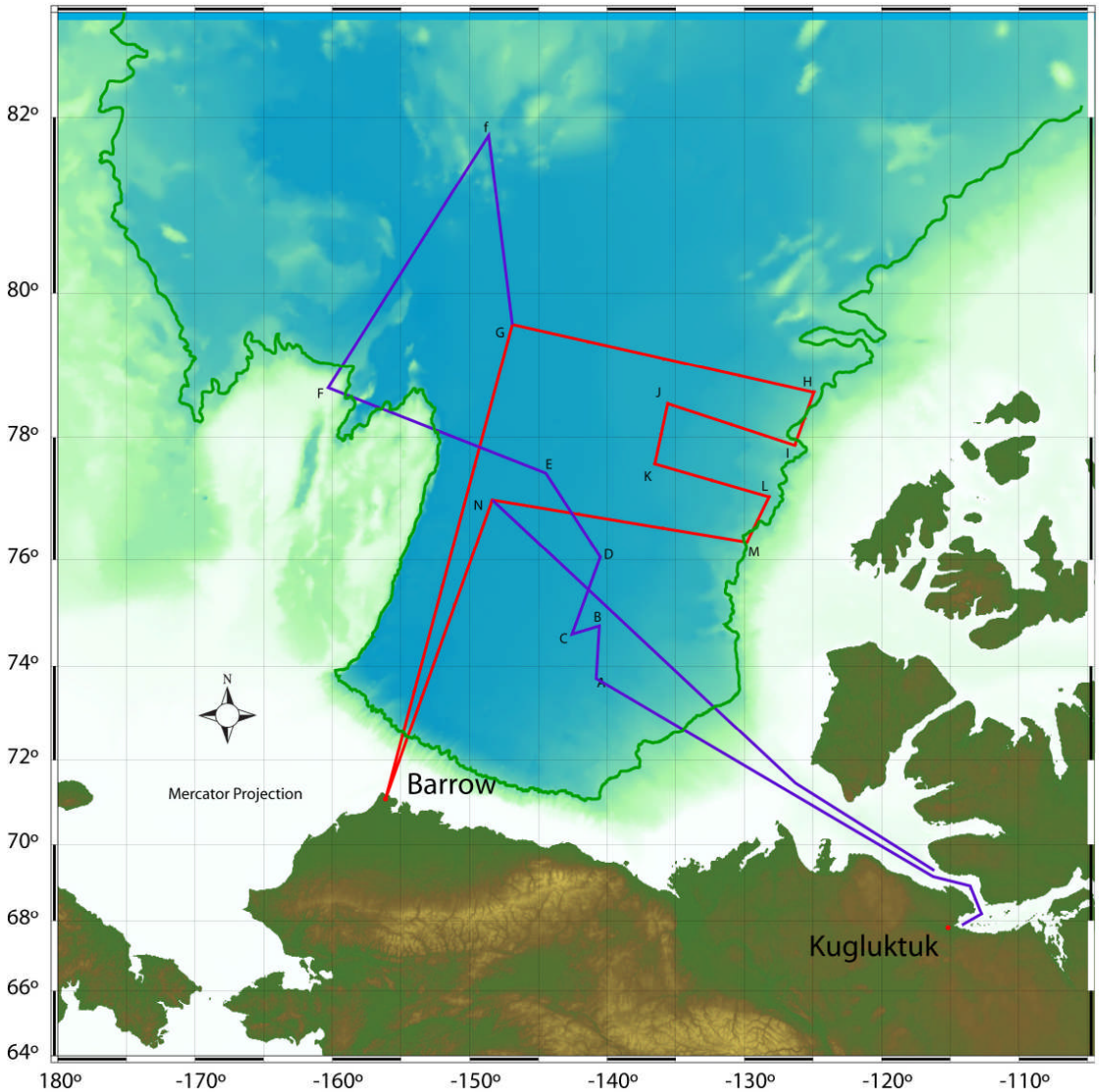

Figure 1: Preliminary tracklines proposed for the Law of the Sea seismic reflection work for USCGC *Healy* and *CCGS Louis S. St. Laurent*, in September, 2008. Blue lines indicate where *Louis* will operate as a single-icebreaker. Red lines indicate where *Louis* and *Healy* will operate as two-ship experiment with *Healy* leading *Louis*. The 2,500-m contour is shown in dark green.

IV. Polar Bears in the Study Area

Nineteen discrete populations of polar bears exist in the circumpolar North American Arctic (Aars et al., 2006). The proposed 2008 Healy cruise will occur within the range of two of these populations: the southern and northern Beaufort polar bear populations (Figure 2). The most up-to-date information about the southern Beaufort population is summarized in Regehr et

at. (2006); information for the northern Beaufort polar bear population is summarized in Stirling et al. (2007). Much of the following information derives from these two reports.

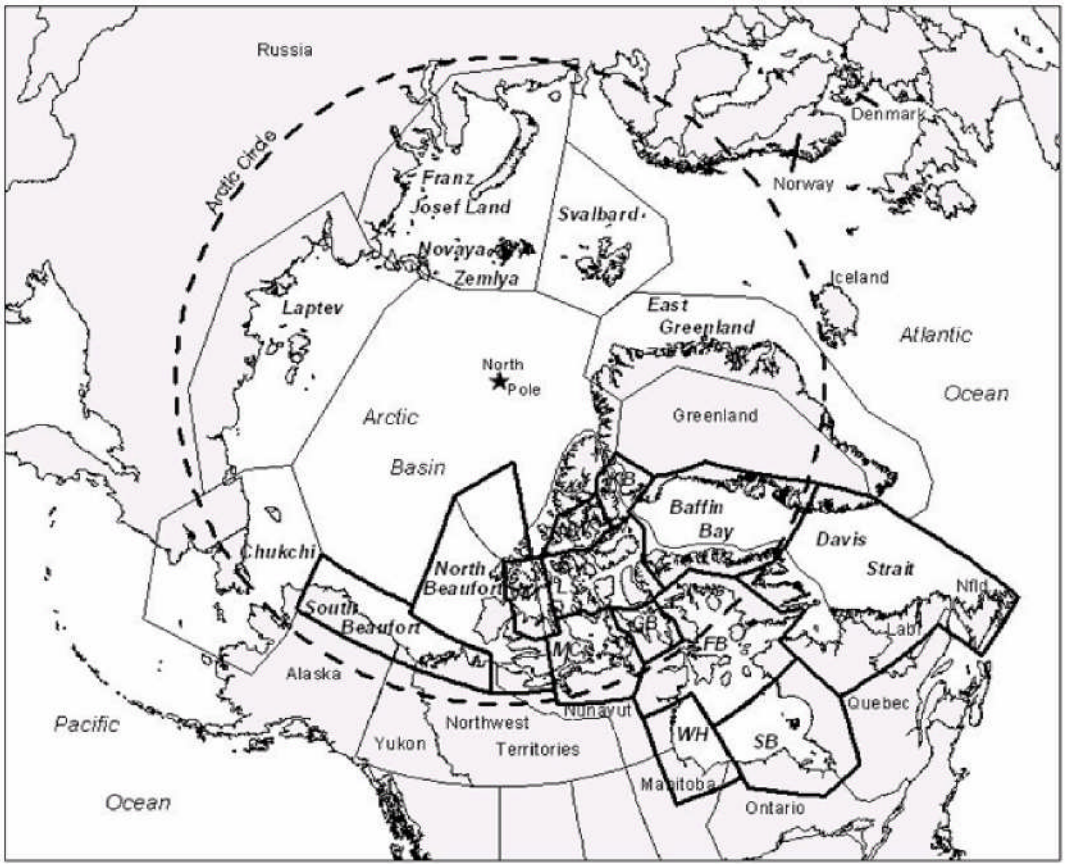

Figure 2: Circum-Arctic polar bear populations according to U.S. Fish and Wildlife Service (source: http://alaska.fws.gov/fisheries/mmm/polarbear/images/circumpolar-maplg.gif). GB=Gulf of Boothia; FB=Foxe Basin; KB = Kane Basin; LS=Lancaster Sound; MC=M'Clintock Channel; NW=Norweigian Bay; SB=Southern Hudson Bay; WH=Western Hudson Bay.

Polar bears are dependent upon sea ice for their survival, using it to hunt their primary food source, seals (Stirling, 1974; Stirling and Latour, 1978; Smith, 1980). Polar bear populations are generally most abundant on the annual ice over the relatively shallow waters of the continental shelf, which are more biologically productive than the offshore deep waters (Stirling et al., 1982; Kingsley et al., 1985; Stirling and Oritsland, 1995). Both the southern and northern Beaufort polar bear populations move north with the ice as it melts in the summer (Amstrup et al., 2000; Mauritzen et al., 2003; Wiig et al., 2003). More polar bears in the Beaufort Sea are also being found on land during the summer season, indicating not all bears move north with the ice (Schliebe et al., 2006).

On May 14, 2008, the polar bear was listed as a threatened species under the Endangered Species Act of the United States. Canada has not listed the polar bear as a threatened species. For many years, the United States and Canada have cooperatively managed hunting polar bears of the southern Beaufort population that encompasses northern Alaska, the Yukon, and

Northwest Territories (Brower et al., 2002). In response to the U.S. listing polar bears as threatened, U.S. Secretary of the Interior, Dirk Kempthorne, and his Canadian counterpart, John Baird, Minister of the Environment, have signed a Memorandum of Understanding for both conserving and managing polar bear populations that are shared by both countries.

Population Estimates

The total estimated size of the southern Beaufort polar bear population based on long-term capture/recapture statistics and population models is 1,526 individuals (±315, 95% CI) (Regehr et al., 2006). Because of uncertainties, this value can not be statistically differentiated from previous estimates of population size, suggesting that the population is stable. However, declining cub survival rates, and decreasing skull and body weight measurements for adult males from this population suggests these southern Beaufort polar bears are nutritionally stressed (Regeher et al., 2007).

Similar capture/recapture models used to estimate the northern Beaufort polar population give an estimate of 980 individuals (±155, 95% CI) (Stirling et al., 2007). These size estimates are also statistically indistinguishable from earlier estimates of the size of the northern Beaufort population. This population, however, is interpreted to be stable (Stirling et al., 2007). The smaller number of polar bears in this northern area (980 individuals versus 1,526 in the southern area), together with the larger areal size of the northern area (compare southern and northern Beaufort areas in Figure 2) indicates that the average density of polar bears in this northern area is considerably less than that of the southern area.

According to Lunn et al. (2002), the total population of circum-Arctic polar bears is ~21,000 - ~25,000. Therefore, the southern and northern Beaufort populations (±2506 individuals) comprise ~ 10 - ~12 % of the total polar bear population.

Potential Encounters

Healy may encounter polar bears from the southern Beaufort population while departing from and returning to Barrow at the start and end of the cruise, although open water conditions during this time of year when ice thaw is at its greatest will contribute to minimizing encounters. For the duration of the cruise, the tracks are primarily within the area of the distribution of the northern Beaufort population.

Polar bears expected to be encountered during the *Healy* 2008 cruise are likely to be few in number. On the *Healy* 2005 cruise with marine mammal observers, three polar bear were sighted along ~2,400 km of observed trackline during 14 days from 70° N to 81° N (Haley and Ireland, 2006). Similarly, for the 2007 Louis 42-day cruise in the Canada basin just north of the U.S. 200 nautical mile limit, less than 30 polar bears were sighted along the ~3,000 km of tracklines (H.R. Jackson, Chief Scientist aboard *Louis*, personal communication).

Effects on the polar bear are anticipated to be minor. Encounters are expected to be when the polar bears are on the ice, where underwater signals from *Healy* multibeam, Chirp systems, or engine noise will not be heard. The sea surface is an efficient reflecting horizon and underwater sound generally does not pass into the air. If any of the encountered polar bears are in the water, levels of *Healy* sound systems would be attenuated by the pressure release effect at the

air/water interface (Greene and Richardson, 1988; Richardson et al., 1995). Polar bears generally do not dive much below the water's surface.

The icebreaking operation may change the geometry or width of open-water leads, and therefore affect habitat, but these changes are expected to be minor. Healy will make every attempt to follow existing leads rather than creating new leads during the profiling. Depending on wind and current conditions, the ice often closes behind the vessel returning the track path to its previous ice-covered state.

V. Subsistence Harvest Considerations

The information on subsistence harvest considerations presented in Crain (2006, p. 61) applies equally well to the 2008 Healy cruise:

> *"Hunting typically occurs during periods of heavy ice coverage (winter and spring; USGI/BLM 2003), not during the open-water season when the seismic survey will be conducted. Therefore, the proposed survey is not expected to disrupt subsistence hunting of polar bears. In the event that both marine mammals and hunters were near the Healy when it begins surveying, the proposed project potentially could impact the availability of marine mammals for the harvest in a very small area immediately around the Healy. However, the majority of marine mammals are taken by hunters within ~24 – 33 km offshore (USGI/BLM, 2005), and the Healy will conduct its survey operations significantly farther offshore than that. After debarking from Barrow, the UTIG cruise takes place in a region far north of where polar bear subsistence hunting is known to occur, transiting to >150 km north of Barrow, the bears that may be encountered by Healy are so far from any subsistence hunting villages in Alaska and Russia that no ongoing hunt is expected to be interrupted."*

For the 2008 experiment, *Healy* will be near shore during embarking (6 September, 2008) and disembarking (1 October, 2008). This is not considered a time in which polar bears will be hunted because of (a) open water and (b) occurrence of the fall bow-head whale harvest (as per C. Brower, personal communication).

VI. Polar Bear Interaction Strategy

The objectives of the polar bear interaction strategy are to avoid situations where polar bears will be encountered at less than 1 km, and to minimize disturbance to their natural habitat. This strategy contains four parts: (a) survey designs that minimize encounters; (b) marine mammal observer actions; (c) marine mammal observer actions in support of *Louis* operations; and (d) steps to follow when an encounter occurs. Because no scientists are expected to work on the ice, there should be no human-bear interactions. Further, *Healy* does not have a helicopter aboard, so this interaction strategy does not include actions for hazing or moving polar bears on the ice.

Survey Designs that Minimize Encounters

- All of the proposed track lines are in water depths or greater than 2,000 m, i.e., well beyond the continental margin and shallow-water habitats of the continental shelf where polar bear prefer to live (Stirling and Oritsland, 1995).
- The long, linear proposed tracks mean *Healy* (and *Louis)* will not be in any one area for an extended period of time. Therefore, any encounters with and presumed impacts on bears will be local and of short duration.
- Every attempt will be made to follow existing leads while fulfilling the objectives and safe operations of the cruise, and simultaneously avoiding any sighted polar bears. Conducting the experiment in existing leads should minimize disturbance of sea-ice habitat.
- The speed of proposed profiling (2-4 knots, depending on how heavy the sea ice is) should allow sufficient time to visually identify polar bears at a distance and take appropriate actions.
- The Chief Scientist of *Healy* will brief the ship and science crew of this plan at the beginning of the experiment and post copies of the plan on the bridge, lounge, and actively-used laboratories.

Marine Mammal Observer (MMO) Actions

- There will be two observers aboard *Healy*, one who a skilled marine mammal observer (MMO) with NOAA/NMFS sanctioned training and background in biological research; and a second community observer with indigeneous/traditional knowledge, experienced in the Arctic landscape and a background in subsistence hunting.
- The MMOs will record all polar bear observations using the attached polar bear observation form (Attachment C).
- A response strategy for when a polar bear is encountered will be followed, as outlined in the polar bear interaction notification diagram (Attachment D).

Marine Mammal Observer Actions in Support of Louis *Operations*

- *Healy* MMOs will make observations in support of MMOs aboard *Louis* who will be recommending actions to be taken for *Louis* seismic operations. The safety radius for Louis seismic operations and marine mammals is 1 km.
- A copy of portions of the 2008 Canadian Environmental Assessment relevant to marine mammals and polar bears is given in Attachment B.
- *Healy* MMOs will be in regular communication with MMOs aboard *Louis* regarding any polar bear sightings.
- A wireless network and radio communications between the two ships will facilitate regular and on-demand communications between the MMOs on both vessels.
- Early in the cruise, the captain of *Louis* has agreed to a meeting of the MMOs on both vessels to facilitate their working together. *Louis* has a helicopter that can be used to transfer MMOs and community observers between the two vessels for day-time visits.

Steps to Follow when an Encounter Occurs

- For the sighting of a polar bear at a distance greater than 1 km, the MMO will record all

relevant details about the sighting on the polar bear observation form (Attachment C).

- For an incidental encounter with a polar bear within 1 km of *Healy*, the MMOs will immediately notify the MMOs aboard *Louis* who will decide the appropriate course of action to be taken for the seismic operations (for example, shutting down the seismic operations or altering course). The MMOs will also record all details of the incident on the polar bear observation form (Attachment C).
- If there are any lethal encounters with a polar bear as a result of Healy operations, the MMOs will immediately notify the U.S. Fish and Wildlife Service (Craig Perham) as well as recording details, relevant witness statements, and other information. The entire carcass will be transported to shore (Barrow, AK). The U.S. Fish and Wildlife Service (Craig Perham) will decide disposal of the carcass.

U.S. Fish and Wildlife Contacts:

Primary: Craig Perham
Polar Bear and Incidental Take Coordinator
U.S. Fish and Wildlife Service
Marine Mammals Management
1011 E. Tudor Road
Anchorage, Alaska, 99503
907-786-3810
Craig.Perham@fws.gov

Alternate: Tom Evans
907-786-3814
Thomas_Evans@fws.gov

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Attachments

Attachment A: *Louis* Data Acquisition Systems

Attachment B: 2008 *Louis* Marine Mammal Monitoring and Mitigation Strategy

Attachment C: Polar Bear Observation Form

Attachment D: Polar Bear Interaction Notification Diagram

Attachment A: *Louis* Data Acquisition Systems

This attachment gives relevant sections of the DFO environmental assessment with respect to Louis operations and scientific equipment. The source of information is:

Hawkins, C.M., 2008, Canadian polar margin seismic reflection survey in waters offshore of the western Canadian Arctic Islands in support of the Law of the Sea, Environmental Assessment - 2008 Survey: Dartmouth, NS., Administrative Report prepared for H.R. Jackson, May, 2008, 113 pp.

2.2 Experiment

In overview, the project requires the acquisition of seismic reflection data, based on scientific and technical guidelines provided by CLCS. A seismic air-gun array of up to 1820 cu in will be used to provide information on the thickness of sedimentary layers as deep as the crust or bedrock. The array is towed continuously, as ice conditions permit, behind the Canadian icebreaker CCGS Louis St. Laurent that was preloaded with all resource/material requirements for the field survey prior to its departure from Dartmouth, Nova Scotia. The location of the survey area is from the offshore extension of the Canadian border with Alaska to the east seaward of the Canadian Arctic Islands as far as the ice conditions allow. The seismic lines will start at about 2500 m bathymetric contour and continue seaward. There will be no seismic profiling on the shallow water continental shelf region.

...

2.4 Project Component

The primary project component relevant to the seismic survey is the Field Data Acquisition program. This component will take place solely from the research vessel, CCGS Louis St. Laurent. The icebreaker Healy will provide ice-breaking support. There are four activities associated with the Field Data Acquisition component: gear deployment, ‘ramping-up” of seismic air-gun array, firing of air-gun array and data recording and finally, gear retrieval. A short duration for these activities is anticipated during the total period of the survey (42 field

days, mid-August to early October 2008) due to the sever ice conditions historically experienced in this region of the western Canadian high Arctic. Consequently, the frequency, magnitude and extent of these activities are extremely low and subject to continual disruption and change due to the pack-ice conditions expected. Notwithstanding, large marine mammals may frequent peripheral landward regions of the survey area. However, the field program begins at about the 2500 m bathymetric contour and proceeds seaward to deeper waters. This starting area is greater than 60 nm (100 km) from the nearest coastal areas that are most frequently occupied by large marine mammals. Any anticipated interaction with marine mammals is considered low. Nonetheless, appropriate mitigative measures will be adopted to address the potential of any marine mammal interaction. The field program may affect marine fish. However, at such far distances offshore where the seismic field program will be undertaken, there are no commercial fisheries or aboriginal traditional resource use activities. Nevertheless, mitigation measures such as “ramping-up” the air-gun array will be adopted (see Mitigation section below) and 3 observers for marine mammals will be on board to ensure no marine mammals are within 1 kilometer of the array. It should be noted that during the previous year of seismic exploration in this same region no marine mammals were seen by native observers on the Louis St. Laurent research vessel (Appendix 1).

Attachment B: 2008 *Louis* Marine Mammal Monitoring and Mitigation Strategy

This attachment gives relevant sections of the DFO environmental assessment with respect to polar bears or to marine mammals when polar bears are not specifically cites. The source of information is:

Hawkins, C.M., 2008, Canadian polar margin seismic reflection survey in waters offshore of the western Canadian Arctic Islands in support of the Law of the Sea, Environmental Assessment - 2008 Survey: Dartmouth, NS., Administrative Report prepared for H.R. Jackson, May, 2008, 113 pp.

3.3.7 Polar Bears

Taylor and Lee (1995) have discussed the distribution and abundance of Canadian Polar Bear Populations. For the Canadian Arctic they have determined that there are 12 discrete polar bear populations as based on movements of marked and recaptured as well as killed bears (Figures 7,8). Two populations are important with respect to the CPMSRS-08, the southern Beaufort Sea and Northern Beaufort Sea populations. Based on their data, they have estimated that the density of southern Beaufort Sea polar bear population is in the order of 7 bears per 10,000 km^2 and for the northern Beaufort Sea population a density of about 6.5 bears per 10,000 km^2. Given that the total area to be surveyed in this study is about 350,000 km^2 there could be potentially 250 polar bears within the entire survey area.

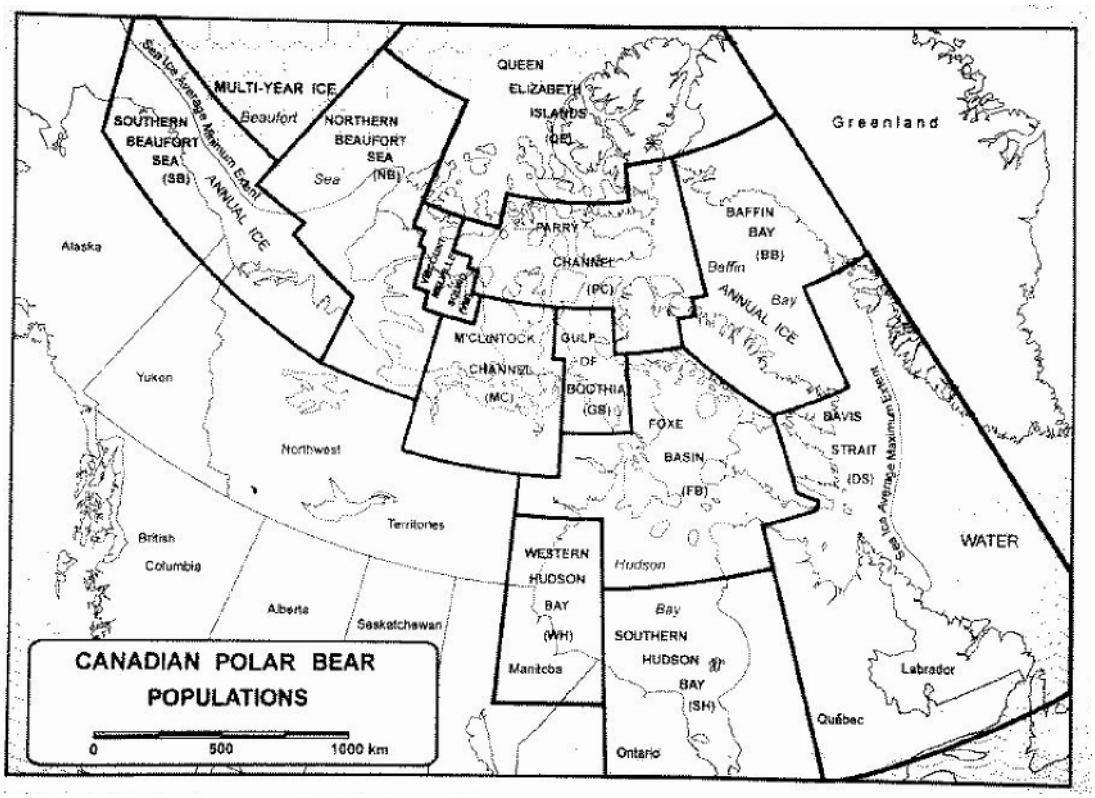

Figure 7. Polar Bear distribution in the Arctic. (From Taylor and Lee 1995)

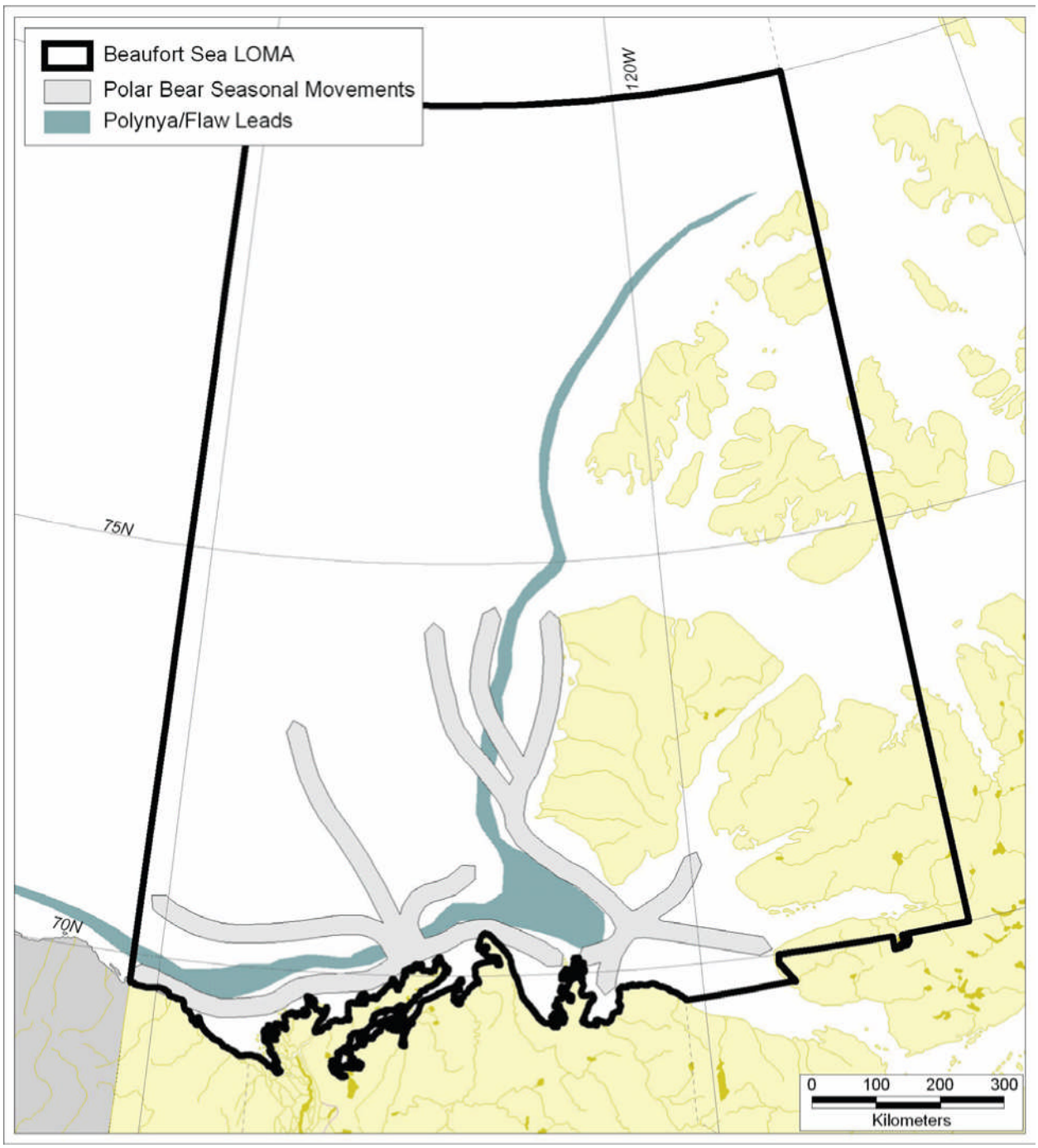

Figure 8. General pattern of seasonal polar bear movements in the Beaufort Sea (DFO 2007).

4.4 Potential Impacts of Project ...

4.4.1 Marine Mammals

... With respect to polar bears, it is highly unlikely that the sub-sea sound produced will impact bears if they are encountered as the sound will be produced underwater.

...

8.0 Mitigation

All standard and industrially related mitigative measures pertaining to the use of seismic air-gun arrays for exploration will be adopted and followed by the CPMSRS-08. For the marine mammals, especially the whales, it has generally been accepted that a safety radius or zone of about 1 km from the sound generating source be adopted to reduce received sound levels (LGL 2005). This safety zone will be adopted for the CPMSRS-08. Note that this sound level is about the same sound production level that is produced by cracking and breaking pack ice that is prevalent in this high Arctic environment, and represents a background noise level. Further mitigative measures with respect to potential marine mammal interaction with the project will be adopted. These include:

1. Alteration of vessel speed/course providing it will not compromise operational safety requirements.
2. Air-guns will be shut down if any marine mammal enters or is anticipated to enter the 1 km safety zone through observations by a trained marine mammal observer on the research vessel.
3. Air-gun start-up procedures will not commence unless a full 1 km safety zone is clear of any marine mammal by visual inspection by a trained marine mammal observer for a continuous period of at least 30 minutes.
4. The air-gun array will be “powered down” during transit from one seismic line to another. All guns will be turned off except for one gun, which will function as a signal intended to alert marine mammals of the presence of a seismic vessel in the region.
5. Total shut down of all air-gun activity will occur and not resume until all marine mammals have cleared the 1 km safety zone.

6 Air-gun start-up procedures will include a “ramping up” period. The rate of ramping up will be monitored so that it will not exceed more than 5 dB per 5 minute period.

7 The location of the CPMSRS-08 will no take place in the vicinity of any beluga harvest area or during the period of beluga harvest.

8 There will be 3 marine mammal observers on board the seismic research vessel.

With respect to polar bears, it is highly unlikely that the sub-sea sound produced will impact bears if they are encountered. If seen by a trained marine mammal observer within the 1 km safety zone all of the above mitigative measures will be applied to ensure that no project interaction occurs.

...

9.0 Accidents and Malfunctions

All field collection of seismic data will be carried out on the Canadian icebreaker, Louis St. Laurent. All safety measures established on the icebreaker will be enforced while seismic data are collected. Dedicated safety officers and crew of the icebreaker will be fully briefed on the procedures required by the scientific staff for deployment, data collection, and instrument retrieval. No instrument deployment/data collection will occur at any time without the knowledge of the vessel captain or designate. The vessel carries trained personnel and applies specific protocols to deal with equipment malfunctions that may lead to the spill of toxic materials. The vessel also carries trained medical personnel to deal with potential medical conditions/emergencies that may arise during long voyages at sea.

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9.1 Effects of Environment on the Project

The pack-ice conditions that will be experienced in this area of the western Canadian high Arctic will pose the greatest environmental restrictions affecting the collection of seismic data. The thickness of the pack ice, generally greater than 3 m, may restrict the movements of the icebreaker Louis St. Laurent, and consequently impact spatial and temporal deployment and retrieval of seismic data collection gear. For this reason, the active period of seismic data collection is estimated to be considerably less than the 42-day window available for the field data acquisition program.

10 Cumulative Environmental Effects

None of the VEC's was determined to be significantly affected by the Canadian Polar Margin Seismic Field Survey program. The remote and inhospitable nature of the western Canadian high Arctic region precludes human activity. The background noise levels are high reaching 180 dB and the nearest point of land from any point where seismic data will be collected is greater than100 km. There is no commercial vessel traffic in the area due to the extremely thick pack-ice conditions. In addition, there are no aircraft flights through the area that may contribute to a cumulative noise effect. Furthermore, during the 42-day field program window, it is estimated that considerably less than 42 days will be available to actively collect seismic data due to the severe pack-ice conditions. On the basis of location remoteness, high ambient background ambient noise levels, the inability of ships to travel the extensive pack-ice, no aircraft flights in this harsh environment and the short duration of the active seismic data collection within a scheduled period of 42 days, no past, present or future cumulative effects on any environmental element is envisioned during the period of the proposed study.

11 Consultations

Information sessions were held with 8 regional communities, their respective Hunters and Trappers Committees and other interested stakeholders. The consultative process began in February 2006 and repeated in 2007. There were no questions on the potential impacts of the CPMSRS-08 study on aquatic marine resources. The few questions that were posed related to the UNCLOS program and process. Nevertheless, any pertinent comment brought forth in any of the information sessions is addressed in this environmental assessment and a copy of the information session summary minutes is presented in Appendix 5.

In addition, the regional EISC as well as the regional Department of Fisheries and Oceans (DFO) were consulted for concerns related to fish and fish habitat potential impacts. DFO involvement is due to the potential issuance of a s.32 Fisheries Act Authorization for the destruction/alteration of fish habitat by means other than fishing. For the seismic programs already conducted, the Environmental Impact Screening Committee (EISC) of the Northwest Territories, Environment Canada, the National Energy Board and the Department of Fisheries and Oceans gave their authorization for the seismic data acquisition program. The present survey is an extension of the 2007 survey.

12 Follow-up

No follow-up program is required for this project. The active seismic data collection program is short-lived, in the order of 42 days. There are no residual environmental impacts expected on any marine life: birds, mammals, fish, invertebrates that would require follow-up investigations. Members of the Hunters and Trappers Community will be present at the experiment to monitor any potential environmental effects.

13 Conclusion

The Canadian Polar Margin Seismic project is not likely to cause important environmental effects, taking into account the implementation of appropriate mitigation measures.

Attachment C: Polar Bear Observation Form

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

POLAR BEAR SIGHTING REPORT

Date: _____ Observer name: _____
Time: _____ Contact number/email: _____

Location: _____
_____

Latitude: _____ Longitude_____ Datum: _____

Weather conditions: Fog_____ Snow_____ Rain_____ Clear_____ Temperature_____F/C

Wind speed_____mph/kts Wind direction_____ Visibility: Poor
Fair
Good
Excellent_____

Number of bears:

_____ Adult M/F
_____ Sub-adult
_____ Unknown

_____ Sow/cub(s)
_____ Sow/yearling(s)
_____ Sow/2YO(s)

Estimated distance of bear(s) from personnel_____ (meters) and facility: ____ (meters)

Possible attractants present: _____

Bear behavior: Curious_____ Aggressive_____ Predatory_____ Passing through ____ Other____

Description of encounter: _____
_____
_____
_____

Duration of encounter: _____

Deterrents used/distance:

_____ Vehicle
_____ CrackerShell
_____ Rubber bullet

_____ Bean bag
_____ Horn/siren
_____ Spotlight/Headlight

_____Other
_____

Agency/Contacts:

USFWS_____ Time_____ Date_____
ADF&G_____ Time_____ Date_____
CLIENT_____ Time_____ Date_____

Attachment D: Polar Bear Interaction Notification Diagram