

NOAA REPORT TO THE AICC
JUNE 3-4, 2008
Compiled by K. Crane
Arctic Research, Climate Program Office
NOAA

**Abundance and Distribution Surveys for Ice Seals Aboard the USCG
Healy and the Oscar Dyson, 10 April – 18 June 2007**

**National Marine Mammal Laboratory (NMML)
Polar Ecosystems Program**

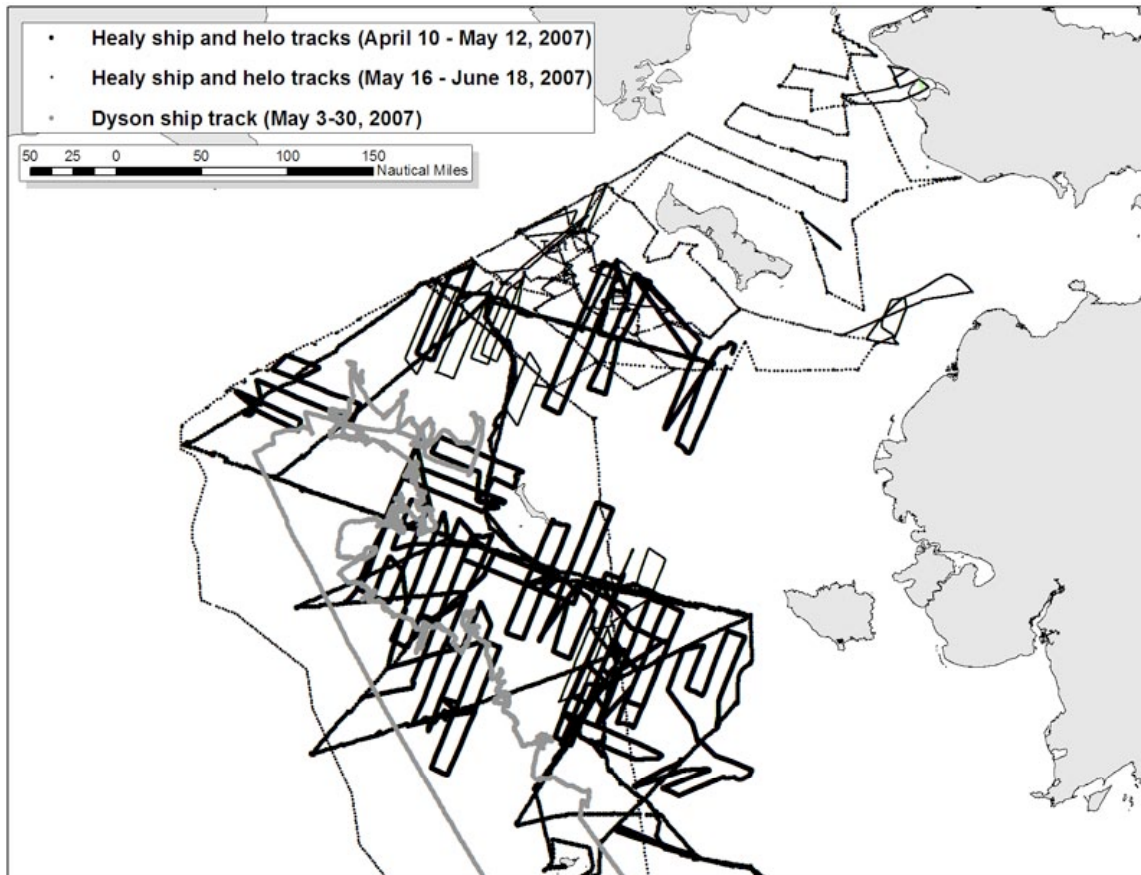
Species	Shipboard	Helicopter
Bearded seal	225	320
Ribbon seal	204	217
Ringed seal	46	24
Spotted seal	436	778
Unknown pinniped	205	228
Walrus	329	283
TOTAL	1,445	1,850

Table 1. Number of seals and walrus observed during the Healy shipboard and helicopter surveys.

Researchers from the National Marine Mammal Laboratory's Polar Ecosystems Program (PEP) were joined by four Alaska Native seal hunters to conduct shipboard and aerial abundance and distribution surveys for the four species of ice-breeding seals (i.e., bearded, spotted, ribbon, and ringed seals) which are known to occupy the eastern region of the Bering Sea in spring and summer.

The fieldwork was conducted during two cruises (10 April–12 May and 16 May–18 June 2007) on the U.S. Coast Guard icebreaker Healy and a cruise (3–30 May 2007) on the NOAA ship Oscar Dyson .

Whenever the Healy was moving and within 750 m of sea ice, between the hours of 0600 and 1800 local apparent time, at least two observers were posted on the bridge to record the presence of seals and walrus. Information on the species, group size, and distance from the ship's trackline (as calculated using angle measurements from inclinometers) was recorded along with sea-ice type and concentration, weather, and visibility. Where possible, the age, sex, and molt stage of animals were also recorded. In all, 1,116 individual seals (Table 1 above) were observed during 131 hours and 50 minutes of survey effort covering 1,116.0 nautical miles (nmi) of survey line.



Whenever the Healy was near ice and the weather conditions were conducive to flying, between 0900 and 1500 local apparent time, we also conducted line-transect surveys from a helicopter based aboard the icebreaker. Each flight had 2-3 observers and was flown at an altitude of 400 ft and a speed of 95 knots. A camera mounted on the airframe took digital pictures of the area underneath the helicopter every 2 seconds. These images will be analyzed for the presence of seals and to identify the type and percent cover of sea ice. As with the shipboard surveys, information on the species, group size, and distance from the helicopter's trackline was recorded.

In all, 1,567 seals (Table 1 above) were observed during 48 hours and 55 minutes of survey effort covering 4,414.4 nmi of survey line on 44 flights.

We also conducted line-transect surveys opportunistically from the Oscar Dyson's bridge. We recorded 296 seals or groups of seals while on effort, of which 47% were spotted seals, 22% were ribbon seals, less than 1% were bearded seals, and the remainder (30%) could not be identified to species, usually because of distance from the observer.

Preliminary analyses indicate some habitat partitioning among the three most abundant species of ice seals in spring. This partitioning may be related to their foraging strategies. Bearded seals are benthic feeders and were most abundant in the shallow waters near the St. Lawrence Island polynia, where walrus (also benthic feeders) were also most abundant.

Ribbon seals are known to forage at depths over 500 m and were most abundant at the southern edge of the sea ice and close to the shelf break, in close proximity to deep water. Spotted seals feed throughout the water column while over the Bering Sea shelf and tended to occupy the more interior areas of the pack ice.

These associations tended to break down later in the season as the reduction of the ice field limited areas available for hauling out. Survey data from cruises planned for 2008 and 2009 will contribute further to a database that will eventually be used to calculate the springtime abundance and distribution of ice seals in the eastern Bering Sea.

By Michael Cameron and Peter Boveng

BERING SEA ECOSYSTEM STUDY April/May 2007, 2008
Phyllis Stabeno PMEL, NOAA
Jeff Napp AFSC, NOAA
John Bengtson and Peter Boveng, NMML, NOAA

This team used the USCG Cutter Healy in April/May 2007 and again in 2008 as part of NSF's Bering Sea Ecosystem Study. In addition to scientists from PMEL there were three groups from Fisheries (AFSC) in 2007. Jeff Napp's group collected zooplankton, Alex DeRobertis (Alex.DeRobertis@noaa.gov) made acoustic measurements under the ice to explore if there was a significant population of fish under the ice and John Bengtson and Peter Boveng from NMML conducted areal enumeration of ice seal population (John.Bengtson@noaa.gov, Peter.Boveng@noaa.gov). (See larger description of this work below). Both Jeff Napp and Phyllis Stabeno received some NSF funds to contribute to the cruise while Alex DeRobertis and NMML were funded by NOAA. In 2008 only DeRobertis and Stabeno's group participated on the cruise.

PMEL, NOAA contributed to the cruise in multiple ways: The basic hydrographic sections done were ones that were developed by PMEL in conjunction with other Bering Scientists. PMEL scientists were lead on hydrography, both collecting data for NOAA and ensuring that each group got the water they needed from CTD casts. PMEL scientists measured the nutrients and oxygen on each CTD cast; conducted a series of measurements on the ice (thickness, vertical temperature/salinity/nutrients/chlorophyll, light penetration etc.). This was an opportunity for NOAA scientists to make measurements in the ice to begin ecosystem understanding of the system. 2007 was the first year that an icebreaker was available to make measurements on the Bering Sea shelf.

ICEALOT

**International Chemistry Experiment in the Arctic Lower Troposphere
Preliminary Cruise Report
April 24, 2008**

Chief Scientists: Tim Bates and Trish Quinn

As part of POLARCAT, an International Polar Year activity, NOAA undertook a research cruise in the ice-free region of the Arctic during March and April of 2008 to study springtime sources and transport of pollutants to the Arctic, evolution of aerosols and gases within the Arctic, and the climate impacts of short-lived pollutants in the Arctic. The first part of Leg 1 (March 19 – 21) was devoted to an air quality study off the coast of New York and in Long Island Sound with a focus on photochemical processing of pollutants at cold, early springtime temperatures. During the second part of Leg 1, the ship transited across the North Atlantic while measurements were made of marine background aerosols and gases. The ship crossed the Arctic circle on April 3 and spent 9 days between 67° and 72°N sampling local sources within the Arctic as well as pollution that had undergone long distant transport from the mid-latitudes. During Leg 2, these measurements continued as the ship left Tromso, Norway, crossed the Norwegian and Greenland Seas to the ice edge at 80.2°N, and then headed to Reykjavik via the east coasts of Greenland and Iceland. During the cruise the following tasks were accomplished:

- Smelter emissions from Kola Peninsula were sampled as the ship sat downwind of Murmansk thereby achieving the goal of characterizing local point sources within the Arctic.
- Emissions from fishing boats off the coast of northern Norway were measured again achieving the goal of characterizing local point sources.
- Lidar measurements captured a high altitude plume of biomass burning emissions as it was transported from eastern Europe to the Arctic.
- Arctic haze formed from the transport of pollutants from the northern mid-latitudes was sampled within the polar front at the northern-most latitudes of the cruise. Properties of aerosol particles and gaseous compounds within the haze were characterized with one of the most comprehensive instrument packages every deployed to the Arctic.
 - The ship was positioned underneath Calipso, a space-based lidar, during 5 satellite overpasses. Two of the 5 Calipso validation exercises were conducted in conjunction with a French ATR research aircraft that performed vertical profiles over the ship thereby linking the surface and space-based measurements.
- For comparison purposes, the ship sat near the Zeppelin sampling station located on Spitsbergen and sampled the same air mass for over half a day. The Zeppelin station has one of the longest data records in the Arctic for many of the same properties that were measured on the ship.

Over the next 2 years, the data collected on the cruise will be processed, analyzed, presented at national and international meetings, and published in scientific journals all with the goal of furthering our understanding of the impact of these short-lived pollutants on the Arctic.

**Abundance and distribution surveys for ice seals aboard the USCGC Polar Sea
April 6 – April 27, 2008: Lessons learned and proposals for future research
National Marine Mammal Laboratory
Polar Ecosystems Program**

Three researchers from the National Marine Mammal Laboratory's (NMML), Polar Ecosystem Program were joined by an Alaska Native seal hunter to conduct aerial abundance and distribution surveys for the four species of ice seals (bearded, spotted, ribbon and ringed seals) which are known to occupy and breed in the eastern region of the Bering Sea during the spring and summer. The fieldwork was conducted from the Coast Guard icebreaker *Polar Sea* and a USCG 65-HH Dolphin helicopter from April 6 to April 27 (Map 1).

Survey preparation aboard the Polar Sea:

The first 10 days on the icebreaker were spent preparing for surveys while the Coast Guard was engaged in law enforcement activities in ice-free waters. At this time our primary concern was preparing the helicopter and crew for the sightings surveys; this included: 1) mounting, testing and acquiring final USCG approval for the externally mounted camera pod, 2) manufacturing and calibrating the custom sighting-boards used by observers to determine the distance to the seal from the helicopter track line for each sighting, and 3) training the pilots, flight crew and observers to identify the different seal species from a distance.

Species	# Identified
Bearded	107
Ribbon	95
Ringed	26
Spotted	168
Unknown Pinniped	246
TOTAL SEALS	640
Walrus	229
Sea Lion	2
TOTAL PINNIPEDS	871

Table 1. Number of pinnipeds observed during the *Polar Sea* helicopter surveys.

Aerial observations during the Polar Sea cruise:

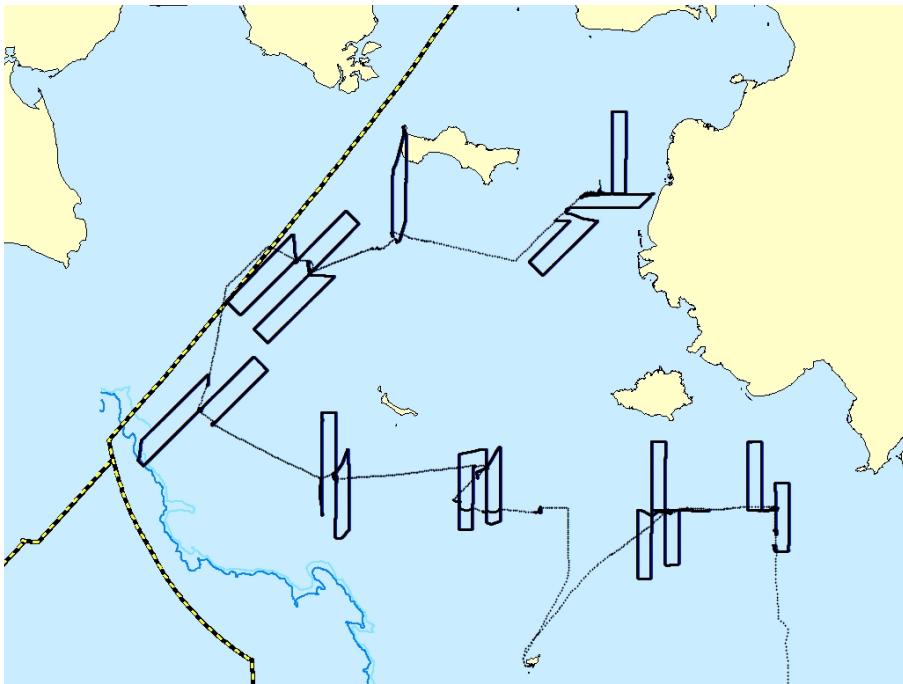
The *Polar Sea* completed her law enforcement activities in the Gulf of Alaska and entered the Bering Sea ice pack near Bristol Bay on April 16, 2008. Whenever the weather conditions were conducive to flying, between 09:00 and 15:00 (local apparent time), we conducted line transect surveys from the USCG 65-HH Dolphin helicopter based aboard the icebreaker. Each flight consisted of two parallel 50 nautical mile transect surveys spaced 10 miles apart. The target altitude and speed for the aerial surveys were 400 ft and 85 knots. Each flight had 3 observers including a flight mechanic who was trained to use the sightings bars and identify ice seals. Data from the flight mechanic will be used to identify potential sighting biases among the primary observers. All observers recorded information on the species, group size and distance from the helicopter track line for each sighting. In addition, an externally mounted camera took digital pictures of the area beneath the helicopter every 2 seconds. These images will be analyzed for the presence of seals and to identify the type and percent cover of sea ice. In all, 640 seals (Table 1) were observed during 26.5 hours of survey effort covering approximately 1900 nautical miles of survey line on 19 flights over 11 days.

Preliminary analyses indicate some habitat partitioning among the three most abundant species of ice seals in spring and may be related to their foraging strategies; this partitioning is also consistent with observations made from helicopter surveys based on the *USCGC Healy* in 2007 (Map 2). Bearded seals are benthic feeders and were most abundant in the shallow waters near the St. Lawrence Island polynia, where walrus (also benthic feeders) were also

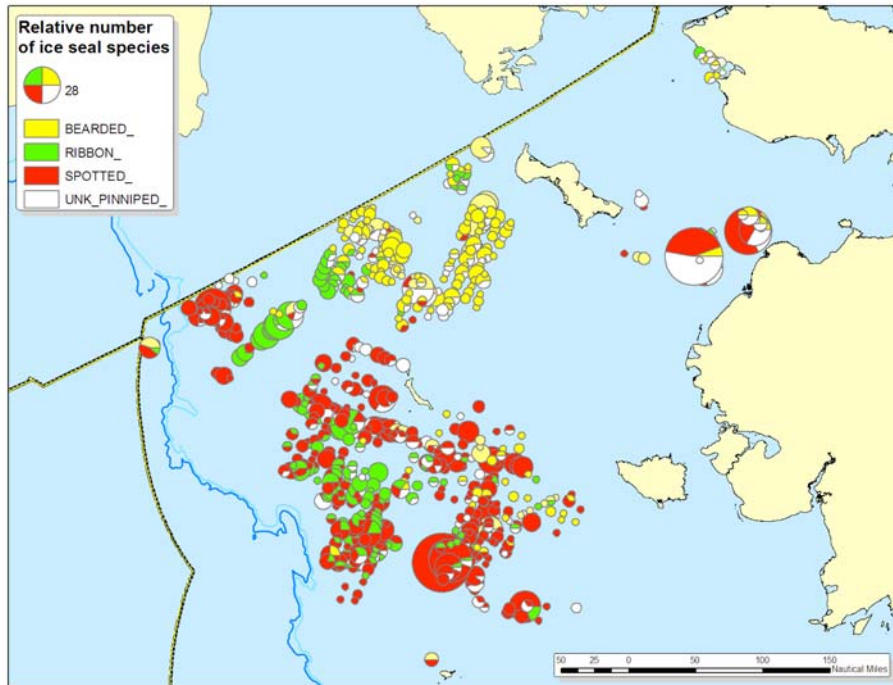
most abundant. Ribbon seals are known to forage at depths over 500m and were most abundant at the southern edge of the sea ice and close to the shelf break, and proximate to deep water. Spotted seals feed throughout the water column over the Bering Sea shelf and tended to occupy the more interior areas of the pack ice. Survey data from cruises planned for 2009 and 2010 will further contribute to a multi-year sightings database that will be used to calculate the springtime abundance and distribution of ice seals in the eastern Bering Sea.

Value of data and usefulness of the Polar Sea and USCGC helicopters:

The opportunity to conduct aerial surveys for seals off of an ice breaker in the Bering Sea pack ice is extremely valuable and the data we have collected is a significant contribution towards the science community's understanding of these species. Given the size of the Bering Sea, helicopters are an essential tool for surveying ice seals and the use of a ship-based helicopter for this deployment was critical to our success. Similarly, the *Polar Sea* was the perfect ship for this type of research. It allowed us to occupy areas deep in the spring pack ice that would otherwise be inaccessible, serving as a moveable platform for launching and recovering the helicopter.



Map 1. Map showing ship and helicopter tracks of the *Polar Sea* during the 2008 spring cruise.



Map 2. Map showing the abundance and distribution of seals observed during the 2007 *Healy* cruises. Counts of animals were summed over 5 Nmi. of survey trackline and are represented by a pie chart. The diameter of the pie cart represents the total number of animals in the 5 Nmi of trackline, and the relative proportion of species seen are shown with different colored pie “wedges”. Ringed seal sightings are not included in this map because so few were seen during these surveys.

ICE SEAL BREEDING ECOLOGY
National Marine Mammal Laboratory
OSCAR DYSON
9-30 APRIL, 2008

Science Team:

Josh London (NMML), John Jansen (NMML), Dave Withrow (NMML), Shawn Dahle (NMML), Heather Ziel (NMML), and John Goodwin (Alaska Native, Ice Seal Committee).

The Ice Seal Breeding Ecology Cruise is part of an on-going effort by the National Marine Mammal Laboratory's Polar Ecosystems Program to understand the association ribbon and spotted seals have with sea-ice in the Bering Sea during their annual breeding period. This cruise focused on the marginal ice edge in the Bering Sea between longitudes 170W and 179W. Bering Sea sea-ice ecosystems have been changing in recent years and are predicted to change even more in the next several years. Ribbon seals are one of the least studied pinnipeds and it is hoped that this work will help to understand how seals may respond to a changing environment.

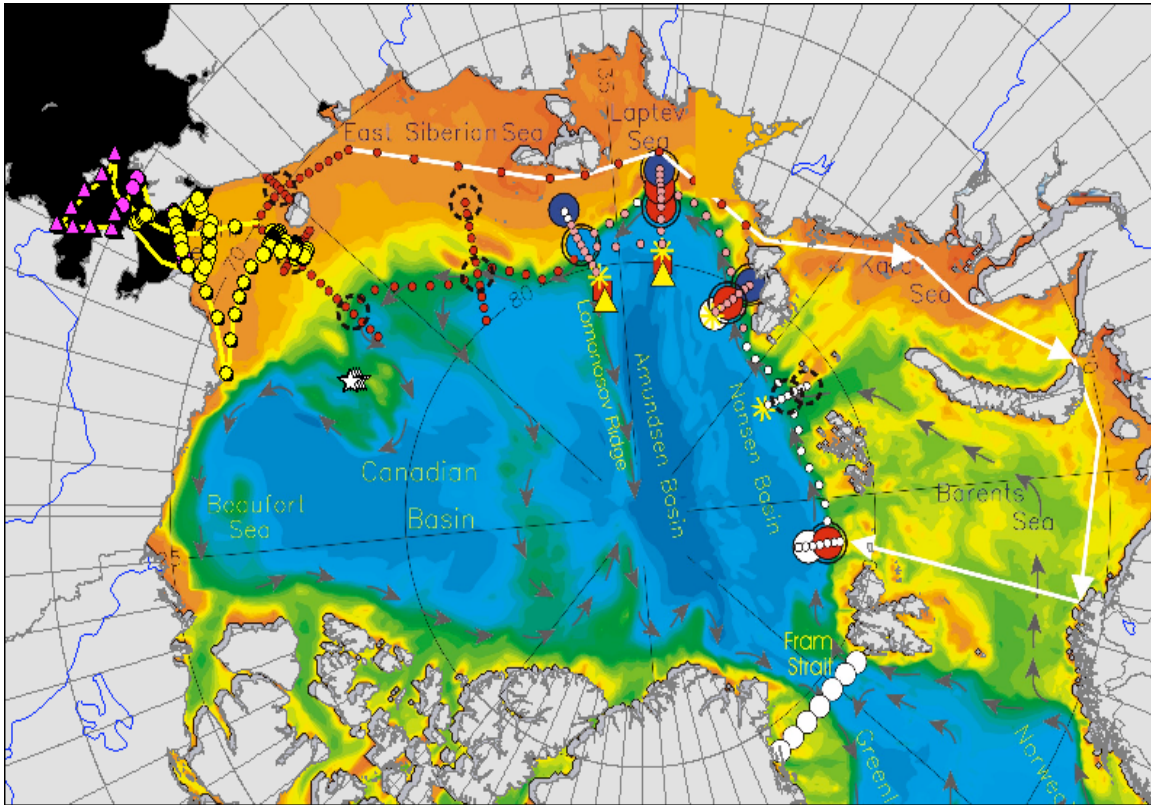
The main objective for this cruise was to capture seals and deploy satellite linked tags. Researchers capture seals on ice floes by slowly approaching in inflatable boats and leaping out to catch the seals with long-handled nets. The satellite tags transmit for approximately one year.

NABOS 2008

Contact Points Igor Polyakov, IARC, NOAA contacts K. Crane and J. Calder

1. The NABOS 2008 plan includes three cruises.
 - a. CABOS mooring (C) will be deployed in the Canada Basin. Mike Dempsey is in charge of this work. Canadian ship Louis S. St-Laurent will be used.
 - b. Near Svalbard we plan to recover and deploy two moorings (M4 and M7). Ian Waddington is in charge of this work. Norwegian ship "Jan Mayen" will be used (dates Sep 8-25).
 - c. NABOS plans a big cruise aboard the Russian icebreaker "Kapitan Dranitsyn" (see map). UAF lawyers and contracting office are working with Shell to resolve some legal issues. Currently the ship is in Kirkenes, Norway Shell specified September 10th as the date for the ship return somewhere in the Alaskan waters (tbd). That puts the starting date for a 30-33 day cruise at ~8-10 of August. Note that (because of some issues with change of management of the icebreaker fleet in Russia) there might be a two-week earlier starting date.

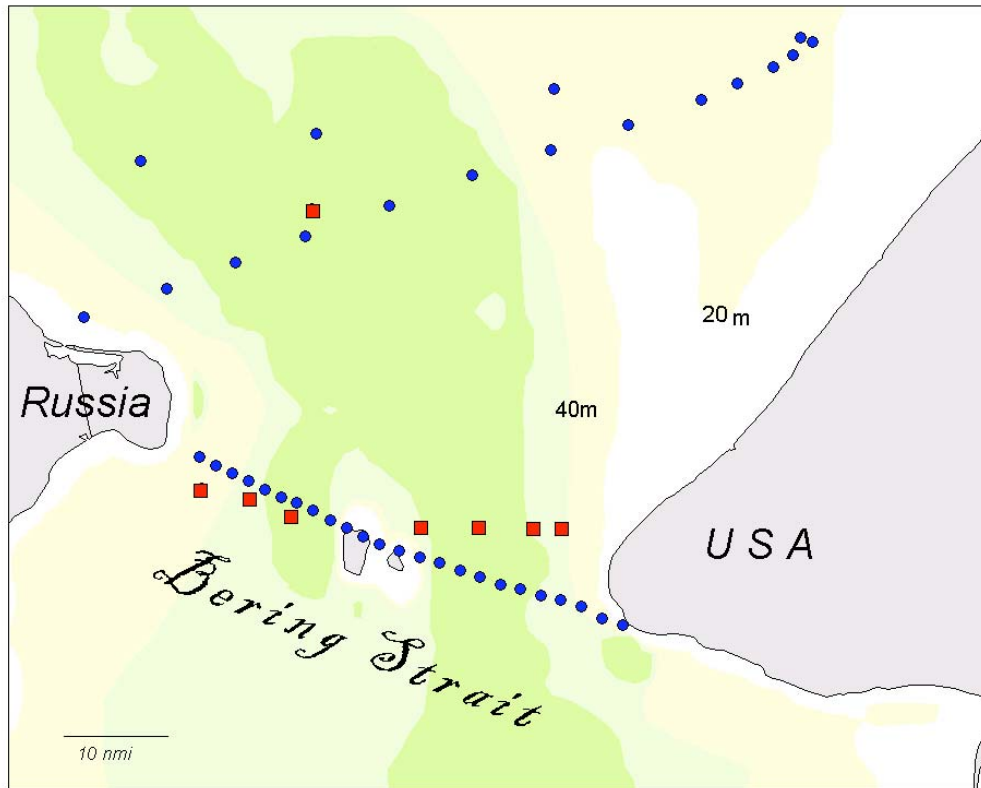
The ship will start the cruise in Kirkenes, and the transfer of KD to Shell will be in Alaskan waters. IARC is working on procedures of disembarking people and equipment from KD in this area.



Using KD NABOS plans to recover several moorings (M5, M6, M1, M3, M8, M9 and M10) and deploy two IARC moorings M1 and M9 and several LU moorings (M3, M8, M9a and M10), carry out various observations along the ship track. At the end of the cruise the ship may be used to escort the RUSALCA vessel R/V Lavrentiev through the ice in the northern Chukchi Sea, the Makharov Basin, north of Wrangel Island and or the Long Strait.

RUSALCA 2008 August-September, 2008
Contact Person K. Crane, NOAA
Chief Scientists A. Astakhov, and T. Whitledge

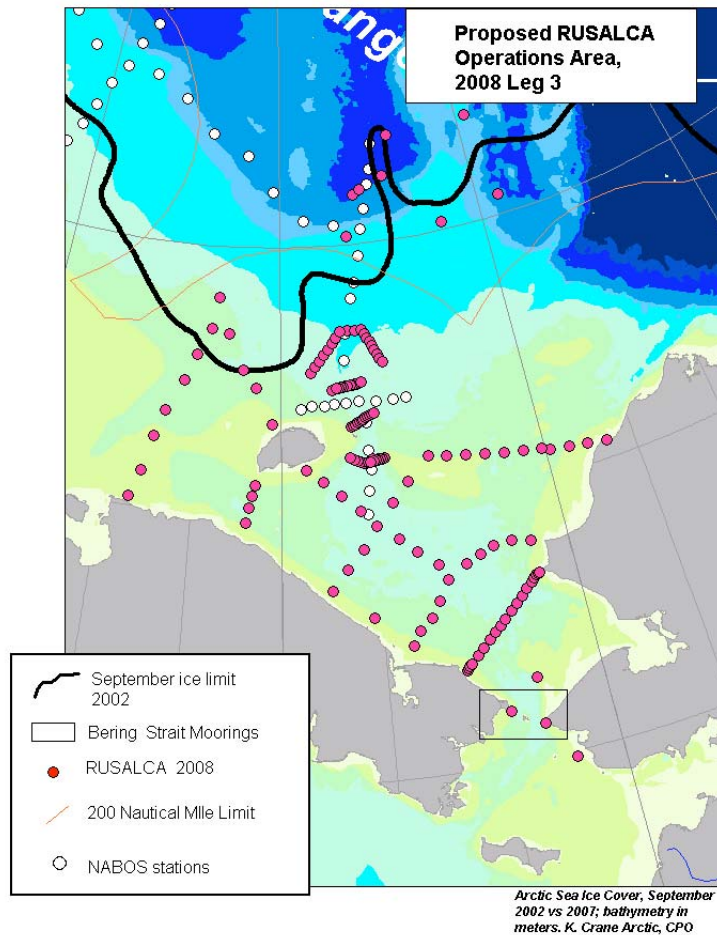
During 2008, the RUSALCA expedition will consist of four legs for 61 days of ship time primarily in the Bering Strait and the Chukchi Sea. The expedition's vessel will be the Lavrentiev operated by the Russian Academy of Sciences. Approximately 45 scientists will take part. The second leg will focus on the servicing of the Russian-American Bering Strait moorings (eight in total). (Funding in the USA is provided by NOAA and NSF. Funding from Russia is from the Russian Academy of Sciences and Roshydromet. Principal scientists on this leg will be Rebecca Woodgate from UW, Tom Weingartner and Terry Whitledge from UAF.



The third leg the expedition will be carried out from Nome to Nome to sample a suite of stations previously sampled in 2004 and to extend the sampling range into the Long Strait, north of Wrangle Island and north into the Makharov Basin and potentially onto the Chukchi Plateau. Investigators will cover a range of disciplines including physical and chemical oceanography, marine geology- methane studies, benthic, and water column biology (from particulates to fish) and a carbon census of the water column and benthos. Goals are primarily focused on examining the physical and ecological environment in a region that is undergoing extreme change in sea ice cover, water temperatures, and salinity. In addition, the 2008 RUSALCA expedition will be co-sponsored by the Office of Ocean Exploration and Research of NOAA to carry out a sampling program in the poorly explored region, to search for previously unknown species of life and to document the changes in the habitat ranges of marine species.

Pending logistics arrangements, the Lavrentiev will meet the icebreaker Kapitan Dranitsyn at the close of the NABOS mission to be escorted into ice covered waters, thus

enabling a range extension for sampling.



Pacific Arctic Group, 2010

The Pacific Arctic Group (PAG) is a group of institutes and individuals having a Pacific perspective on Arctic science. Organized under the International Arctic Science Committee (IASC), the PAG has as its mission to serve as a Pacific Arctic regional partnership to plan, coordinate, and collaborate on science activities of mutual interest. PAG has ten principle science themes.

At the PAG meeting during the ASSW in Syktyvkar, Russia, the parties agreed to move forward to plan a cooperative set of expeditions using the vessels and scientists of the PAG countries in a



collaborative crossing of the Arctic Ocean (potentially from Svalbard to the Bering Strait), with additional activities organized in the Canada Basin, the Makharov Basin and along the shelf break north of Russia. Countries represented include China, Korea, Japan, Russia, Canada and the USA.

A workshop will be held in December 2008 (probably in Shanghai, China) to discuss science drivers and logistics concerns.

EXTENDED CONTINENTAL SHELF SURVEYS

Contact info: A. Armstrong, NOAA

Andy Armstrong will be making this presentation at the AICC