RUSALCA 2014 Expedition Report
July 8-17, 2014
Anadyr-Anadyr

Nature and objectives of the project:

The Russian-American Long-term Census of the Arctic (RUSALCA) has been implemented by both the National Oceanic and Atmospheric Administration NOAA for the USA and the Alliance Group Ltd. for the Russian Academy of Sciences. The program was developed to monitor the changing fluxes of heat, salt, (fresh water) nutrients and marine life from the Bering Strait into the Pacific Arctic Ocean where sea ice loss was a maximum Because the Bering Strait and the Chukchi Sea are shared water masses by both the USA and the Russian Federation, the coordinating parties decided that the best and most stable way to monitor this region was by the fully integrated cooperation of the science agencies in both of our countries. The RUSALCA program was the first project carried out during the implementation of the 2003 the Memorandum of Understanding between the US National Oceanic and Atmospheric Administration (NOAA) and the Russian Academy of Sciences (RAS). The project has also been endorsed by the Hydrometeorological Service of the Russian Federation (Roshydromet) under the auspices of the Memorandum of Understanding between Roshydromet and NOAA signed in 2005. Other U.S. agency participants in RUSALCA include the National Science Foundation, the Department of the Interior, and the Office of Naval Research.

The word RUSALCA means "mermaid" in Russian.

The first project expedition was conducted in the summer of 2004. It was a multi-disciplinary cruise intent on building a long-term repeat suite of observations of the region, from physical oceanography to marine ecosystems with the goal of monitoring the consequences of the loss of sea ice cover. Oceanographic mooring stations were first deployed in the western part of the Bering Strait in 2004. They were recovered and redeployed annually from 2005 until 2012. In addition to the three mooring stations in the western, Russian part of the Bering Strait, five more stations were serviced annually, starting in 2007. These were located in the eastern, US part of the Bering Strait.

A significant number of CTD stations (Conductivity, Temperature, and Density), along with benthic and water column biological stations, were taken in 2004 through 2012. Three large, multidisciplinary expeditions were successfully implemented in the years of 2004, 2009 and 2012 in the Beaufort, East-Siberian and Chukchi Seas. The 2009 research cruise was widely covered by the news media even prior to its completion, including internationally recognized mass media such as The New York Times and Reuters. More detailed information can be obtained on the following RUSALCA web sites at NOAA www.arctic.noaa.gov/aro/russian-american/, as well on the Alliance Group's site www.rusalcaproject.com.

In 2013 the RUSALCA team did not go to sea to provide the scientific party the time to work on a decadal synthesis of results. The second decade of the RUSALCA Program will be coordinated primarily by NOAA, RAS, and Roshydromet and the Alliance Group. Annual to biannual expeditions will be organized to continue the research in the area of the Bering Strait and the seas and the Pacific-Arctic Ocean to the North. Multi-disciplinary and geographically more extensive research expeditions will be arranged every 2 to 4 years in the northern part of the East-Siberian, Chukchi and Beaufort Seas and in the Pacific Arctic Ocean.

Access to Russian Territorial Waters and the EEZ as well as internal Russian coordination and permitting is maintained by the Alliance Group in Moscow. The Roshydromet research vessel is operated by a New Zealand Company (Heritage) and maintains many links in Anadyr, where the vessel is normally outfitted for its Arctic expeditions. Heritage provides Chukotka permits for the science party, while the Alliance Group is responsible for visa processing. In 2014, the RUSALCA team deployed a mooring in the Western Bering Strait (to replace one that was removed in 2012, carried out transects of the Distributed Biological Observatory (DBO) line 3 (also known as line Chukchi South CS), a Bering Strait transect and a Russian coastal transect located between the two named line CX across the Chukchi Sea from Russia to the USA. RUSALCA is the only expedition to date that has been able to cover the DBO from Russia to the USA. The DBO constitutes the U.S. and some of the Russian sentinel Arctic stations, a part of the Arctic Council's endorsed Circumpolar Biodiversity Marine Monitoring Program. Data from the RUSALCA program are stored on the Alaska Ocean Observing System website and are being prepared for submission to the Arctic Council's Conservation of Arctic Flora and Fauna (CAFF) working group's data portal in Iceland.

In 2014, the RUSALCA needed special permission from the US National Security Council to continue operations. This was received on April 23, 2014. The main goal of RUSALCA 2014 was to redeploy a suite of instruments in the Russian waters of the Chukchi Sea. Instruments were purchased by the Alliance Group from EG &G, Sea Bird, Aanderaa, and Multi-electronic to complete the mooring. The equipment was laid out to replicate the previous mooring located at site A-1-2. Russian based equipment will allow us to be more flexible in our mooring activities, using the Russian ports of Anadyr and Provedenia.

<u>The scientists on board the R/V Khromov for the 2014 operations were:</u>

Vladimir Bakhmutov, Chief of Expedition, GNINGI, MTB, (*Vessel support)*

Kathleen Crane *U.S. Mission Coordinator of RUSALCA*, NOAA

Aleksey Ostrovskiy, *Russian Mission Coordinator of RUSALCA*, Alliance Group

William Floering, PMEL, NOAA *(mooring technician*)

Elizabeth Labunsky, U.S. Fish and Wildlife Service, (Seabird Observations)

Calvin Mordy, University of Washington, PMEL, NOAA, Water Samples (*productivity, nutrients, chemistry*)

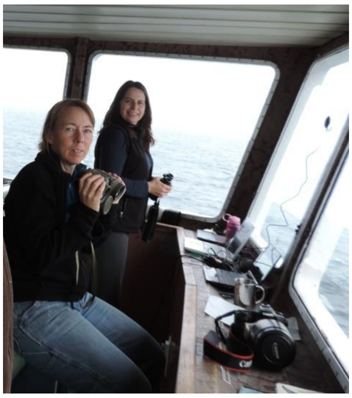
Yuri Paschenko, Far Eastern Branch of Roshydromet (deck operations)

Maria Pisareva, Woods Hole Oceanographic Institution and P. P. Shirshov Institution of Oceanology, (*Physical Oceanography*)

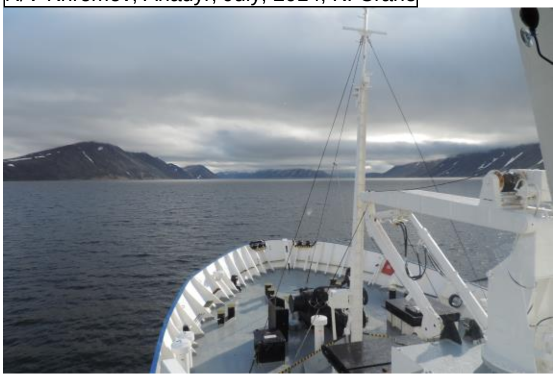
Alexander Polshin, MTB, (vessel support and instrument tech operations)

Kathleen Stafford, University of Washington, (*Marine Mammal Observations, and mooring operations*)

Kevin Wood, University of Washington, PMEL, NOAA *(Logistics and all around support)*



Particulars of vessel:

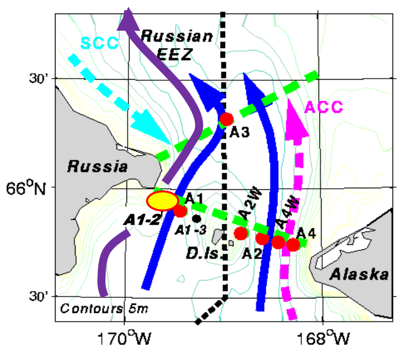
 Name:	R/V Khromov, Anadyr, July, 2014, K. Crane  Professor Khromov
Nationality (Flag state):	Russian Federation
Owner:	Far Eastern Roshydromet Research Institute
Operator:	Heritage Expeditions, NZ
Overall length (meters):	71.6
Maximum draught (meters):	4.5
Displacement/Gross tonnage:	2140
Propulsion:	Dizal 2 x 1560 1560 h/p
Cruising & Maximum speed:	11 & 17.3 knots
Call sign:	UBWR
Method and capability of communication (including emergency frequencies):	USW 156-158 MHz, SW: 2022.5 MHz INMARSAT 1626.5-1646.5 MHz
Name of master:	Djachenko Alexander Nikolaevich
Number of crew:	26
Number of scientists on board:	11

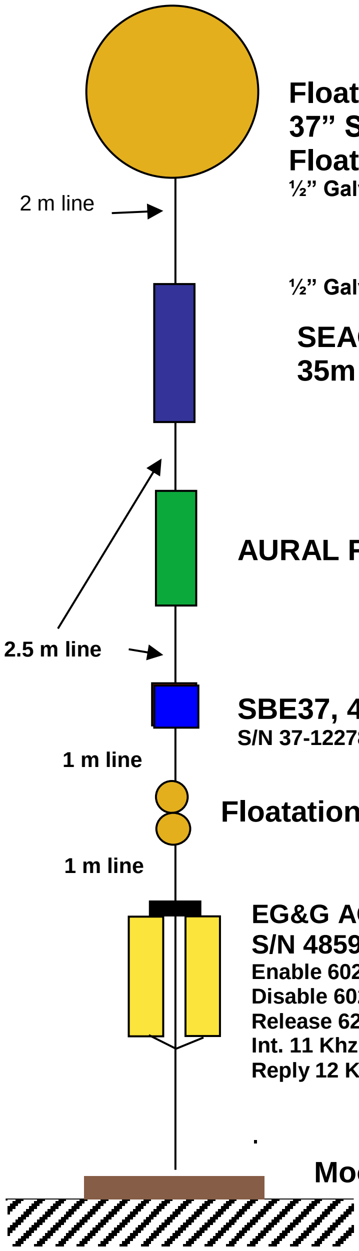
Mooring operations.
The mooring A1-2 was deployed on the Russian side of the Bering Strait at position of 65° 56.994' N, 169° 36.990' W on the 10 of July 2014.

RUSALCA 2014 Mooring

A1-2 – RUSSIAN Territorial Waters

Latitude 65* 55.994'N
Longitude -169* 36.990'W





Floatation
37" Syntactic Float
½" Galv. Shackle

½" Galv. Shackle

SEAGUARD RCM Blue Current Meter
35m depth, S/N 5450 64

AURAL Recorder 38m depth, S/N 00247LF

SBE37, 43 depth
S/N 37-12278, no cage !

Floatation

EG&G ACOUSTIC RELEASE
S/N 48597
Enable 602113
Disable 602130
Release 623721
Int. 11 Khz
Reply 12 Khz

.

Mooring Anchor

Bottom Depth 51 m.
Anchor Dry Wt.= 2220 lbs

Aanderaa RCM Blue Seaguard 5450.

The AADI RCM Blue Seaguard 5450 (with temperature sensor) was positioned on the mooring at depth of 35 m. The RCM Blue is depth rated to 300m, and is powered by two packs of alkaline batteries. The instrument was configured in AADI Real-Time Collector (PC software, provided with the device) using a Bluetooth connection between the PC and the instrument. The device was set to operate with four active transducers in spread mode Zpulse operation with 300 pings in one measurement interval (60 min for this deployment), storing all the data internally (the size of the SD card is ~950 Mb). Sleep mode was enabled in between measurements. Tilt compensation was enabled. The distance for the pulse to propagate before the start of measurements was set to 0.50 m/s, the cell size to 1.50 m/s. In order to improve the current speed accuracy the forward ping mode was enabled (to measure upstream to reduce problems related to turbulence in the downstream measurement volume). The time of each record was set to align with the internal clock (set to UTC time). Storage on low voltage was disabled. The default sound speed was set to 1500 m/s which can be adjusted during data processing.

The compass offset correction value was factory set to -5.779999E-01. The magnetic declination for the A1-2 mooring position in 2014 is 12.2 from the 1994 charts on the bridge of R/V Pr.Khromov, but it was left disabled for the deployment (was set to true north) and is a subject to adjustment in data processing.

SBE 37-SMP (RS-232).

SBE 37-SMP RS-232 MicroCAT (with a pump for a conductivity cell, temperature, conductivity and pressure sensors) was deployed at the depth of 43 m on the mooring, powered by a pack of AA Lithium cells. The pressure sensor of the instrument is depth rated to 100 m. Its case is depth rated to the 350 m. Calibration coefficients have been factory preset. The AF24173 Anti-Foulant device was factory installed in the conductivity cell intake to control the growth of aquatic organisms. The instrument was configured for autonomous sampling every 15 minutes in Seaterm V2 (PC software, provided with the device). In this mode the device wakes up, runs the pump for 1 sec, samples, stores data in Flash memory and goes to sleep (each sampling takes 2.6 sec). The instrument clock was set to UTC time (time from the bridge). The minimum conductivity frequency to activate the pump was set to 1500 Hz. The data output format was set to raw .hex format.

CTD operations.

Three hydrographical transects (28 CTD stations in total, one station was repeated twice) were occupied during the cruise. They are the:

- Bering Strait line (9 stations: 5 on the Russian side of the strait, 4 on the US side). The CTD station bs14-02 is at the geographical position of the deployed mooring A1-2;
- Cape Serdtse Kamen to Point Hope line (“Chukchi South” (CS) transect – same as Distributed Biological Observatory (DBO) line 3). 14 stations in total: three stations on the CS line (CS1, CS2, CS3) close to Russian coast were aborted due to restrictions to work within the 12-mile zone. CS17 and CS19 were aborted because lack of time.

- CX line (5 stations; positions repeated from the RUSALCA 2010 cruise. Station CX7 was repeated twice; station CX3 was shifted eastwards from its 2010 position in order to lie outside the Russian 12-nautical mile Territorial Waters.)

Hydrographic stations were carried out with the SBE19 plus V2 SEACAT Conductivity, Temperature, and Pressure Recorder with RS-232 Interface - profiler, equipped with strain gauge pressure, temperature, conductivity and fluorescence CHL/NTU Wet Labs sensors. The profiler was equipped with a SBE 5M submersible pump. The conductivity sensor is pressure rated to 600 m. The T-C Duct ensures that temperature and conductivity measurements are made on the same parcel of water. The instrument was configured in SeatermV2 (terminal program for easy communication and data retrieval) to sample in a profiling mode, powered by the deck unit for the first six stations and by nine D-size alkaline batteries (they provide 60 hours of operation in Profiling mode). A plastic housing and the pressure sensor on the instrument are rated to 600 m. The sampling frequency of the instrument is 4 Hz. For the BS transect the sampling rate was set to average 4 scans (1 scan per second output) and for two other lines 2 scans (2 scans per second output). The pump conductivity frequency was set to 1500 Hz. The data were output in raw .hex format. In addition the pump delay was set to 60 sec. The instrument was turned on, on the deck for operation mode by the magnetic ON-OFF switch.

For the first six CTD stations the instrument was operated in a real-time acquisition mode (through Sea Save V7 PC software), via a sea-cable connection and a carousel deck unit (SBE 33). The rest of the stations were collected in the autonomous sampling mode. Data were downloaded after each cast from the 64 Mbyte FLASH RAM of the instrument. The bottom depth for the each station was recorded from the bridge echosounder adding 5 m for the keel.

Water Sampling Program

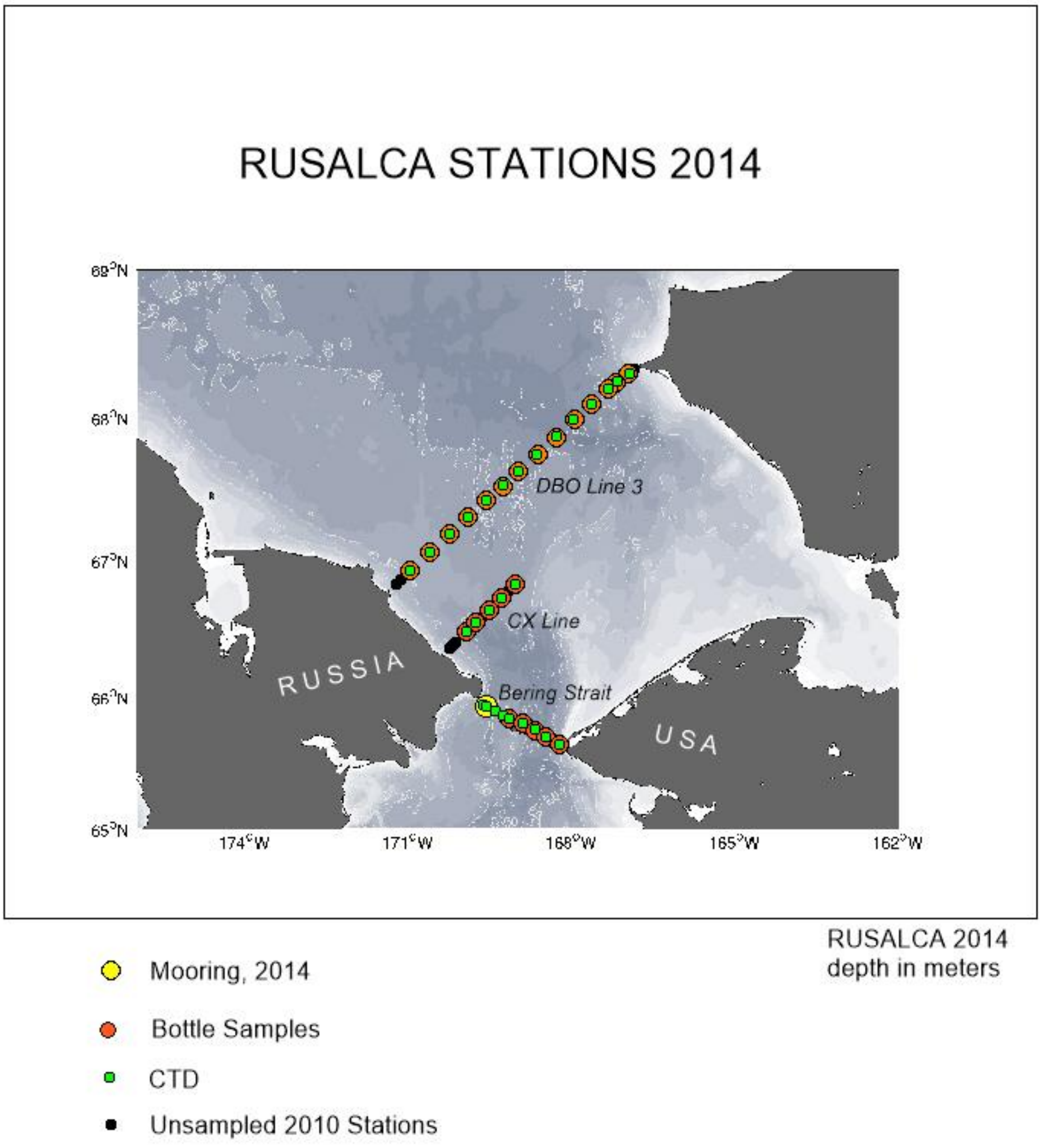
Calvin Mordy, JISAO, University of Washington

In the absence of a rosette sampling package, water samples were collected using 4-5 Niskin bottles attached to a ~1/4" non-conducting wire with a CTD package. Niskin bottles were attached 5 m above the CTD package with 10 m spacing, and tripped with messengers. Surface samples were often collected using a bucket. The first 5 stations on the Russian side of Bering Strait were CTD casts only as the non-conducting wire used for bottle casts had not been spooled on the second winch (the Niskin bottles could not be mounted on the larger conducting wire). At Station 6, the CTD cast was followed by a bottle cast, and during the bottle cast, the primary winch failed. From Station 7 onwards, the CTD was mounted to the non-conducting cable, and CTD data was collected internally and downloaded after each cast. The sampling routine was first to conduct an uninterrupted CTD downcast, and then attach Niskin bottles to the wire to be tripped when the package was at depth. In total, there were 29 CTD casts, and 24 bottle casts.

Water samples were collected for oxygen, nutrients (phosphate, silicic acid, nitrate, nitrite, ammonium), chlorophyll, and salinity. Nutrient and chlorophyll samples (134 samples for each) were collected from each water sample, and frozen for later analysis at PMEL. Due to abundance of particulate matter in the water, nutrient samples were filtered through a 45 um cellulose acetate filter to reduce noise during analysis. Samples for chlorophyll were collected by filtering 139 ml (Niskin samples) or 138 ml (bucket samples) through GF/F filters, and sealed in foil packets. Only 16 oxygen flasks were provided for the cruise with the intent of calibrating the CTD O_2 sensor. In the absence of a CTD O_2 sensor, it was decided to only sample oxygen from the deepest bottle along the primary transect (14 samples on the CS Line), and this would provide some indication of horizontal variability in bottom waters. Two additional samples were collected from bottom water at either end of the CX Line. Oxygen samples were collected in calibrated 125 ml Winkler flasks, pickled with 1 ml of Winkler reagents, and sealed for shipment and later analysis at PMEL. Twelve salinity samples were collected to calibrate the CTD salinity sensor, and will be analyzed at PMEL.

Station positions and timing.

#	Latitude of the CTD cast (Deg Min N)		Longitude of the CTD cast (Deg Min W)		Bottom Depth [m]	Date of the ctd cast	Time of the ctd	Latitude of the bottle cast (Deg Min N)		Longitude of the bottle cast (Deg Min W)		Station name	Country
1	65	56,5200	169	39,3600	48,5	20140710	0:40	-	-	-	-	bs1401	rus
2	65	56,0940	169	36,1300	52,5	20140710	1:28	-	-	-	-	bs1402	rus
3	65	54,0590	169	25,9580	52,5	20140710	2:18	-	-	-	-	bs1403	rus
4	65	52,0830	169	16,9900	50,5	20140710	3:11	-	-	-	-	bs1404	rus
5	65	50,1920	169	10,9490	49,5	20140710	3:56	65	50,1920	169	10,9490	bs1405	rus
6	65	48,3140	168	55,7540	49,7	20140711	14:47	65	48,3520	168	55,0540	bs1406	us
7	65	45,3080	168	43,0940	55,2	20140711	16:15	65	45,2070	168	43,0350	bs1407	us
8	65	42,1910	168	31,2520	56,7	20140711	17:50	65	42,1120	168	30,6950	bs1408	us
9	65	38,6110	168	15,0930	45	20140711	19:27	65	38,6660	168	14,9680	bs1409	us
10	68	18,6310	166	58,4660	37	20140712	15:27	68	18,4140	166	58,8160	cs18	us
11	68	15,0000	167	12,1940	47,2	20140712	16:39	68	14,8570	167	12,3530	cs16	us
12	68	12,0420	167	21,3370	50,7	20140712	17:39	68	11,9250	167	21,4130	cs15	us
13	68	6,1170	167	39,9450	55	20140712	19:05	68	6,0590	167	39,7140	cs14	us
14	67	59,3540	167	59,3780	57,5	20140712	20:34	67	59,3820	167	59,2830	cs13	us
15	67	52,5270	168	18,7390	59,2	20140712	22:07	67	52,3080	168	18,5040	cs12	us
16	67	45,3120	168	39,8360	52,7	20140712	23:48	67	45,1460	168	39,5890	cs11	us
17	67	38,1020	169	0,8530	53,2	20140713	1:32	67	37,9010	169	0,4200	cs10	rus
18	67	32,0270	169	18,3700	52,7	20140713	3:06	67	31,8640	169	17,7260	cs9	rus
19	67	25,9490	169	35,7870	53,2	20140713	4:38	67	25,8230	169	35,2670	cs8	rus
20	67	18,6650	169	56,4400	51,5	20140713	6:17	67	18,5040	169	56,1190	cs7	rus
21	67	11,3830	170	17,1170	50,5	20140713	7:59	67	11,2480	170	16,9610	cs6	rus
22	67	3,7560	170	38,2290	48	20140713	9:44	67	3,7580	170	37,7110	cs5	rus
23	66	56,0770	170	59,5170	44,2	20140713	11:34	66	56,0770	170	59,5170	cs4	rus
24	66	29,1570	169	57,9140	51,7	20140714	1:07	66	29,1290	169	58,3690	cx3-1	rus
25	66	33,1580	169	47,5530	59,2	20140714	2:18	66	33,4230	169	47,6660	cx5	rus
26	66	38,6360	169	33,1880	50,5	20140714	3:34	66	38,5890	169	33,2770	cx7	rus
27	66	44,2040	169	18,7230	50,2	20140714	4:56	66	44,2070	169	18,7770	cx9	rus
28	66	49,7510	169	4,2280	49,5	20140714	6:11	66	49,7510	169	4,4130	cx11	rus
29	66	38,6400	169	33,1400	50,7	20140714	8:18	-	-	-	-	cx7	rus



ARDEM bathymetry used for the base map: Danielson, S., M. Johnson, S. Solomon & W. Perrie, 2008. http://mather.sfos.uaf.edu/~seth/bathy/

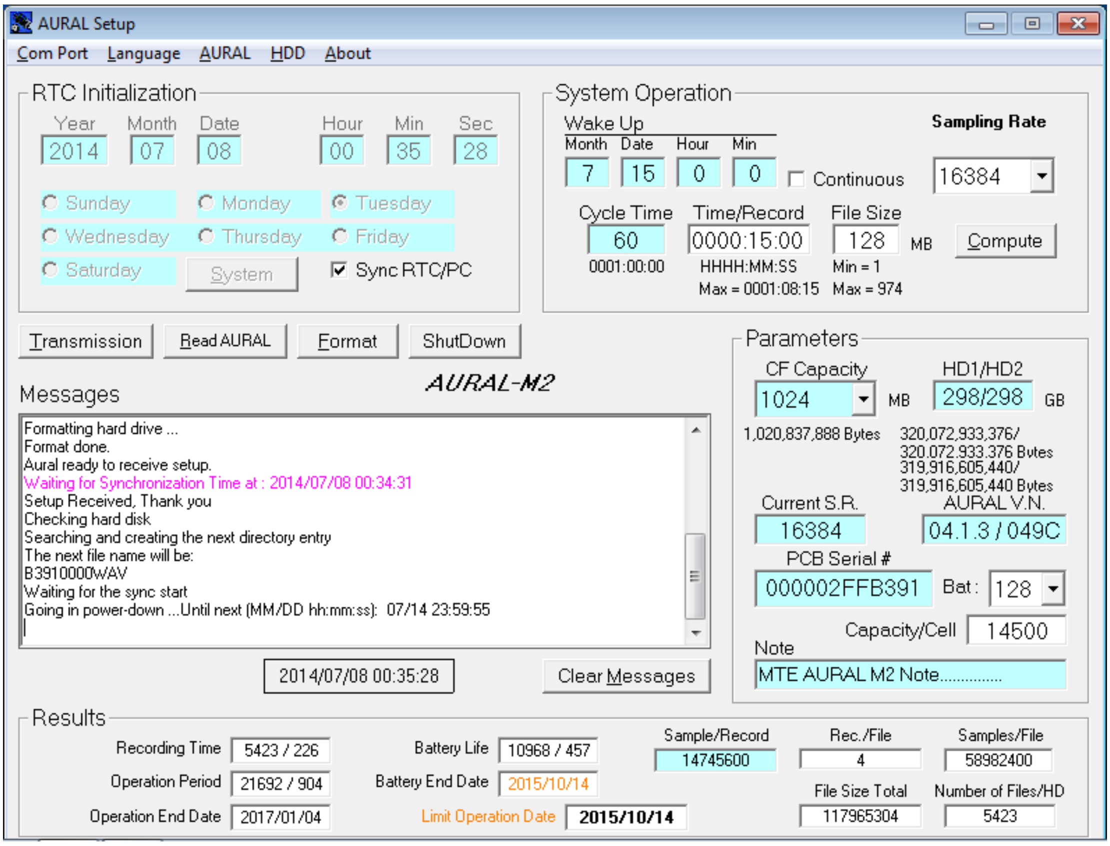
Marine Mammals (Mooring and Passive Observations)

The marine mammal component of Rusalca 2014 had two components: deploying a hydrophone in the Bering Strait to record marine mammal sounds for a year and conducting a visual survey in Russian waters to document the presence of different marine mammal species.

Hydrophone

A Multi-electronique Aural M2 instrument was deployed on the mooring with other instrumentation. This instrument was programmed to begin sampling at 15 July 2014 0000h (GMT) on a duty cycle where the first 15 minutes of every hour collect acoustic data at a sample rate of 16384 Hz. This results in a frequency range of 10-16384 Hz which covers the bandwidth of bowhead, beluga, fin and humpback whales as well as walrus, bearded seals and sea ice noise. Assuming the batteries last, this instrument can record until 14 October 2015. Because of the cold water of the Bering Strait, it is likely that the batteries will die sooner, therefore this buffer should allow for a full year's worth of data collection. Figure 1 shows the setup and successful launch of the programming. Appendix 1 provides data form for redeployment steps and Appendix 2 a step-by-step visualization of the instrument programming.

Figure 1. Aural hydrophone programming settings for 2014-2015. S/N MTEAU0000247LF.



Sighting survey

In order to document marine mammal species seen along the trackline of the Professor Khromov during the 2014 Rusalca cruise, a marine mammal watch was kept on the bridge from ~0500-2200 daily. The "On Effort" watch was halted during mooring and CTD operations, heavy fog and seas. Visibility needed to be greater than 0.5 nm and sea state

Beaufort 5 or less in order to reliably sight animals. Watches consisted of one person stationed primarily on the port side of the bridge (to stay out of the way of bridge operations), scanning roughly 60° to either side of the bow with a pair of Steiner 7 x 50 binoculars. When sightings were made the time, location, species and number of animals as well as any notes on observations were logged in the program *Wincruz..* The track of the *Professor Khromov* and "On effort" track line are shown in Figure 2.

Despite considerable poor viewing conditions nearly every day due to thick fog or high winds and seas, 9 different species of marine mammal were seen and numerous unidentified pinnipeds and large whales (most likely gray whales but at least one probable fin whale) were seen (Table 1). A total of 210 sightings of 1020 animals were recorded (Table 2). The largest group size was from a haul out of walrus on a beach at the mouth of Anadyr Gulf. Gray whales were the most common cetacean sighted with 84 sightings of 132 animals including several cow-calf pairs and a group of 3 young animals feeding together (Figure 3). Humpback whales were the second most common but there were only 10 sightings of 13 animals, most of these in the Gulf of Anadyr (Figure 4). There were 32 sightings of 52 unidentified large whales. Most of these were likely gray whales as they were usually seen in the vicinity of gray whales but due to the occasional presence of humpback whales these sightings (of blows only) could not be definitively attributed to a species (Figure 5). Walrus and seal sightings are shown in figure 6. Most of the seals could not be attributed to species as only a head was seen above water and only very briefly. Nevertheless ringed, spotted and bearded seals were identified. Perhaps the most interesting sighting was a haul out of over 600 walrus on a sand spit just out side of Anadyrskiy Liman. These animals were seen on the way out of Anadyr but not on the way back in although a few animals were in the water. The only odontocetes sighted were beluga whales which were seen in Anadyr and throughout the Liman on the way to the Gulf, and orcas, which were seen four times; three of these were just outside of Anadyr and the fourth was south of Bering Strait (Figure 7).

Table 1. Number of sightings and total number of animals seen by species

species	**numsightings**	**num animals**
gray whale	84	132
minke whale	1	1
orca	4	21
beluga	20	95
bearded seal	4	4
ring seal	11	13
walrus	13	654
unid phocid	30	34
unid large whale	32	52
spotted seal	1	1
humpback whale	10	13
Total	210	1020

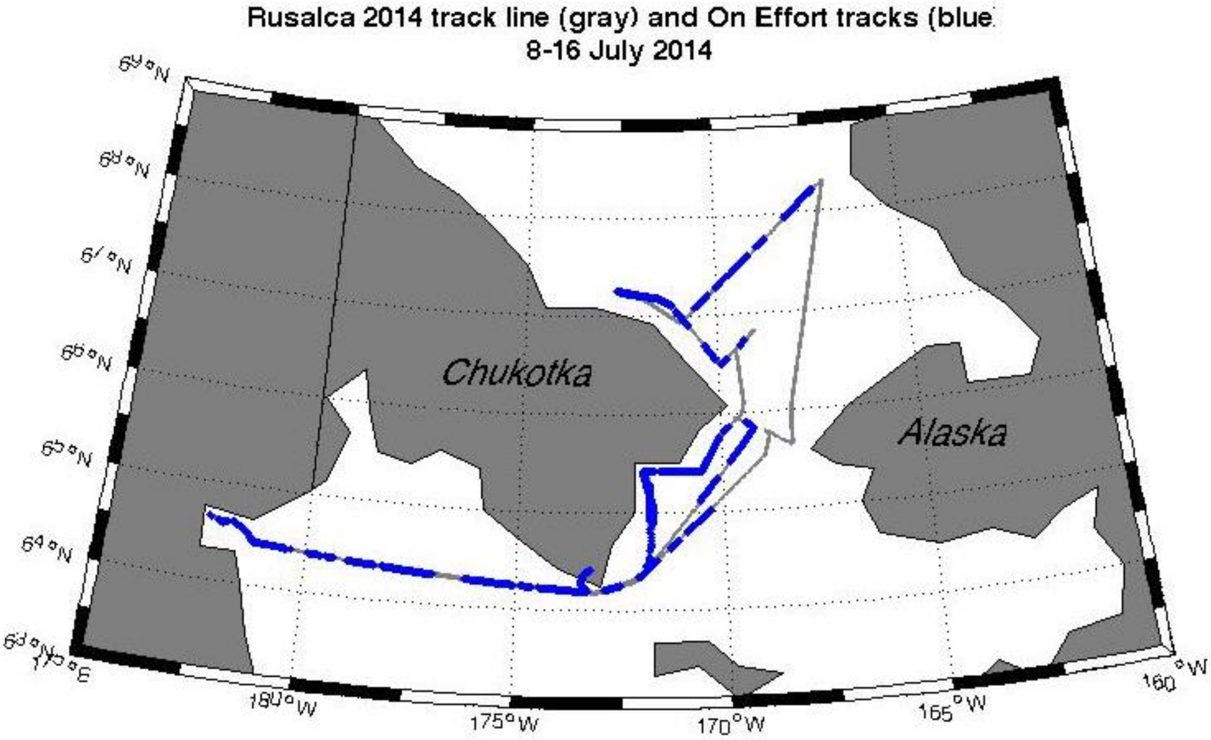


Figure 2. Track of the Professor Khromov (gray) and "On effort" track (blue) for 8-16 July 2014.

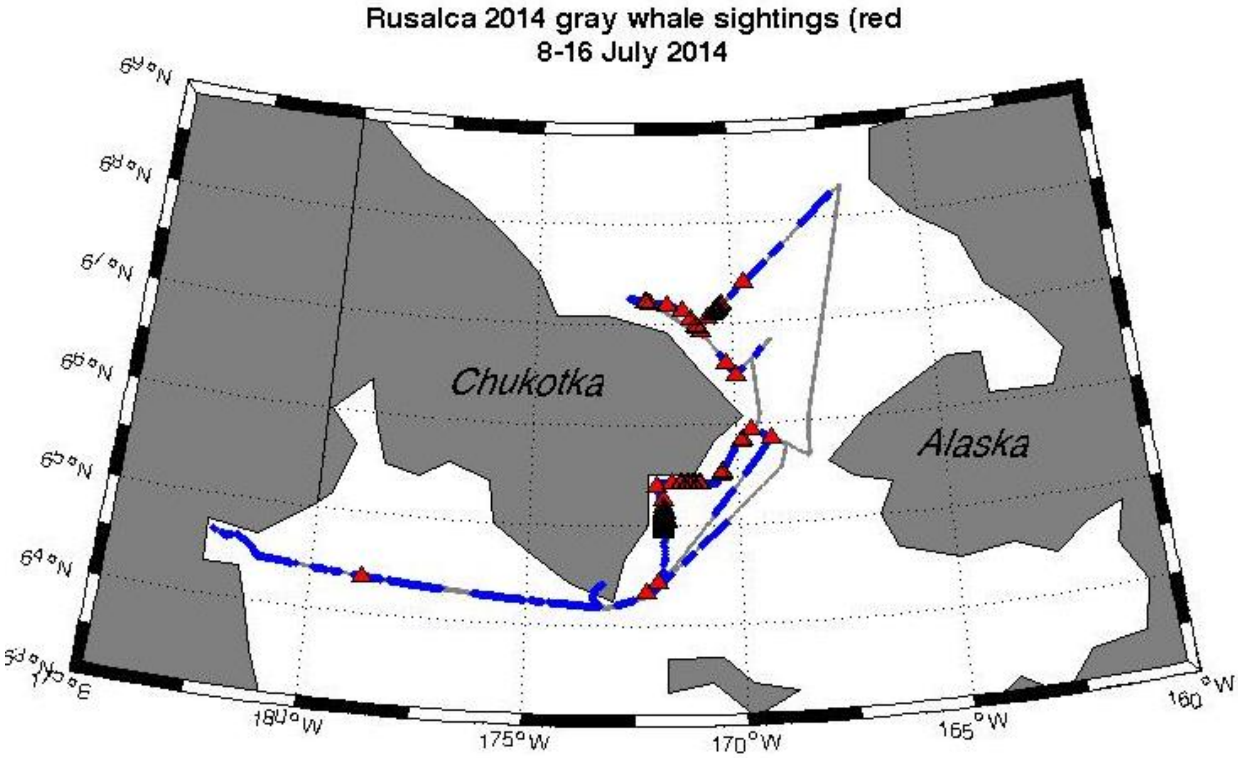


Figure 3. Gray whale sightings (red diamonds) on trackline.

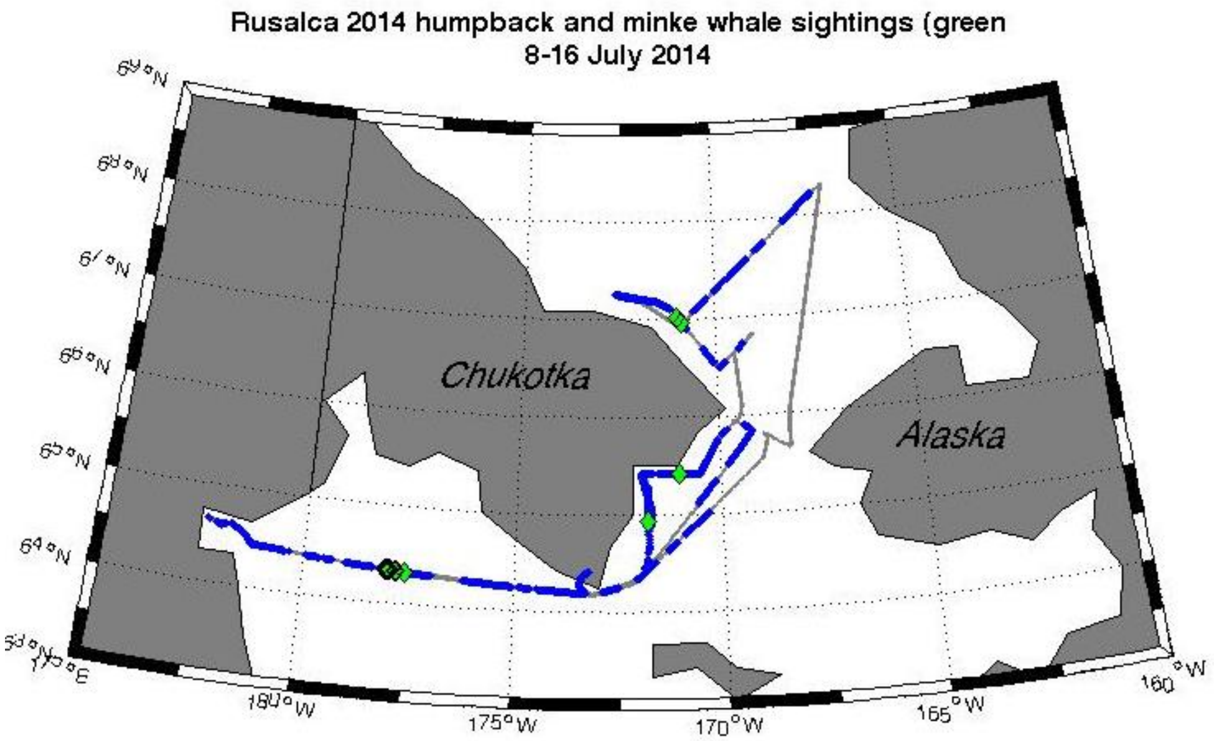


Figure 4. Humpback whale and minke whale sightings.

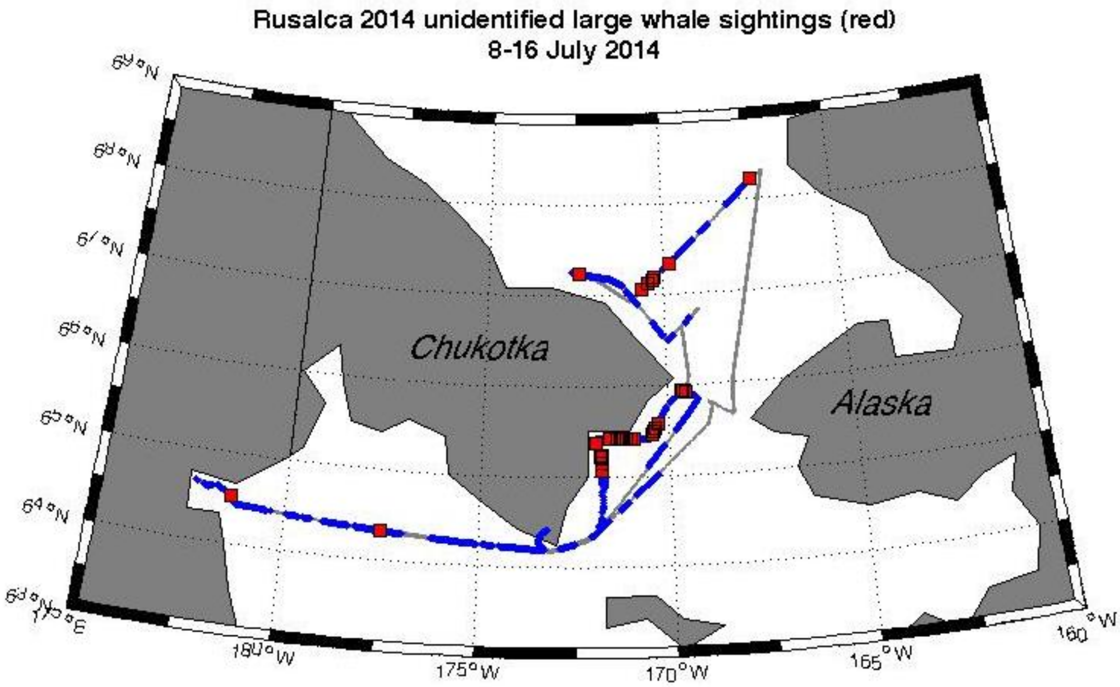


Figure 5. Unidentified large whale sightings. Most of these were likely gray whales.

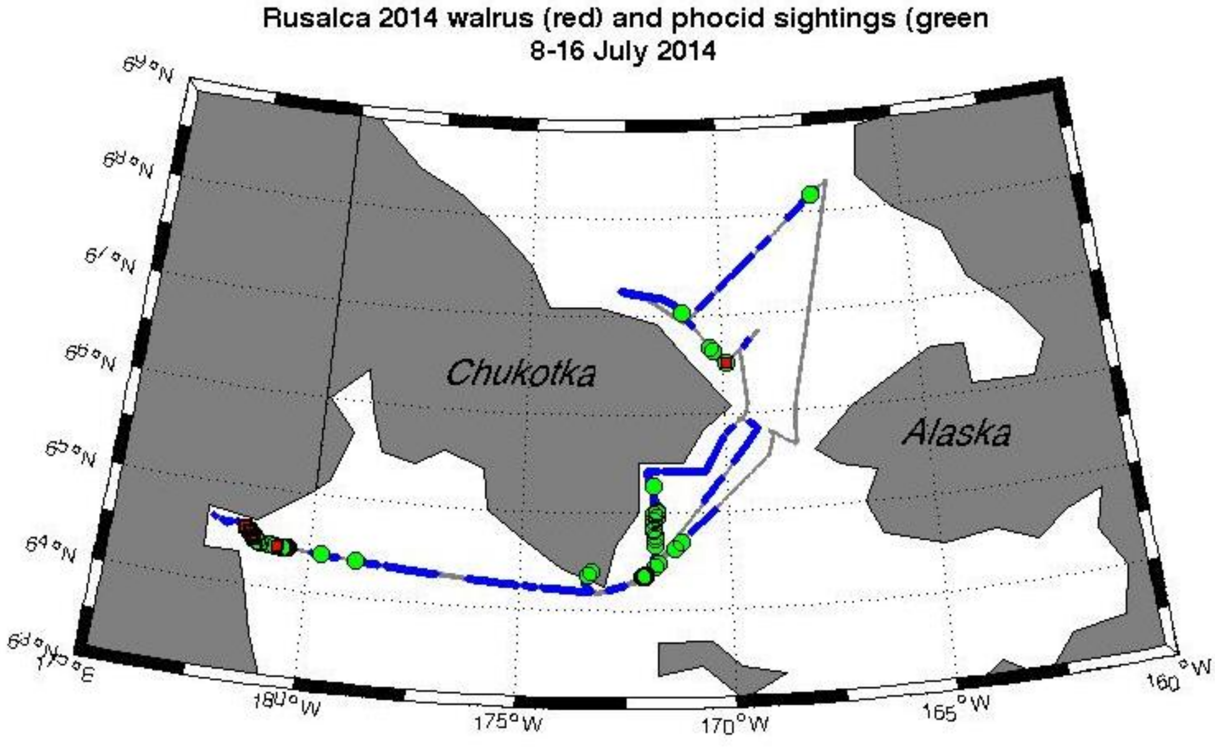


Figure 6. Walrus and seal sightings.

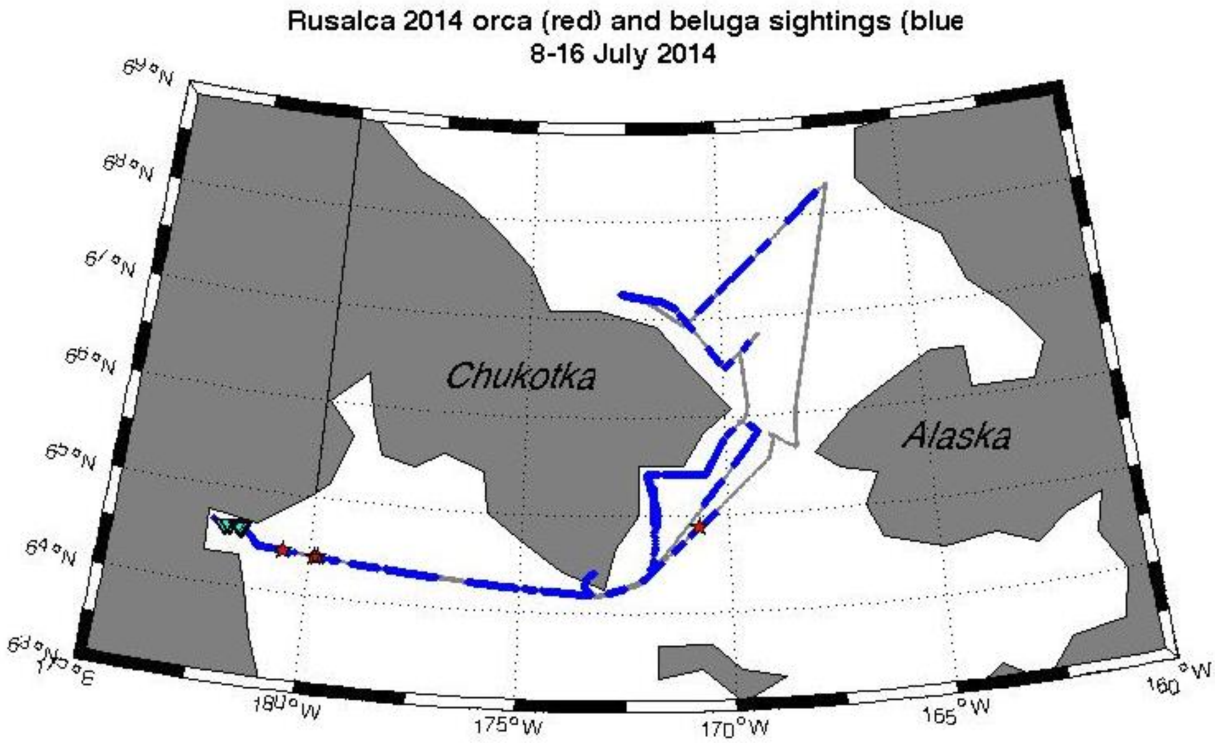


Figure 7. Beluga and orca sightings

Daily narrative

8 July
We left Anadyr under excellent viewing conditions and saw many beluga and spotted seals on the way out of Anadyr as well as walrus hauled out on "Russian Cat Island" and swimming in the vicinity of the island. There were three sightings of killer whales. On effort watch: 7 h

9 July
Weather and visibility were poor (high winds and waves and then fog) so very few mammals were sighted until the evening when fog cleared and a group of gray whales and one minke whale were sighted feeding along the coast. Numerous ringed and unidentified seals and one bearded seal were sighted. On effort watch: 11.4 h

10 July
Spent the day in the vicinity of Big Diomede Island. The mooring was deployed successfully. Several gray whales were seen in the Diomedes region. Despite good weather on the evening transit south towards Providenya, few marine mammals were seen. On effort watch: 5 h

11 July
The morning was spent anchored off Providenya where several seals were sighted. Upon leaving Providenya, heavy fog impeded visual surveys until the evening. Four gray whales were seen near the ship in fog as well as seals near the ship. The weather cleared by evening when a pod of ~12 transient killer whales was observed right before dusk. On effort watch: 6 h

12 July
Winds and waves were high all day (sea state Beaufort 6+) and fog intermittent resulting in no "on effort" visual survey. On effort watch: 0 hours

13 July
Heavy fog for much of the day impeded observations. Conditions improved in Russian waters. Finished the CTD transect near Russia where many gray whales were sighted coming into the coast. On effort watch: 8 h

14 July
Awoke at 0300 to start watch under excellent viewing conditions for most of the day. Gray whales, two humpback whales and one walrus were seen in addition to unidentified whales and phocids. Day ended in rain and fog and one last CTD transect. On effort watch: 8.5 h

15 July
Transited all day. Awoke at 0300 to start watch – excellent weather until 1300 when conditions deteriorated rapidly. Many gray whales seen including cow-calf pairs and young whales. Several tens of thousands of eiders sighted around 11 am in Mechigmensky Gulf.
On effort watch: 10.3 h

16 July
Transited all day. Miserable weather until ~1000. Began on effort watch at that time. Humpback and gray whales sighted in Anadyr Gulf. There were no walrus on Kosa Russkaya Koshka as there were on the way out and only a few in the water. The day, and the cruise, ended with beautiful warm weather. On effort watch: 15 h

Table 2. All sightings by date and time (GMT – this is -12 hours from local)

sighting #	time (hhmmss)	date	lat	lon	best	high	low	species
1	13037	70814	64.61	-182.10	2	3	2	beluga
2	13605	70814	64.60	-182.07	3	6	3	beluga
3	14949	70814	64.60	-182.00	1	2	1	beluga
4	15118	70814	64.61	-181.99	15	25	12	beluga
5	15353	70814	64.61	-181.98	2	5	2	beluga
6	15806	70814	64.61	-181.95	7	12	5	beluga
7	20018	70814	64.61	-181.93	1	2	1	beluga
8	21813	70814	64.63	-181.80	3	5	3	beluga
9	21901	70814	64.63	-181.80	2	3	2	beluga
10	22036	70814	64.63	-181.79	15	20	10	beluga
11	22221	70814	64.62	-181.78	5	8	4	beluga
12	22632	70814	64.62	-181.75	8	12	5	beluga
13	22832	70814	64.61	-181.74	1	2	1	beluga
14	22944	70814	64.61	-181.73	5	7	3	beluga
15	23153	70814	64.61	-181.72	2	3	2	beluga
16	23329	70814	64.61	-181.71	2	4	2	beluga
17	23427	70814	64.60	-181.70	10	15	8	beluga
18	23745	70814	64.60	-181.68	2	3	2	beluga

19	23900	70814	64.60	-181.67	2	3	2	beluga
20	24138	70814	64.59	-181.65	7	10	6	beluga
21	25108	70814	64.58	-181.59	600	800	450	walrus
22	30624	70814	64.56	-181.50	5	7	4	walrus
23	31059	70814	64.55	-181.48	4	7	3	walrus
24	31448	70814	64.55	-181.47	3	5	2	walrus
25	31922	70814	64.54	-181.45	1	2	1	walrus
26	32524	70814	64.53	-181.43	1	1	1	unid lg whale
27	33126	70814	64.51	-181.40	6	8	5	walrus
28	33316	70814	64.51	-181.39	15	20	10	walrus
29	33949	70814	64.50	-181.37	3	5	2	walrus
30	34438	70814	64.49	-181.35	5	7	4	walrus
31	34752	70814	64.48	-181.33	3	5	2	walrus
32	35426	70814	64.47	-181.30	6	8	4	walrus
33	40244	70814	64.45	-181.27	1	1	1	unid phocid
34	41548	70814	64.44	-181.19	1	1	1	unid phocid
35	45222	70814	64.43	-180.98	1	1	1	unid phocid
36	45622	70814	64.43	-180.95	1	1	1	unid phocid
37	51637	70814	64.43	-180.83	1	1	1	unid phocid
38	51846	70814	64.43	-180.81	1	1	1	unid phocid
39	52544	70814	64.43	-180.77	2	4	2	walrus
40	54522	70814	64.42	-180.65	1	1	1	unid phocid
41	54931	70814	64.42	-180.62	1	1	1	unid phocid
42	55123	70814	64.42	-180.61	1	1	1	orca
43	55426	70814	64.42	-180.59	2	2	2	unid phocid
44	60407	70814	64.42	-180.53	1	1	1	unid phocid
45	60624	70814	64.42	-180.51	1	1	1	spotted seal
46	74227	70814	64.40	-179.87	4	6	3	orca
47	75244	70814	64.40	-179.80	4	5	4	orca
48	80734	70814	64.40	-179.70	1	3	2	unid phocid
49	40302	70914	64.42	-171.94	1	1	1	gray whale
50	53320	70914	64.66	-171.81	1	1	1	ring seal
51	53652	70914	64.67	-171.80	1	1	1	ring seal
52	60122	70914	64.73	-171.80	2	2	2	ring seal
53	60943	70914	64.76	-171.81	1	1	1	ring seal
54	62704	70914	64.81	-171.81	1	1	1	unid phocid
55	62948	70914	64.82	-171.81	1	1	1	ring seal
56	63132	70914	64.82	-171.81	2	2	2	unid phocid
57	63423	70914	64.83	-171.81	1	1	1	unid phocid
58	70423	70914	64.92	-171.81	1	1	1	unid phocid
59	71059	70914	64.93	-171.81	1	1	1	minke whale
60	71156	70914	64.94	-171.81	1	2	1	gray whale
61	71849	70914	64.96	-171.81	2	2	2	gray whale
62	72114	70914	64.96	-171.82	1	1	1	gray whale
63	72210	70914	64.97	-171.82	1	1	1	gray whale
64	72245	70914	64.97	-171.82	1	1	1	gray whale
65	72756	70914	64.98	-171.82	1	1	1	unid phocid
66	72958	70914	64.99	-171.82	1	1	1	gray whale
67	73023	70914	64.99	-171.82	1	1	1	bearded seal
68	73100	70914	64.99	-171.82	3	4	3	gray whale
69	73416	70914	65.00	-171.82	1	1	1	gray whale
70	73603	70914	65.01	-171.82	1	1	1	gray whale
71	73703	70914	65.01	-171.82	1	1	1	gray whale

72	74249	70914	65.03	-171.82	1	1	1	gray whale
73	74617	70914	65.04	-171.81	3	4	3	gray whale
74	74808	70914	65.04	-171.81	1	1	1	gray whale
75	75028	70914	65.05	-171.81	2	3	2	gray whale
76	75232	70914	65.06	-171.81	1	2	1	gray whale
77	75423	70914	65.06	-171.81	1	2	1	unid lg whale
78	75557	70914	65.07	-171.81	1	1	1	gray whale
79	75728	70914	65.07	-171.81	3	5	3	gray whale
80	80322	70914	65.09	-171.81	1	1	1	gray whale
81	80621	70914	65.10	-171.81	1	2	1	gray whale
82	81234	70914	65.12	-171.81	3	4	3	gray whale
83	81750	70914	65.13	-171.81	4	6	4	gray whale
84	82446	70914	65.15	-171.81	2	3	2	gray whale
85	82803	70914	65.16	-171.81	1	2	1	unid lg whale
86	83507	70914	65.18	-171.81	4	6	3	gray whale
87	85052	70914	65.23	-171.82	1	2	1	unid lg whale
88	85452	70914	65.24	-171.83	3	5	3	unid lg whale
89	90146	70914	65.26	-171.83	1	1	1	gray whale
90	90305	70914	65.26	-171.83	2	3	2	unid phocid
91	171905	70914	65.82	-169.92	3	5	3	gray whale
92	173812	70914	65.85	-169.85	1	2	1	gray whale
93	215720	70914	65.93	-169.62	3	4	3	unid lg whale
94	222152	70914	65.93	-169.62	3	2		unid lg whale
95	3325	71014	65.94	-169.66	1	1	1	gray whale
96	3341	71014	65.94	-169.66	2	3	2	unid lg whale
97	13822	71014	65.94	-169.60	2	3	2	unid lg whale
98	15212	71014	65.92	-169.54	1	2	1	unid lg whale
99	40552	71014	65.84	-169.18	1	1	1	gray whale
100	230155	71014	64.40	-173.30	1	1	1	bearded seal
101	230427	71014	64.40	-173.31	2	3	2	unid phocid
102	230715	71014	64.39	-173.33	1	1	1	unid phocid
103	232202	71014	64.36	-173.40	1	1	1	ring seal
104	31943	71114	64.32	-172.21	3	3	3	gray whale
105	33409	71114	64.34	-172.11	1	1	1	bearded seal
106	34143	71114	64.35	-172.06	1	1	1	unid phocid
107	34351	71114	64.35	-172.05	1	1	1	unid phocid
108	34543	71114	64.36	-172.04	1	1	1	unid phocid
109	42632	71114	64.44	-171.81	1	1	1	ring seal
110	44115	71114	64.48	-171.73	2	2	2	ring seal
111	55235	71114	64.63	-171.33	1	1	1	unid phocid
112	61958	71114	64.69	-171.18	1	1	1	unid phocid
113	73952	71114	64.87	-170.74	12	16	10	orca
114	172200	71214	68.22	-167.31	1	1	1	unid lg whale
115	181659	71214	68.17	-167.44	1	1	1	ring seal
116	51919	71314	67.40	-169.68	1	1	1	gray whale
117	55426	71314	67.34	-169.85	1	1	1	unid lg whale
118	74736	71314	67.20	-170.27	2	3	2	gray whale
119	82501	71314	67.18	-170.29	1	1	1	unid lg whale
120	83654	71314	67.17	-170.34	4	6	4	gray whale
121	83904	71314	67.16	-170.35	1	2	1	unid lg whale
122	84220	71314	67.16	-170.36	1	1	1	gray whale
123	84451	71314	67.15	-170.38	2	3	2	gray whale
124	84805	71314	67.15	-170.39	2	3	2	gray whale

125	85442	71314	67.14	-170.42	1	1	1	gray whale
126	85742	71314	67.13	-170.44	1	1	1	gray whale
127	85911	71314	67.13	-170.45	1	1	1	unid lg whale
128	90009	71314	67.13	-170.45	1	1	1	gray whale
129	90604	71314	67.12	-170.48	2	3	2	gray whale
130	91604	71314	67.10	-170.53	1	2	1	gray whale
131	93750	71314	67.07	-170.63	1	1	1	gray whale
132	95016	71314	67.06	-170.64	1	1	1	unid lg whale
133	151724	71314	67.21	-172.10	2	3	2	gray whale
134	154017	71314	67.22	-172.26	1	1	1	gray whale
135	160142	71314	67.24	-172.40	2	3	2	unid lg whale
136	173531	71314	67.22	-172.18	2	2	2	gray whale
137	184947	71314	67.19	-171.66	1	2	1	gray whale
138	194635	71314	67.13	-171.29	1	1	1	gray whale
139	203046	71314	67.04	-171.07	2	2	2	gray whale
140	203933	71314	67.03	-171.04	1	1	1	ring seal
141	204406	71314	67.02	-171.02	1	1	1	humpback whale
142	205751	71314	66.99	-170.96	1	1	1	gray whale
143	210455	71314	66.97	-170.93	1	1	1	gray whale
144	210518	71314	66.97	-170.93	1	1	1	gray whale
145	210755	71314	66.97	-170.92	1	1	1	gray whale
146	210849	71314	66.96	-170.91	1	1	1	humpback whale
147	212536	71314	66.93	-170.84	1	1	1	gray whale
148	232821	71314	66.68	-170.34	1	1	1	ring seal
149	235001	71314	66.63	-170.26	1	1	1	unid phocid
150	240	71414	66.61	-170.21	1	1	1	gray whale
151	11049	71414	66.49	-169.97	2	2	2	gray whale
152	14417	71414	66.51	-169.92	1	1	1	unid phocid
153	14736	71414	66.51	-169.91	1	1	1	walrus
154	161442	71414	65.58	-170.31	1	1	1	unid lg whale
155	163412	71414	65.53	-170.38	2	3	2	gray whale
156	163604	71414	65.53	-170.38	3	4	3	gray whale
157	163831	71414	65.52	-170.39	1	1	1	unid lg whale
158	163913	71414	65.52	-170.39	1	1	1	gray whale
159	164314	71414	65.51	-170.41	1	1	1	gray whale
160	164845	71414	65.50	-170.42	1	2	1	gray whale
161	164906	71414	65.50	-170.43	1	2	1	unid lg whale
162	164930	71414	65.49	-170.43	2	2	2	gray whale
163	170745	71414	65.45	-170.48	1	1	1	unid lg whale
164	181828	71414	65.42	-170.91	1	1	1	gray whale
165	182145	71414	65.42	-170.93	1	1	1	gray whale
166	182723	71414	65.42	-170.97	2	3	2	gray whale
167	182746	71414	65.42	-170.97	2	3	2	unid lg whale
168	183536	71414	65.42	-171.02	1	1	1	humpback whale
169	183714	71414	65.42	-171.04	3	4	3	unid lg whale
170	184154	71414	65.42	-171.07	1	1	1	gray whale
171	184323	71414	65.42	-171.08	3	4	3	gray whale
172	184651	71414	65.42	-171.10	1	1	1	gray whale
173	185044	71414	65.42	-171.13	1	1	1	gray whale
174	185113	71414	65.42	-171.13	1	1	1	gray whale
175	185214	71414	65.42	-171.14	1	1	1	gray whale
176	185453	71414	65.42	-171.15	2	2	2	unid lg whale
177	185535	71414	65.42	-171.16	1	1	1	unid lg whale

178	190125	71414	65.42	-171.20	3	4	3	gray whale
179	190304	71414	65.42	-171.21	1	1	1	gray whale
180	190530	71414	65.42	-171.23	1	1	1	gray whale
181	190639	71414	65.42	-171.23	5	7	5	unid lg whale
182	191022	71414	65.42	-171.26	4	5	4	gray whale
183	192239	71414	65.42	-171.34	3	3	2	unid lg whale
184	192331	71414	65.42	-171.35	2	3	2	gray whale
185	192903	71414	65.42	-171.39	1	1	1	gray whale
186	192947	71414	65.42	-171.39	2	3	2	unid lg whale
187	200153	71414	65.42	-171.61	2	2	2	gray whale
188	200346	71414	65.42	-171.63	1	1	1	unid lg whale
189	210301	71414	65.39	-171.97	1	1	1	gray whale
190	210728	71414	65.38	-171.96	1	1	1	unid lg whale
191	221345	71414	65.21	-171.85	1	1	1	unid lg whale
192	224954	71414	65.13	-171.79	1	1	1	gray whale
193	225232	71414	65.12	-171.79	1	1	1	gray whale
194	232131	71414	65.06	-171.74	2	3	2	gray whale
195	232627	71414	65.05	-171.74	1	1	1	gray whale
196	233043	71414	65.04	-171.74	1	1	1	gray whale
197	234148	71414	65.01	-171.74	1	1	1	bearded seal
198	234429	71414	65.00	-171.74	1	1	1	unid phocid
199	557	71514	64.95	-171.75	1	1	1	unid phocid
200	231402	71514	64.32	-177.50	1	2	1	unid lg whale
201	232538	71514	64.33	-177.57	2	3	2	humpback whale
202	11	71614	64.33	-177.78	1	1	1	humpback whale
203	846	71614	64.34	-177.84	2	2	2	humpback whale
204	2716	71614	64.34	-177.95	1	1	1	humpback whale
205	2953	71614	64.34	-177.97	1	1	1	humpback whale
206	4041	71614	64.34	-178.04	1	1	1	humpback whale
207	4336	71614	64.34	-178.05	2	3	2	humpback whale
208	24440	71614	64.36	-178.79	2	2	2	gray whale
209	25806	71614	64.37	-178.88	1	1	1	unid phocid
210	30219	71614	64.37	-178.91	1	1	1	unid phocid

On effort watch: 11h

Table 2. All sightings with date and time (GMT).

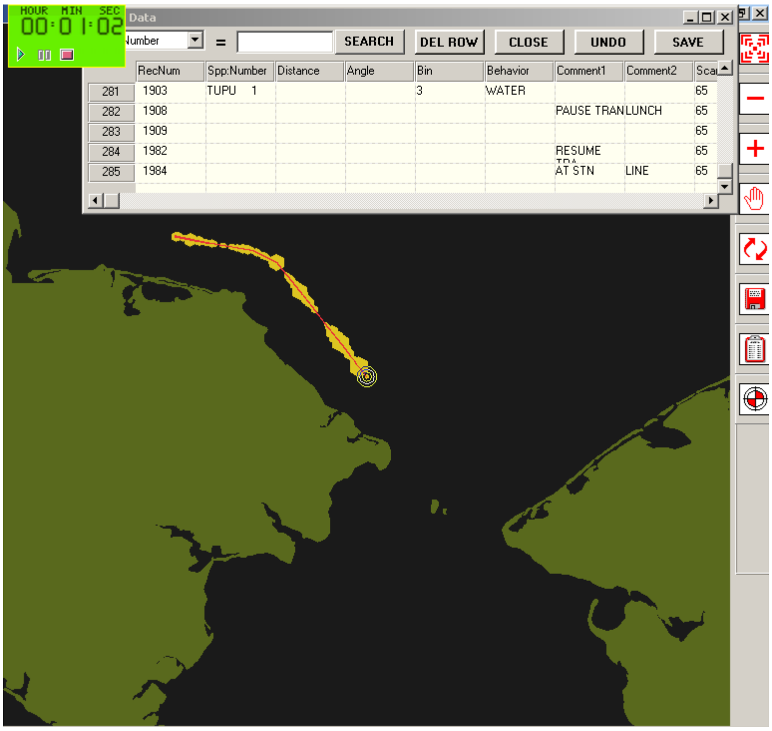
Marine Bird Observations

Marine bird surveys were conducted by U.S. Fish & Wildlife personal Elizabeth Labunski aboard the R/V Professor Khromov in part with the 2014 RUSALA expedition. Surveys were conducted from 8 – 15 July, 2014. This report presents preliminary data that was gathered during surveys through 15 July. Additional data is being collected while the ship transits back to port and arrives in Anadyr, Russia on 17 July. Those data results can be provided after the cruise. Note all dates and times were recorded and are reported in GMT.

Surveys were preformed while the R/V Professor Khromov transited through the Gulf of Anadyr, the northern Bering Sea, and Chukchi Sea. The majority of the surveys were conducted offshore (beyond 12 nm) of Chukotka and Alaska near the Bering Strait region. In addition, some nearshore (3-12 nm) surveys were conducted when possible along the northeastern side of Chukotka. Detailed survey maps showing tracklines, survey effort, and total kilometers surveyed can be provided in a final cruise report after the survey is completed on 17 July.

Survey regions included: Gulf of Anadyr, Provedenia region, Mechigmensky Bay, Bering Strait, Point Hope region, and the northeastern Chukotka coast (Figure 1.)

Figure 1. Screen capture of the survey's northern extent during RUSALCA 2014. Red line indicates transect surveyed, yellow dots depict the number of birds observed.



Marine bird surveys were conducted using standardized strip transect methodology while the ship was transiting between stations. Surveys were conducted during daylight hours locally 3 am – 10 pm when conditions allowed. Fog and rough seas truncated survey effort when conditions could not allow for proper visibility. All marine birds were recorded into a GPS integrated laptop using Dlog3 software. Dlog3 allowed us to record the latitude and longitude of each observation. Birds that were observed from 0-300m from the ship were recorded as "on transect" and divided into 3 distance bins that estimated the bird's location from the centerline of the ship (see Figure 2). Any observations beyond the 300m range were entered as Bin 9 or "off transect". All data will be compiled and submitted to NPPSD (North Pacific Pelagic Seabird Database). The NPPSD is a multi agency database that has been created to store marine bird survey data in one location for research purposes. Additional information on the NPPSD is located at: www.seabirds.net.

- Optimum survey area is 300m strip transect.
- Record all observations in one of four Distance Bins:

  Bin 1 0- 100 meters
  Bin 2 100- 200 meters
  Bin 3 200 - 300 meters
  Bin 9 > 300 meters, or "off transect"

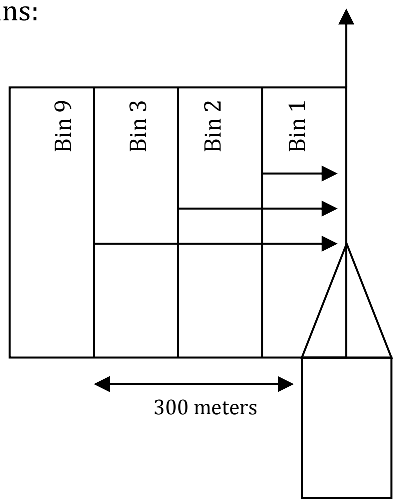


Figure 2. Survey distance bins

A total of 7,081 birds were observed during surveys from 8-15 July (Table 1.) The two most common species observed were king and spectacled eiders. These two species comprised nearly 36% of the total birds observed during the survey. Crested auklets and thick-billed murres that nest in the Bering Strait, also occurred in high numbers during the survey along with red phalaropes.

We noted a large concentration of king and spectacled eiders in Mechigmensky Bay on the two occasions 9 July and 14 July when we surveyed in this area. This area was first surveyed during the evening hours of 9 July. Light conditions were low when we initially started to encounter large flocks of eiders. Most of the birds were observed beyond 300m (off transect) and were congregated in large flocks. Survey conditions were optimal when we again transited through Mechigmensky Bay on 14 July and we recorded 887 spectacled eiders and 1,189 king eiders located in several flocks in the north and western part of Mechigmensky Bay (Figure 3.). We observed several eiders that appeared to be undergoing a molt during this time and they were not able to fly. The highest concentration of eiders occurred south of the town of Lorendza, Russia and extended into the northwestern part of the bay. Eider numbers dropped as the survey proceeded south and out of the head of the bay.

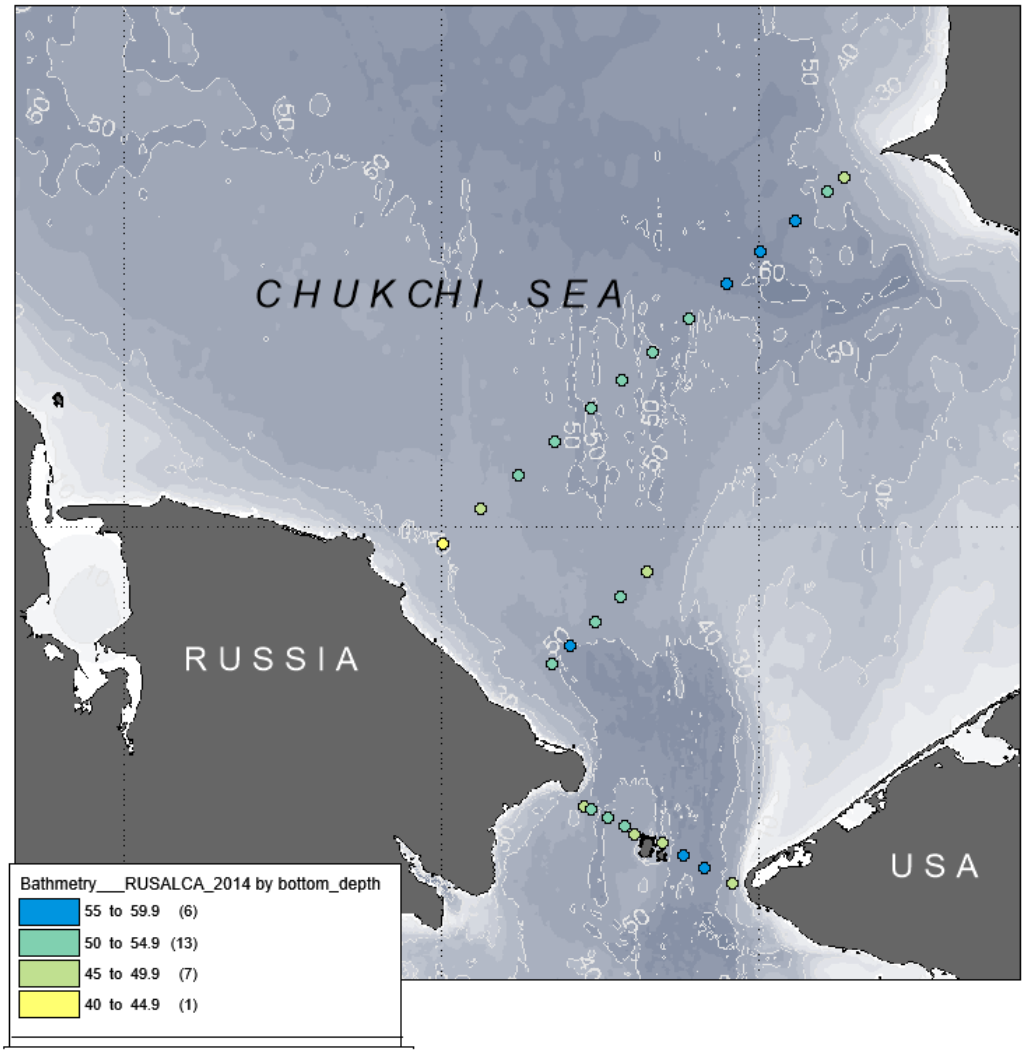
Also of special interest 10 Kittlitz's murrelets were observed during this survey. The Kittlitz's murrelet is an *Alcidae* species that is only found in Russian and Alaskan waters. The population of Kittlitz's murrelets has been in recent decline and has prompted conservation concern. Russia has listed the species as critically endangered, and in the U.S. the species is considered threatened. We were able to collect valuable near shore and offshore distribution information on this species during this RUSALA cruise.

Table 1. Total marine birds observed on transect during surveys from 8-15, 2014 aboard RUSALCA 2014.

Species	Number	% Total
King Eider	1,342	18.95
Spectacled Eider	1,199	16.93
Crested Auklet	1,187	16.76
Thick-billed Murre	892	12.60
Red Phalarope	820	11.58
Northern Fulmar	618	8.73
Black-legged Kittiwake	236	3.33
Tufted Puffin	182	2.57
Horned Puffin	139	1.96
Least Auklet	111	1.57
Common Murre	69	0.97
Herring Gull	65	0.92
Pigeon Guillemot	52	0.73
Red-necked Phalarope	52	0.73
Parakeet Auklet	46	0.65
Glaucous Gull	25	0.35
Kittlitz's Murrelet	10	0.14
Arctic Tern	7	0.10
Parasitic Jaeger	6	0.08
Red-faced Cormorant	6	0.08

Black Guillemot	3	0.04
Greater-white fronted Goose	3	0.04
Pelagic Cormorant	3	0.04
Slaty-backed Gull	3	0.04
Common Eider	2	0.03
Pomarine Jaeger	2	0.03
Pacific Loon	1	0.01
total	7,081	100%

RUSALCA 2014 Station Bathymetry



Suggested list of items to bring for Future Russian mooring recoveries:

For RCM Blue Seaguard:

- new SD card (~1 Gb) (in case we are not formatting the old card at sea)
- hard drive for downloading data

For SBE 37-SMP (RS-232):

- new Anti-foulant device for the conductivity cell ?.. (if redeploy the instrument)

This information is based on William Floering's observations of what the R/V Khromov has available and the expectations of those collecting CTD and mooring instrument data in future years.

The 8242 Acoustic release battery pack for the Russian Bering Strait mooring should be good for two years so if RUSALCA returns next year one will only need a zinc and release link to turn that piece of equipment around. If it stays out 2 years then one should plan on replacing the link, zinc and battery pack.

The RCM 9-Blue current meter will need a new battery pack (comes with 2) each year of deployment. The data card can be downloaded or replaced with a new card depending on what is easiest in the somewhat controlled data access environment aboard the ship. The cage that came with this unit is not as robust as the cage available for other RCM 9 models. One might want to look into using a more robust cage. This could be an issue if the release failed and you had to drag the mooring up with the anchor attached to recover it. There were spare zincs for this unit in the box it was shipped in.

The SeaBird SBE 37 did not come with a cage and is currently clamped to the mooring line. A suitable cage for this instrument should be provided for next year's deployment. PMEL may have a suitable cage. RUSALCA will also need additional shackles to mount this new cage. The SBE 37 has an interesting battery pack that can be a challenge to figure out and has a circuit board on the base of the instrument that if damaged will keep the battery pack from working. You can simplify a battery exchange for this instrument if you order a new pack with batteries installed. Pack is good for one year deployment. There are also poison cells in the instrument that need to be replaced each year. These are anti-fouling cells to keep the conductivity cell clean.

The Aural is handled by Kate Stafford, and would be the contact person for what is needed to turn that instrument around at sea.

There are some set up menus in the SBE 37 and RCM9-Blue that are critical if you want to collect good data or even any data at all. It's advisable to have someone on the cruise that has some knowledge of the set up for these two instruments. The same is true for the operation of the acoustic release deck set. It's possible to enter incorrect codes, set up commands and frequencies into the deck set and not be able to range on or recover the mooring. One must also remember to disable the release in the water or it will remain in the "on" configuration and drain the battery power before return in a year to recover it.

There are cables that are needed to download the data from the SBE and to talk to it to set it up and the RCM 9.

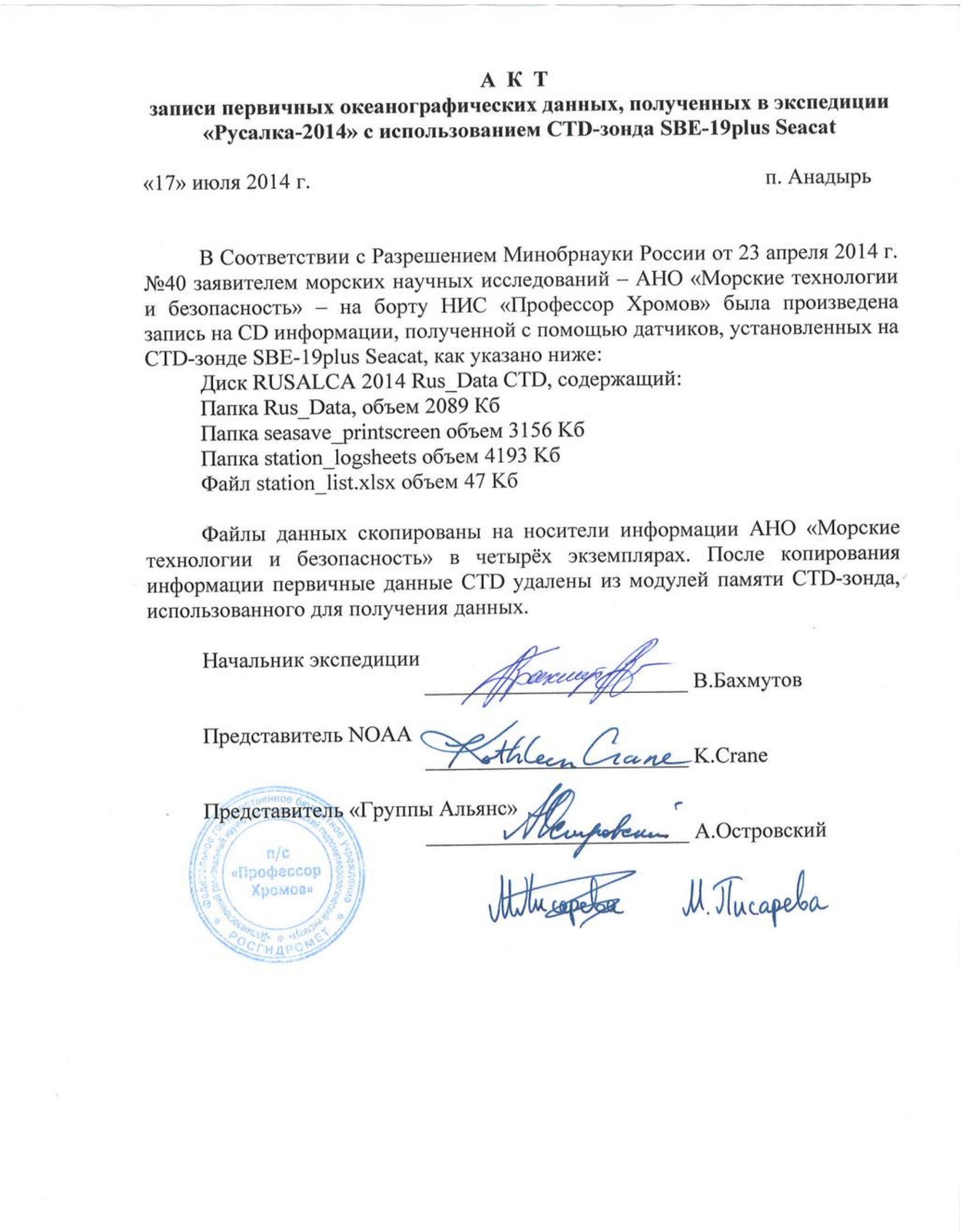
For the mooring in general one needs to pay attention to the different metal types in the cages, shackles and mooring back bone line. Stainless steel has to be isolated from the galvanized metal to avoid electrolysis that could eat through one of the attachments and cause the mooring to break apart and float away. Also, there is a compass in the RCM 9 that needs to be isolated from Ferris metal at least a half meter above the top of the instrument. If not one runs the risk of interfering with the compass and throwing off all the directions for the currents you are trying to measure. The nylon rope backbone currently deployed with this mooring could be used again next year for another deployment but I would take a couple extra pieces along in case there is damage to one of the sections. One 1 meter section was not deployed, that was the one that would have connected to the SBE37 cage if a cage had been available. That piece will be needed next year if a cage is located for the SBE.

For CTD operations the following equipment will be needed:

- Chinese fingers specific for the diameter wire on their conducting wire winch.
- A proper pig tail that attaches to the end of the conducting wire and plugs into the CTD PDIM. Right now this is a 3 pin wet mate able plug and one was in the CTD wooden box when we left. It would be good to have a spare in case that pig tail was damaged.
- A male dummy plug for the end of that pigtail when not plugged into the CTD and a spare dummy plug for the PDIM in case the one you have gets lost. To make the connection of the pigtail to the conducting winch wire you have two options. 3M makes an epoxy mix potted model 82-F1 that provides a water tight seal on the wire. It takes approximately 24 hours for this type to set up and be ready to put in the water. Another option is to use layers of self-volcanizing electrical tape and liquid electrical tape. This system works too and only requires a couple hours of drying time before deployment. With both systems one needs butt splices, electrical tape and shrink tubing to make a good water tight seal. There is a deck test cable in the CTD shipping box that is good for testing the system separate from the winch wire.
- It's possible RUSALCA will have a rosette next year for the CTD and the oceo winch with the conducting wire will work for the entire cruise. If not, RUSALCA will have to go back to mounting the niskin bottles on a ¼ inch stainless wire and tripping the bottles with messengers to get the water samples. PMEL suggests taking the supplies needed for the wire method as a backup to the winch as its history of reliability is suspect. One would need about 300 feet of stainless ¼ inch wire with an eye on each end.
- Do not forget backup Messengers to trip the bottles and the nicopress fittings and nylon lanyard material to rig the niskin bottles for a wire trip.
- The same niskin bottles can be used on the rosette or on the wire but the lanyard (the nylon line that hold the bottle open on deployment, is set up differently for the rosette mount than it is for the wire mount.
- It is a good idea to take at least 2 spare niskins as occasionally one will break.
- Also bring springs or rubber bands that go inside the niskin bottles to close them.
- If there is a problem with the winch wire or the water tight integrity of the pigtail splice, fuses may blow in the CTD deck unit.
- Take 10 or so spare fuses (there are two different ones for the deck unit) as one can burn through a few trouble shooting a short in the conductive cable.
- Take some extra rope or line for tying things on deck as there is little if any available on the Khromov.
- Also bring extra shackles, both galvanized and stainless.
- The two small plastic floats that were deployed do not take a normal safety shackle with a cotter pin to secure it. They require smaller screw pin shackles that need to be seized

with stainless safety wire or something similar. Floering brought a SeaCatch release to release the anchor from the crane when deployed. The Navy reps were interested in obtaining one of those which cost about $1600. For one mooring you can use a piece of suitable rope to hang the anchor and cut the rope to drop it; A cheap and effective way to deploy the anchor.

Calvin Mordy mentioned that if possible it would be good to include a -40 portable freezer in the list of equipment to load. PMEL has those at the lab. PMEL also may have a conductive wire winch that could be loaded as a backup to the ships winch if it failed. There would be added shipping costs for this level of redundancy and right now I think our backup winch would require about 3K in upgrades to make it serviceable. The other side of this would be to insure our hydraulic fittings fit the ships hydraulic fittings and that will probably require some research.



А К Т
записи первичных океанографических данных, полученных в экспедиции «Русалка-2014» с использованием CTD-зонда SBE-19plus Seacat

«17» июля 2014 г. п. Анадырь

В Соответствии с Разрешением Минобрнауки России от 23 апреля 2014 г. №40 заявителем морских научных исследований – АНО «Морские технологии и безопасность» – на борту НИС «Профессор Хромов» была произведена запись на CD информации, полученной с помощью датчиков, установленных на CTD-зонде SBE-19plus Seacat, как указано ниже:

Диск RUSALCA 2014 Rus_Data CTD, содержащий:
Папка Rus_Data, объем 2089 Кб
Папка seasave_printscreen объем 3156 Кб
Папка station_logsheets объем 4193 Кб
Файл station_list.xlsx объем 47 Кб

Файлы данных скопированы на носители информации АНО «Морские технологии и безопасность» в четырёх экземплярах. После копирования информации первичные данные CTD удалены из модулей памяти CTD-зонда, использованного для получения данных.

Начальник экспедиции ____ В.Бахмутов

Представитель NOAA Kathleen Crane K.Crane

Представитель «Группы Альянс» ____ А.Островский

п/с «Профессор Хромов» РОСГИДРОМЕТ

М. Писарева

The RUSALCA 2014 Bering Strait Protocol signed 17 July, 2014 in the Port of Anadyr