



UNCLASSIFIED
IGR-694

August 17, 2018

Mr. Michael Layne
Deputy Director
Ocean Science Policy and Authorizations
Office of Ocean and Polar Affairs
United States Department of State
2201 C Street NW
Washington, D.C. 20520

Dear Mr. Layne,

**Amendment to IGR-584: Authorization for U.S. Marine Scientific Research:
Northwest Passage Project – F2018-044** (August 19 – September 18, 2018)

I am pleased to advise that the Government of Canada grants its consent to the request for the University of Rhode Island Graduate School of Oceanography (henceforth referred to as URIGSO in this letter) to undertake marine scientific research (MSR) in areas under the national jurisdiction of Canada during the above mentioned dates.

This letter of authorization is an amendment to IGR-584 of August 14, 2018.

As this application indicates there will be research activity taking place in Canadian waters, conducted onboard the One Ocean AKADEMIK IOFFE research vessel, as well as a port of call, I would like to remind the URIGSO and the One Ocean AKADEMIK IOFFE of the Canada Border Services Agency (CBSA) - marine reporting requirements:

Canada Border Services Agency (CBSA) - marine reporting requirements:

Foreign expeditions arriving in Canada by research vessel and entering Canada's internal waters or territorial sea are required to report to the nearest Canada Border Services Agency (CBSA) Marine Reporting office.

CBSA Marine Reporting Offices: (**Atlantic**) Phone: 902-426-5738 / Fax: 902-426-1007

Vessels are required to transmit the following completed forms: **Form A6** General Declaration and **Form A6A** Freight/Cargo Manifest. The forms can be obtained electronically via the links below:

Form A6: <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6.pdf>

Form A6A: <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6a.pdf>

Port Calls: Please note, a Pre-Arrival Notice must be submitted to the CBSA at CBSA-ASFC-PANS/AA@cbsa-asfc.gc.ca

We would like to remind the URIGSO and the One Ocean AKADEMIK IOFFE that it is required to submit an **A6 outward report** when it leaves its last port in Nunavut, following the conduct of multi-stop research in Canada. The A6 form can be provided to the CBSA at Nunavut_clearance@cbsa-asfc.gc.ca.

The URIGSO and the One Ocean AKADEMIK IOFFE will require a fishing license in order to proceed with the proposed plankton tows. This license will be issued by Fisheries and Oceans Canada once satisfactory notifications have been received from the Nunavut Impact Review Board.

In addition, Fisheries and Oceans Canada will not permit the deployment of the Slocum Glider as requested in the MSR. Since this would be a first attempt to operate a Glider in the area and due to the arduous conditions of the Arctic environment, it has been determined that there is a pronounced risk of non-recovery and associated liability once this instrument is deployed.

Furthermore, as the request is for the URIGSO to conduct MSR in Canada, Canada's consent only applies to MSR to be conducted by the URIGSO. As such, any research conducted must be done exclusively with instruments owned by U.S. academic institutions. Tools or instruments that may be aboard the vessel being used as an MSR platform not owned by a U.S. academic institution and operated by the URIGSO may not be used for MSR.

We would also like to remind the URIGSO and the One Ocean AKADEMIK IOFFE that the regulatory regime for ships operating in the Canadian Arctic primarily consists of the *Canada Shipping Act, 2001*, the *Arctic Waters Pollution Prevention Act*, the *Marine Liability Act*, the *Marine Transportation Security Act*, and various regulations made thereunder.

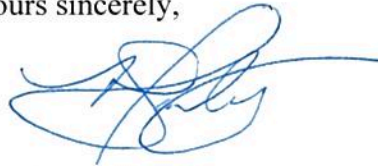
Please be advised that on 19 December 2017, the new *Arctic Shipping Safety and Pollution Prevention Regulations* (ASSPPR) entered into force. Amongst other things, the ASSPPR incorporates by reference all safety chapters of the Polar Code, as well as elements of the pollution prevention chapters that maintain Canada's zero-discharge

regime for waste generated onboard ships. Additional Canadian modifications not captured by the Polar Code though included within the ASSPPRs include the establishment of methodologies for determining a vessel's operational limits in ice, requirements for ice regime routing messages, and requirements for ice navigators. For additional information on the ASSPPR, please see the attached Ship Safety Bulletin.

Please also be advised that vessels operating in the Canadian Arctic must follow the *Northern Canada Vessel Traffic Services Zone Regulations* (NORDREG) which sets out various reporting requirements for vessels of certain sizes or engaged in certain activities.

We are pleased that Canadian participants would be welcomed to join the project, and that the scientific results and all the data from this cruise will be freely and generously shared and request copies of the preliminary and final cruise reports.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Meghan Hanley', with a long horizontal flourish extending to the right.

Meghan Hanley,
Deputy Director
Defence and Security Relations Division

APPLICATION FOR CONSENT TO CONDUCT MARINE SCIENTIFIC RESEARCH

1. General Information

1.1 Cruise name and/or number:		Northwest Passage Project - Akademik Ioffe 2018 - F2018-044	
1.2 Sponsoring institution(s):			
Name	Address	Name of Director	
University of Rhode Island Graduate School of Oceanography	Inner Space Center 215 South Ferry Road Narragansett, RI 02882 401-874-6637	Dwight F. Coleman, Ph.D.	
1.3 Scientist in charge of the project:			
Name:	Brice Loose		
Country:	US		
Affiliation:	University of Rhode Island		
Address:	215 S Ferry Rd Box 46 Narragansett, Rhode Island 02882 US		
Telephone:	401-874-6676		
Email:	bloose@uri.edu		
1.4 Entity(ies) /Participant(s) from coastal State involved in the planning of the project: See Section 8 (Participation)			
Name:	See Section 6.2.		
Country:			
Affiliation:			
Address:			
Telephone:			
Fax:			
Email:			
Website (for CV and photo):			
1.5 Submitting officer:			
Name:	Dwight Coleman		
Affiliation:	University of Rhode Island		
Address:	Graduate School of Oceanography		
Phone:	401-874-6637		
Fax:			
Email:	dcoleman@uri.edu		

2. Description of Project

2.1 Nature and objectives of the project:	
The Northwest Passage Project (NPP) is a US National Science Foundation funded program to explore the changing Arctic through an innovative expedition that will engage diverse audiences through real time interactions from sea, a high definition 2-hour documentary, and related community events. The expedition will be conducted onboard the One Ocean Akademik Ioffe, which will be fully equipped with telepresence technologies for shore-based participation in the project. Undergraduate and graduate students will participate in the expedition along with scientists, historians, journalists, and a documentary film crew.	
2.2 Relevant previous or future research projects:	
N/A	
2.3 Previous publications relating to the project:	
N/A	

3. Geographical Areas

3.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude, including coordinates of cruise track/ way points):
Northwest Passage Canadian Arctic Archipelago 23-Aug-18 RESOLUTE BAY, NUNAVUT 24-Aug-18 Beechey Island 24-Aug-18 Radstock Bay 25-Aug-18 Cape Charles Yorke 25-Aug-18 Edwin Inlet 26-Aug-18 Prince Leopold Island 26-Aug-18 Port Leopold 27-Aug-18 Fort Ross 27-Aug-18 Bellot Strait 28-Aug-18 Conningham Bay 29-Aug-18 Victory Point 30-Aug-18 Royal Geographical Society Islands 31-Aug-18 South King William Island or Victoria Island 1-Sep-18 CAMBRIDGE BAY 2-Sep-18 Victory Point 3-Sep-18 Conningham Bay 4-Sep-18 Fort Ross 5-Sep-18 Beechey Island 6-Sep-18 Dundas Harbour 7-Sep-18 Pond Inlet 8-Sep-18 Gibbs Fjord 9-Sep-18 Isabella Bay 10-Sep-18 Sunshine Fjord 11-Sep-18 Pangnirtung 12-Sep-18 Monumental Island 13-Sep-18 IQALUIT, CANADA

3.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical areas of the intended work and, as far as practicable, the location and depth of sampling stations, the tracks of survey lines, and the locations of installations and equipment.
Chart provided - see Section 10.1.

4. Methods and Means to be Used

4.1 Particulars of vessel:

Name:	AKADEMIK YOFFE
Type/Class:	Ship
Nationality (Flag state):	Russian Federation
Identification Number (IMO/Lloyds No.):	
Owner:	
Operator:	
Overall length (meters):	385.00
Maximum draught (meters):	19.90
Displacement/Gross tonnage:	6600.00
Propulsion:	
Cruising:	
Maximum speed:	
Call sign:	UKLP
INMARSAT number and method and capability of communication (including emergency frequencies):	
Name of master:	TBD
Number of crew:	65
Number of scientists on board:	36

4.2 Other craft in the project, including its use:

N/A

4.3 Particulars of methods and scientific instruments:

Types of samples and measurements	Methods to be used	Instruments to be used
Physical oceanographic measurements - digitally recorded data.	<p>A Slocum Glider is a type of Autonomous Underwater Vehicle or AUV. AUVs operate independent of ships based on programed instructions they are given. The Slocum Glider to be used on the URI Northwest Passage Project 2017 can communicate with land based researchers through a satellite link. The data from the glider can be downloaded and new instructions can be uploaded. The Slocum Glider operates by making small changes to its buoyancy which allows it to move up and down in the water column to create a profile of the water column. To make a Slocum Glider work, a pump transfers seawater in and out of a holding chamber, which results in a change to the vehicle's density; this leads to a sequence of sinking and rising, which is translated into a forward motion by the attached wings. The average horizontal speed is 20-40 cm/s and vertical motion is 10-20 cm/s. Dive depth can be regulated by a pressure sensor. Forward and backward shifting of the battery packs controls dive angle; a rudder in the tail fin controls the yaw. When at the surface for communication, an air bladder at the tail is filled for additional buoyancy. The glider makes a minimum of noise underwater, with the greatest noise happening for short periods when the pumps are operating. Typical sound levels are 35 to 45 dB re 1 μPa at 1m from 20Hz to 13,000 Hz and while</p>	Slocum Glider

	<p>pumping sound levels range from 45 to 85 dB re 1 μPa at 1m from 20Hz to 13,000 Hz. Sound levels above 65 dB re 1 μPa at 1m only occur between about 8,000 Hz and 11,000 Hz. These are pretty low underwater sound levels and as such the gliders are considered good platforms for passive acoustic listening. For example, they are being used as a monitoring tool by the U.S. National Oceanic and Atmospheric Administration (NOAA) to monitor endangered North Atlantic right whales as well as fin, sei, and humpback whales. Marine mammals do not seem to be disturbed by the gliders or to disturb the gliders. The glider is about 2.4 meters long with a 0.45 meter diameter and weights about 90 kilograms. The glider is painted yellow with a black nosecone. For the NPP expedition, the glider will be equipped with conductivity meter (to measure salinity), a temperature sensor, a pressure sensor (for depth), a dissolved oxygen sensor, and 3-channel fluorometer (to measure Chlorophyll-a, CDOM, and optical backscattering). For the 2018 NPP expedition, the glider will be deployed around August 24 north of Somerset Island will be recovered around September 6, when the ship returns to the area. The glider will operate within the Lancaster Sound area. Once the glider is deployed, the ship does not need to stay near the glider. The glider will be untethered and can operate on its own for multiple weeks. To pilot the glider, the science team will be in daily communication with the glider pilot at the Virginia Institute of Marine Science. Data will also be downloaded to the ship on a daily basis. The glider's mission is to conduct repeated cross strait transects to monitor water masses, freshwater transport, boundary currents on the two sides of Lancaster Strait, and eddies inside the strait. This across-strait survey pattern would complement the ship's along-strait survey and a more comprehensive view of the oceanographic conditions in Lancaster Strait during the period of the cruise. While Dr. Gong has operated Slocum gliders in the Arctic before, primarily in the Beaufort Sea area, and others have operated them around the Arctic, we are unaware of any Slocum Gliders used in the Nunavut Territory. Other types of gliders/autonomous underwater vehicles have been used extensively in the Arctic: around Alaska, around Greenland, around Svalbard, and around Ellesmere Island.</p>	
Physical oceanographic measurements of currents and sonar investigation of fish and zooplankton.	<p>As part of the proposed University of Rhode Island Northwest Passage Project (NPP) expedition aboard the Akademik Ioffe, the science team will utilize several different sonar systems to investigate zooplankton and fish as well as ocean currents. Specifically, the science team will use three sonar systems: A research sonar operating at 45kHz, a TRDI Acoustic Doppler Current Profiler</p>	<p>The science team will use three sonar systems: A research sonar operating at 45kHz, a TRDI Acoustic Doppler Current Profiler (ADCP) operating at 38kHz, and a Lowered Acoustic Doppler Current Profiler (LADCP) operating at 300kHz. The TRDI 38kHz ADCP and the 45kHz research sonar are mounted on the hull of the Akademik Ioffe and the 300kHz LADCP is mounted on the water sampling</p>

	<p>(ADCP) operating at 38kHz, and a Lowered Acoustic Doppler Current Profiler (LADCP) operating at 300kHz. The TRDI 38kHz ADCP and the 45kHz research sonar are mounted on the hull of the Akademik Ioffe and the 300kHz LADCP is mounted on the water sampling rosette. The 45kHz research sonar will be used in conjunction with zooplankton net tows to describe the plankton community observed in the sonar and to investigate the abundance, distribution, spatial variability, and temporal variability of zooplankton and fish. Both the TRDI 38kHz ADCP and the 300kHz LADCP will be used to measure ocean currents. The NPP expedition is aware of concerns about the potential for research acoustic sources to have a behavioral impact on marine organisms, particularly marine mammals. The LADCP 300kHz sonar operates at a frequency that is outside the detection limit of all the Arctic marine mammal species, the intensity decreases very rapidly with distance from the instrument, and it will only be used at the 17 water sampling stations. However, the operating frequencies 38kHz ADCP and the 45kHz research sonar can both be readily perceived by common marine mammals (narwhals and belugas among others) and operate at an intensity where an animal in the vicinity of the vessel could hear the signal. There are several procedures that can be used to reduce or eliminate any impact on marine organisms that may exist from the use of the sonar.</p> <ul style="list-style-type: none"> o First, the sonar can be run intermittently, with a focus on the times when it would be most important to collect acoustic data. For example, the 45kHz sonar would be most useful to run when the zooplankton net tows occur and could be turned off when in any sensitive region. o Second, it may be possible to run the 38kHz and 45kHz sonars in a reduced power mode. Running in a low power mode would reduce the distance from the ship that the sound from the instrument could be perceived by any animals. o Finally, the sonar can be turned off and not used in areas or situations where it is deemed that the sonar may pose an unacceptable risk of impact. The proposed standard procedure for the NPP 2018 expedition will be to have the hull mounted 38kHz and 45kHz sonar operating when the ship is underway, except under these conditions: 1) When in restricted waters of the Bylot Island Migratory Bird Sanctuaries or Parks Canada Waters, the sonar will be off. 2) Out of respect for concerns about the sonar in regard to a group of narwhals that moves between the Arctic Bay and Pond Inlet areas, while in Navy Board Inlet, Eclipse Sound, and Pond Inlet, the hull mounted sonars will be off. 2) The sonar will be off when within 5 km of any Nunavut community. 3) Because the most of the marine 	<p>rosette.</p>
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	<p>mammals in the Arctic can perceive frequencies of the 38kHz and 45kHz sonar, the standard operating procedure on the URI Northwest Passage Project 2018 will be that sonar operation will cease when marine mammals are detected within 500m of the ship. 4) East and South of Bylot Island, the ADCP 38kHz sonar will only be used when greater than 5km from land and will not be used in any harbor, bay, or channel. In addition, the 45kHz sonar will not be used within 5km of land (unless while performing a net tow) and will not be used in any harbor, bay, or channel. The science party is eager to have input on how the sonar should be operated by those with local knowledge. NPP is particularly interested in areas where the local communities would find the NPP results useful and where there are areas of additional concerns about places the sonar should not be used, or used in a mitigation mode. NPP looks forward to working with the communities of Nunavut.</p>	
Measurement of water mass properties and circulation inside the Canadian Arctic Archipelago	<p>In addition to the glider and ADCP data previously mentioned, we intend to use the following methods: MBES: Multibeam Echosounder bathymetric data will be collected continually along transits. CTD: Conductivity, Temperature, Depth (CTD) instruments on the rosette will collect data with casts about every 100 nm or daily. O-18: To observe the inputs of freshwater into Arctic seawater, we will measure stable isotopes of hydrogen and oxygen on seawater using laser absorption spectrometers. Freshwater runoff, precipitation-evaporation, sea-ice formation and melting ice produce water masses with unique slopes along the relationship between the stable isotopic ratio and salinity. These discrete measurements of liquid water will be taken from sample pumping, CTD casts and precipitation.</p>	Multibeam Echosounder, CTD Rosette, Water Pump, Flowthrough Seawater System, Rainwater Collection System
Observations and Measurements of Microscopic Communities in Transition	<p>As the waters of the Arctic warm and the sea ice cover decreases, the surface ocean ecosystem is undergoing considerable changes. Habitats are changing and moving, perhaps disappearing, and species distributions and abundance may be changing rapidly. Examination of the habitats along the NPP cruise track will have a three pronged approach. Zooplankton nets will be periodically towed in the upper water column (100m and less). The contents of the nets will be catalogued. The net observations will be augmented with a laboratory bench-top flow cam which can identify and quantify 'particles' from a volume of seawater. These particles can be sediments, phytoplankton, or even zooplankton. In addition, the Akademik Ioffe is equipped with a high frequency sonar system that can observe zooplankton and fish in the water column. The sonar system allows real time observation of the abundance and patterns of distribution of zooplankton</p>	Plankton Nets, Fisheries Sonar, FlowCam, CTD Rosette

	<p>and fish. This sonar system will be used to make observations that can be compared to past studies and serve as a baseline in locations without previous data.</p> <p>Combining these approaches to an ecosystem studies will make the results more robust. FlowCam: To observe phytoplankton and zooplankton, we will conduct regular zooplankton net tows (Figure 4) for shipboard analysis via Flowcam. The Flowcam counts and images micrometer size particles using an imaging microscope. This provides the ability to identify and quantify 'particles' from some sampled volume. These particles can be sediments, phytoplankton, or even zooplankton. This imaging system will generate a library of images for each net tow and store them for processing later. Conductivity, Temperature, Depth (CTD) samples: CTD rosette bottles will be sampled for bacteria, archaea, and protists to analyze via the DNA-staining dye DAPI and counting by epifluorescence microscopy. Biotic material will be filtered onto polycarbonate filters for later nucleic acids extraction. Additional science and education activities include, understanding autofluorescent pigments like chlorophyll and phycobilins, recognizing major phytoplankton groups e.g. diatoms, cryptophytes and dinoflagellates, and grid counting and calculating cell concentrations.</p>	
Observations and Measurements of At-Sea Distributions of Marine Birds and Mammals in Canadian Arctic Waters	<p>Marine birds play an important role in marine ecosystems. Their abundance and distribution can be used to monitor changes and variability in marine ecosystems. We intend to characterize the distribution and abundance of marine birds (and mammals) along the survey route during the post-breeding period in late September. We plan to identify the associations between the marine bird community and the physical and biological properties of their marine environment. Changes in marine bird abundance and distribution using data collected from the same area over 30 years ago will be described. The NPP cruise will use a standard method to perform seabird counts and contribute to the sea bird database of the Canadian Wildlife Service. Data will be collected from the bridge using a laptop computer while ship is underway (daylight hours). We will collaborate with oceanographers to investigate bird-habitat associations (analyses likely to commence post expedition), and we will compare historical datasets to current survey data (analysis likely to commence post expedition).</p>	Binoculars
Study of Water Column Chemistry Affecting Greenhouse Gas Fluxes	<p>The concentration and isotopic composition of methane and carbon dioxide in the Arctic Ocean and atmosphere are of great interest as both are greenhouse gases and the sources and flux of both between the ocean and</p>	Picarro Laser spectroscoper and membrane contactor; Incubation chamber; Laser absorption spectrometer.

	<p>atmosphere are important components in the climate system. The Arctic Ocean generally absorbs carbon dioxide but ice cover limits air-sea exchange. Measuring carbon dioxide and its isotopic composition can give information about the carbon system sources and fluxes of carbon to the atmosphere. Methane - an even more potent greenhouse gas than carbon dioxide - is found throughout the Arctic circle, and the Arctic appears to be an ever growing source of methane to the atmosphere. Methane is found in land-based permafrost, and as methane ice or methane hydrate, which is distributed along the seafloor. With less sea ice cover, there can be an increased flux of methane from the ocean. However, some microbes in ocean water use methane as a food source. If microbial breakdown of methane is rapid enough, it may serve to offset the methane that escapes to the atmosphere. The estimates of this methane breakdown in Arctic water temperatures are very few. The NPP will study this microbial breakdown of methane and the rate at which it occurs in the Northwest Passage. The following techniques will be employed during the cruise. Seawater sampling: $^{13}\text{CH}_4$ (carbon-13 methane), and $^{13}\text{CO}_2$ (carbon-13 carbon dioxide) will be continuously sampled using a Picarro Laser spectrometer and membrane contactor attached to the flowing seawater system. The same instrument will be used to analyze discrete profiles of $^{13}\text{CH}_4$ and $^{13}\text{CO}_2$ concentration collected using the CTD rosette. To measure methane in seawater, water will be continuously pumped into the wet lab aboard the Ioffe to be analyzed by infrared spectroscopy (Figure 3). This will provide a continuous record of surface methane concentrations and serve to illuminate interesting features that emerge as the ship transits. Students will collect ice core samples to look for methane trapped in sea ice and they will repeat bacterial methane oxidation experiments to compare with the abnormally large values observed by Kitidis et al. (2010). Methane oxidation rate measurements: Shipboard incubations will be used to measure the rate of methane oxidation following the procedure of Uhlig & Loose (2017). Gas-tight foil bags will be evacuated and filled with seawater, then spiked with an isotopically-labeled methane gas standard and allowed to equilibrate with the seawater. Incubation bags will be sampled every 12-24 hours to determine the time rate of change of methane in the incubation chamber. Atmospheric gas sampling: Two laser absorption spectrometers to analyze (1) the stable isotopic ratio ($2\text{H}/1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$) of seawater and water vapor and (2) the stable isotopic ratios (^{13}C) of CO_2 and CH_4. These analyzers are small,</p>	
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	approximately the size of a desktop computer, and designed to make continuous measurements in field settings. They can be operated remotely and log continually during the course of the cruise. The work proposed here will support the science mission by using water isotopes along with salinity to differentiate water masses. Freshwater runoff, precipitation-evaporation, sea-ice formation, and melting ice produce water masses with unique slopes along the relationship between the stable isotopic ratio and salinity. The carbon isotope values will be used to fingerprint changes in the methane production pathways as oxidation generates a distinct fractionation signature.	
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4.4 Indicate nature and quantity of substances to be released into the marine environment:
No

4.5 Indicate whether drilling will be carried out. If yes, please specify:
No

4.6 Indicate whether explosives will be used. If yes, please specify type and trade name, chemical content, depth of trade class and stowage, size, depth of detonation, frequency of detonation, and position in latitude and longitude:
No

4.7 Indicate whether protected species be studied. If yes, please specify:
No

5. Installations and Equipment

Details of installations and equipment (including dates of laying, servicing, method and anticipated timeframe for recovery, locations and depth, and measurements):
yes A Slocum Glider will be deployed near the beginning of the cruise and recovered near the end of the cruise. The glider will be deployed around August 24 north of Somerset Island will be recovered around September 6 when the ship returns to the area. The glider will conduct operations in Lancaster Sound. See more details in the methods section.

6. Dates

6.1 Expected dates of first entry into and final departure from the research area by the research vessel and/or other platforms:		
Project Start Date: Aug 19, 2018		
Project End Date: Sep 18, 2018		
6.2 Coastal State-specific details:		
Coastal Area	Estimated Entry Date	Estimated Departure Date
Canada	Aug 19, 2018	Sep 18, 2018
Explanation of multiple entries: N/A		
Research will be performed: within 12 nm		
Extent to which Canada will be enabled to participate or to be represented in the research project: There will be 3 Canadian researchers onboard the ship collaborating with the US based research team.		
Name, affiliation and contact information for all participants from Canada: Carina Gjerdrum Canadian Wildlife Service carina.gjerdrum@canada.ca Mary Thaler Universit�� Laval mary.thaler.1@ulaval.ca Sarah Rosengard University of British Columbia srosengard@eoas.ubc.ca		

7. Port Calls

Port	Arrival Date	End Date	Special Logistical	Shipping Agent
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			Requirements	
Resolute Bay	8/23/2018	8/23/2018	Transfer from airport to ship will be handled by One Ocean Expeditions	TBD
Cambridge Bay	9/1/2018	9/1/2018	Transfer from airport to ship will be handled by One Ocean Expeditions	TBD
Iqaluit	9/13/2018	9/13/2018	ETA - 0700 hrs, ETD - 1800 hrs	No, agent, ship at anchor, zodiacs used to transfer luggage and passengers from beach to vessel

8. Participation of the representative of the coastal State

8.1 Modalities of the participation of the representative of the coastal State in the research project:
See Section 6.2.
8.2 Proposed dates and ports for embarkation/disembarkation:
See Section 6.2.

9. Access to Data, Samples and Research Results

9.1 Expected dates of submission to coastal State of preliminary report, which should include the expected dates of submission of the data and research results:
No more than 60 days from the end date of the research as provided in Section 6.1.
9.2 Anticipated dates of submission to the coastal State of the final report:
No more than 2 years from the end date of the research as provided in Section 6.1.
9.3 Proposed means for access by coastal State to data (including format) and samples:
Data will be provided through official channels at no cost to the coastal State(s). Samples will be provided upon request.
9.4 Proposed means to provide coastal State with assessment of data, samples and research results:
Assessment of data, samples and research results will be provided at no cost to the coastal State(s).
9.5 Proposed means to provide assistance in assessment or interpretation of data, samples and research results:
Assistance in further assessment or interpretation will be provided upon request.
9.6 Proposed means of making results internationally available:
This project will be in collaboration with several Canadian researchers. Data will be shared between US and Canadian researchers and results will be made publicly available through our interactive web site https://northwestpassageproject.org/ , which is available internationally.

10. List of Supporting Documentation

10.1 List of attachments, such as additional forms required by the coastal State, etc.:			
Attachment Type	Description	Attachment	Submission Date
Proposed Cruise Track	Proposed cruise track - Leg 1 is Resolute to Cambridge Bay, Leg 2 is Cambridge Bay to Iqaluit.	7339375000_URI_NPP2018.pdf	Apr 21, 2018
Supplemental Material	Cruise Itinerary. The Northwest Passage Project is only participating onboard during the final two legs from about August 23 to September 13, Resolute to Iqaluit, with a port stop half way through on September 1 in Cambridge Bay.	0257812500_2018_Ioffe_FULL_Sailplan_NPP.pdf	Apr 21, 2018

URI Northwest Passage Project Proposed Cruise Track and Transects



DATE	DAY	PLACE AND ACTIVITY	ARR. TIME	DEP. TIME	DIST. - NM	SAIL TIME (hrs)	SPEED KNOTS
27-Jun-18	1	LOUISBOURG		1800	160	13.3	12
28-Jun-18	2	Inverness, NS	800	2200	17	1.9	9
29-Jun-18	3	Margaree Harbour, Cape Breton	800	2000	60	6.7	9
30-Jun-18	4	Milerand, Les Iles de la Madeleines	800	1900	83	9.2	9
1-Jul-18	5	Morel, PEI	800	1900	134	12.2	11
2-Jul-18	6	Ingonish, NS	800	1800	180	15.0	12
3-Jul-18	7	Sable Island National Park	900	1700	120	10.0	12
4-Jul-18	8/1	LOUISBOURG	1000	1800	113	12.6	9
5-Jul-18	2	Sable Island National Park	1000	1900	168	15.3	11
6-Jul-18	3	Bird Island / Ingonish	900	1900	160	13.3	12
7-Jul-18	4	Georgetown, PEI	900	1900	83	9.2	9
8-Jul-18	5	Milerand, Les Iles de la Madeleines	800	1800	121	13.4	9
9-Jul-18	6	Ile Bonaventure and Cliffs of Forillon NP	900	1800	105	11.7	9
10-Jul-18	7	Anticosti Island	800	1700	155	12.9	12
11-Jul-18	8	Gros Morne National Park	800	1600	231	18.5	12.5
12-Jul-18	9	Francois	1300	2000	77	8.6	9
13-Jul-18	10	Saint-Pierre, France	800	1700	170	15.5	11
14-Jul-18	1	LOUISBOURG	1000	1800	113	12.6	9
15-Jul-18	2	Sable Island National Park	1000	1900	168	15.3	11
16-Jul-18	3	Bird Island / Ingonish	900	1900	150	13.6	11
17-Jul-18	4	Charlottetown - celebrate 150 years of confederation	900	1900	70	7.8	9
18-Jul-18	5	Les Iles de la Madeleines	800	1700	135	15.0	9
19-Jul-18	6	Ile Bonaventure and Cliffs of Forillon NP	900	1800	105	11.7	9
20-Jul-18	7	Anticosti Island	800	1700	155	12.9	12
21-Jul-18	8	Gros Morne National Park	800	1600	231	18.5	12.5
22-Jul-18	9	Francois	1300	2000	77	8.6	9
23-Jul-18	10	Saint-Pierre, France	800	1700	170	15.5	11
24-Jul-18	11/1	LOUISBOURG	700	1800	250	18.8	13.3
25-Jul-18	2	Trout River / Woody Point	1300	1900	156	12.5	12.5
26-Jul-18	3	Red Bay / L'Anse aux Meadows	1300	2100	60	6.7	9
27-Jul-18	4	Battle Harbour	800	1200	310	24.8	12.5
28-Jul-18	5	Hopedale	800	1900	229	19.9	11.5
29-Jul-18	6	Hebrun	1400	2000	36	4.0	9
30-Jul-18	7	Torngat Mountains NP - Nachvak Fjord	1400	2100			
31-Jul-18	8	Torngat Mountains NP - Saglek Fjord / Basecamp	700				
1-Aug-18	9	Button Islands					
2-Aug-18	10	Monumental Island			200		
3-Aug-18	11/1	IQALUIT, CANADA	700	1900	200	16.7	12
4-Aug-18	2	Monumental Island	1400	1800	236	19.7	12
5-Aug-18	3	Pangnirtung and Auyuttuq NP visitors centre	1400	1900	114	12.7	9
6-Aug-18	4	Cape Mercy	800	1200	287	23.9	12
7-Aug-18	5	Qiktarjuaq	1400	1800	160	17.8	9
8-Aug-18	6	Ninginganik NWA (Isabella Bay)	1200	1600	165	18.3	9
9-Aug-18	7	Gibb Fjord / Scott Inlet	1000	1800	196	19.6	10
10-Aug-18	8	Pond Inlet / Sirmilik NP	1400	1900	158	13.2	12
11-Aug-18	9	Dundas Harbour	800	1200	40	3.3	12
11-Aug-18	9	Croker Bay	1600	2000	120	10.0	12
12-Aug-18	10	Prince Leopold Island	600	900	55	6.1	9
12-Aug-18	10	Beechey Island	1530	1930			
13-Aug-18	11	Wellington Channel or Barrow Strait - ICE					
14-Aug-18	12/1	RESOLUTE BAY, NUNAVUT	700	1800	125	13.9	9
15-Aug-18	2	Maxwell Bay	800	1700	121	13.4	9
16-Aug-18	3	Croker Bay	700	1200	40	3.3	12
16-Aug-18	3	Dundas Harbour	1630	2000	130	11.8	11
17-Aug-18	4	Coburg Island NWA	800	1600	73	8.1	9
18-Aug-18	5	Grise Fjord	900	1300	40	3.3	12
18-Aug-18	5	Craig Harbour	1700	2000	158	13.2	12
19-Aug-18	6	Cape Hay	930	1300	132	14.7	9
20-Aug-18	7	Arctic Bay	900	1300	45	3.8	12
20-Aug-18	7	Elwin Inlet	1600	2000	116	12.9	9
21-Aug-18	8	Prince Leopold Island	900	1200	16	1.8	9
21-Aug-18	8	Port Leopold	1430	1900	68	7.6	9
22-Aug-18	9	Beechey Island	800	1300	55	6.1	9
23-Aug-18	8/1	RESOLUTE BAY, NUNAVUT	700	1800	60	6.7	9
24-Aug-18	2	Beechey Island	1000	1300	27	3.0	9
24-Aug-18	2	Radstock Bay	1600	1900	148	12.3	12
25-Aug-18	3	Cape Charles Yorke	800	1230	35	3.9	9
25-Aug-18	3	Edwin Inlet	1600	1900	114	12.7	9
26-Aug-18	4	Prince Leopold Island	800	1200	8	0.9	9
26-Aug-18	4	Port Leopold	1430	1900	144	13.1	11
27-Aug-18	5	Fort Ross	800	1200	18	2.0	9
27-Aug-18	5	Bellet Strait			33	3.7	9
28-Aug-18	6	Conningham Bay	700	2100	137	15.2	9
29-Aug-18	7	Victory Point	1200	1800	73	8.1	9
30-Aug-18	8	Royal Geographical Society Islands	800	1300		0.0	9
31-Aug-18	9	South King William Island or Victoria Island					
1-Sep-18	9/1	CAMBRIDGE BAY	700	1700	191	17.4	11
2-Sep-18	2	Victory Point	1300	1830	137	15.2	9
3-Sep-18	3	Conningham Bay	1000	1800	52	5.8	9
4-Sep-18	4	Fort Ross	1000	1500	158	17.6	9
5-Sep-18	5	Beechey Island	900	1300	160	17.8	9
6-Sep-18	6	Dundas Harbour	730	1400	158	17.6	9
7-Sep-18	7	Pond Inlet	800	1300	200	22.2	9
8-Sep-18	8	Gibbs Fjord	1200	1800	185	14.8	12.5
9-Sep-18	9	Isabella Bay	900	1300	248	20.7	12
10-Sep-18	10	Sunshine Fjord	900	1300	255	21.3	12
11-Sep-18	11	Pangnirtung	1000	1400	243	22.1	11
12-Sep-18	12	Monumental Island	1200	1500	200	16.0	12.5
13-Sep-18	13	IQALUIT, CANADA	700				

