

NIRB Application for Screening #125342

URI Northwest Passage Project 2018

Application Type: New
Project Type: Scientific Research
Application Date: 5/3/2018 2:38:44 PM
Period of operation: from 0001-01-01 to 0001-01-01
Proposed Authorization: from 0001-01-01 to 0001-01-01
Project Proponent: Christopher Knowlton
 University of Rhode Island
 218 South Ferry Road
 Narragansett RI 02882
 USA
 Phone Number:: 401-874-6481, Fax Number::

DETAILS

Non-technical project proposal description

English: The Northwest Passage Project (NPP) is a U.S. 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 Akademik Ioffe, operated by One Ocean Expeditions. Telepresence technologies will allow for shore-based participation in the project. Expedition participants include undergraduate and graduate students, scientists, historians, journalists, and a documentary film crew. The NPP Akademik Ioffe expedition will depart Resolute Bay August 23, 2018, arriving in Iqaluit on September 13 (Fig. 1). Science activities will be primarily ship-based and occur continuously or on an event basis throughout the expedition. Conductivity, Temperature, Depth rosette (CTD) casts and zooplankton net tows will occur every 100 nm or approximately daily, whichever comes first. Other activities, including air sampling, flowing seawater analysis, and seabird census counts will occur throughout. The main science goal is to understand how waters of the Canadian Arctic Archipelago (CAA) have changed as a consequence of the secular warming trend over the Arctic Circle, using an interdisciplinary ocean-based research program to explore the changes in four (4) thematic areas. Theme 1: Water mass properties and circulation inside CAA. Scientists will investigate the increased freshwater storage in and export from the upper Arctic Ocean due to a warming Arctic. Increased melting, river discharge, as well as changing wind patterns have led to increased freshwater accumulation in the western Arctic. The CAA, and particularly the Northwest Passage, is one of the principle conduits for freshwater transport from the Arctic Ocean to the North Atlantic, however, there are uncertainties in the magnitude of transport and water properties. The currents in the CAA will be studied with Acoustic Doppler Current Profiler (ADCP) data, an autonomous glider (Fig. 2), and the CTD. Theme 2: Microscopic Communities in Transition. As Arctic waters warm and sea ice cover decreases, the surface ocean ecosystem is changing, and species distributions and abundances may change rapidly. To examine habitats along the cruise track, zooplankton nets will be periodically towed in the upper water column ($\leq 100\text{m}$). Net contents will be catalogued. This data will be augmented by a laboratory bench-top FlowCam, which can identify and quantify 'particles' in seawater (Fig. 3). These particles can be sediments, phytoplankton, or zooplankton. We will re-occupy the long time series station in Lancaster Sound (Station 323: Lancaster Sound, 74.2, -79.75). Theme 3: Distributions of Marine Birds in Canadian Arctic Waters. Marine bird abundance and distribution can be used to monitor changes and variability in marine ecosystems. NPP will characterize the distribution and abundance of marine birds along the survey route. Associations between the marine bird community and the physical and biological properties of their marine environment will be identified and compared to past results. The cruise will use a standard non-invasive, observational method to perform seabird counts. Theme 4: Water Column Chemistry Affecting Greenhouse Gas Fluxes. 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 atmosphere are important components of the climate system. Measuring carbon dioxide and its isotopic composition can provide information about the carbon system sources and fluxes of carbon to the atmosphere. The Arctic appears to be an ever growing source of methane to the atmosphere. 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 NPP will study the concentrations and isotopes of carbon dioxide and methane by analyzing samples of the air and water with onboard laser spectroscopy instruments, as well as incubation of water to study microbial activity. Open Data Policy. We will disseminate scientific data and results through the NPP website. All processed measurements will be stored in the NSF-supported Arctic Data Portal (<https://arcticdata.io>) and all appropriate Canadian and Inuit science databases, such as the Canadian Wildlife Service seabird database. Acoustic Instrumentation. The NPP science team will use two scientific Acoustic Doppler Current Profiler (ADCP) sonar systems: a hull mounted ADCP operating at 38kHz and an ADCP operating at 300kHz, attached to the CTD. The 38kHz sonar will be operating when the ship is underway, except under these conditions when the sonar will be off when: 1) marine mammals are detected within 500m of the ship. 2) within 5 km of any Nunavut community. 3) East of Bylot Island. The sonar will only be used when greater than 5km from land and will not be used in any harbor, bay, fjord, or channel. 4) in Navy Board Inlet, Eclipse Sound, and Pond Inlet, out of respect for concerns

French:

Inuktitut:

[illegible]

Inuinnaqtun: Una Ukiuqtaqtum Uataa Ikirahak Havaariyakhaq (NPP) Amialikanmiutaq U.S. Nunaryualimaaq Qauyiharvingit manngit ikayuqtauvaktut qauyihaghutik aallannguqpallianingit Ukiuqtaqtuq ukunanngat hivumuurnaqtumik qauyihaghtakhait ilaliutigiangani hivituyumik naalaktukhat ilitquhiriyangit ilauhimayunut taryurmit, puqtuhiumik tukiliutilik 2-ikaakkut unipkaaliuqtut, ilagiyangit nunalingnit hulidjuhiit. Una qauyihaghtuqtut aulapkainiaqtut umiarmi uumani Akademik loffe, munariyaat uumani One Ocean Expeditions. Alruyaqtigut illitturnaqtut qauyiharniit ikayuutauniaqtuq taryum-hinaani hulidjuhikhait havaanut. Qauyiharnikkut ilauqatauhimayut ilaliutiniaqtut iliharyuaqtut ilihaghtunut, qauyihaghtit, pitquhiliqiyit, titiraqtit, qunnialiuqtinillu ilagiiktut. Una NPP Akademik loffe qauyihaghtit aullarlutik hamannqat Qausuittuq uvani Niqiligiivik 23, 2018 mi, tikillutik Igaluinut uvani Apitilirvik 13 mi

(Titirauyaq 1 mi). Qauyihagtit huliynut umiarmiittut hulivangniarumik tamainnut umiaqtuqtunut. Nalunaiqhiniq, Uunnarningit, Hitinianut Naunaiqhiiyut (CTD) naunaiyainingit unalu taryurmiuttat uumayuit kuvyit iqqaqpangniaqtangit 100 nm ubluummaanmiluuniit, hunali hivulluinarumik. Aahiit huliyaqhat, ilaliutigilugillu anurim naunaiyaiyut, qurluaqtut taryum imangit naunaiqhiilutik, unalu taryurmiuttat tingmiat kititiqtakhait pilutik. Qauyihainikkut hivunikhautikhamut kangiqhittaarianangit qanuq imait haffumani Kanatamiunit Ukiuqtaqtumi Qikiqtat Uiguliriit (CAA) aallannguqtut uunnakpallialirami Ukiuqtaqtumi Nunangani, atuqhugit aallatqiit nalunaiqhiiyut taryup-kigliagut qauyihagtit piliriakhaq qauyiharianangani aallannguqhimayut iluani hitamat (4) illitturningit ininganit. Illitturniq 1: Imaup anginiqhautaa ilitquhiita utiqattaqtuniglu iluani CAA Qauyihagtiit qanilrukkut ihivriuqtakhaat angikliktiqhimayut halumayumik imait tutquumavingit iluani agyaqtauvaqtut qulaanngat Ukiuqtaqtum Taryua uunnakpallialiramat Ukiuqtaqtumi. Auktuumilluaqhuni, kuukkat qurluarninga, uuminngalu aallannguqpalliaiyuq anurim ilitquhia taimaa angiklikpallialiqhuni halumayumik imait kititirninga iluani Ukiuqtaqtum uataa. Una CAA, unalu ahiinnaq Ukiuqtaqtum uataa Ikirahak, hivunikhautauvlunilu haffumani halumayut imait agyaqtuiniq Ukiuqtaqtum Taryuata uvunga North Atlantic, kihiani nalunaqtuq hivitunianut agyaqtuiniikkut imaup ilitquhiita. Tadjia qanurilinganingit iluani CAA illittuqtauniaqtuq Niplautingit Imaup Nalunaiyainiq (ADCP) nalunaiqtangit, uumani tingmiannuanut (Titirauyaq 2 mi), unalu CTD. Illitturniq 2: Ilyingnut takunnaittut Nunaliit Ikiaqtut Hamna Ukiuqtaqtum imait uunnakpalliavlutik taryualu hikua qaangani nungutpalliavluni, qulaani taryum avatiqatigiikt aallannguqhuni, uumayuit amigaininngit amihuutait aallannguqtirniaqhutiktauq qilamik. Ihivriuriangani nayuqpaktangit umiaqtuqtut tumingit, uumayuit taryurmiuttat kuvyit iqqaqpangniaqhuni qaanganit imaup mikhaanut (≤ 100 m). Kuvyit ilaliutait titiraqhimaniaqtangit. Una naunaiyaiyut kititiqhimaniaqtut naluaiyarvingmi qaangani FlowCam, naunaiqhiilaaqtut qaffiuningillu kititilaaqtut "ilaurutingit" iluani taryum imanganit (Titirauyaq 3 mi). Tahapkuat mikiyunnuit ilait hiurauyut, kumaruit, uumayunilluuniit. Illittupkaqpangniaqtavut takiyaaqtumik ihivriurvikhaq iluani Lancaster Ikirahak (Qauyiharvik 323: Lancaster Ikirahak, 74.2, -79.75). Illitturniq 3: Auladjutinit Taryurmiuttat Tingmiat iluani Kanatamiunit Ukiuqtaqtumi Imangit Taryurmiuttat tingmiat amihuuningit auladjutingillu parnautilaaqtangit amiqhailugu aallannguqtiqhimaningit aallatqiillu taryurmiuttat avatiqatigiingnit. NPP ilitquhirilaaqtangit auladjutingillu amihuuningillu taryurmiuttat tingmiat nalunaiqhiivlutik. Katudjigiiktut ukunanngat taryurmiuttat tingmiat ilagiiiktut unalu qaanganit ilitquhiriyangit haffumani taryurmiuttat avataita naunaiyainiaqhutik illitpkaihimalguktauq nalunaiqhigaluangit. Una umiaryuaq pulaaqtaqtuq malikhimaniaqtangit ayurnaittumik, tautungnaqtumik maligautaanit nalunaiqhiinahuarlugit taryurmiuttat tingmiat naunaiqhiiyut. Illitturniq 4: Imaup ilitquhiita ilaurutingit Aktuqhimayangit Puyum Anianailaqtuaa Hakugingnia Hakuirningalu Una ihuqhiniit ilahimagamit unalu ilaurutilgit iluaniittuni naimannaittut anianilaqutiit akhaluutim puyungillu iluani Ukiuqtaqtum Taryuata nunapta anirniqautiit ikiariit ihumaaluutaulluaqtangit tamarmiuyuk puyum anianilaqtuaa, ilanganillu hakugingnia hakuirninga ukunani taryum unalu nunapta anirniqautiit ikiariit aturnaqtut ilagiyangit hilaup uunnakpallianingit. Ihivriuqtangit akhaluutip puyungit naimannaittuq anianilaqutilik illitturnaqhilaaqtuq ihingit hakugingnia hakuirningalu uvunga nunapta anirniqautit ikiariitnut. Hamna Ukiuqtaqtuq takunnaqtuq hiammakpallialiqtuq uumani naimannaittuq anianilaqutik nunapta anirniqautit ikiariinni. Ilangit iyingnut takunnaittuq iluani taryum imangit naimannaittumik anianilaqutit niqinut ilagiyaat. Taamna iyingnut takunnaittuq hiaminningit naimannaittut anianilaqutit amihuukpat, taimaa hiamittilaaqhuni nunapta anirniqautit ikiariinni. Una NPP illitturnaqhuni hamna ihuqhiyuq ilahimagami unalu ilaurutilgit akhaluutimit puyungit uumanilu naimannaittut anianilaqutingit naunaiqhiiyangit ihivriuqhutik anurim imarmilu iluaniittumi naunaiyainikkut ingilrutaanit, uumanilu imap puuqpiaghimayut illittuqhaiyut iiyungnut takunnaittut huliyaqhanit. Angmaumayuuq Naunaiyainingit Atuagaq Nalunaiqhiinahuaqtavut qauyihaghimayangit naunaiyaiyut kiuvingillu uumani NPP qaritauyakkut turaarutaata qunnialaaqtangit. Tamaat nalunaiqhiiyangit ihivriuqtangit tutquumahimaniaqtangit iluani NSF-ikayuqtauhimayuuq Ukiuqtaqtumi Naunaiyaivingat (<https://arcticdata.io>) tamaita nalaumattiaqtumik Kanatamiunut Inuinnaillu qauyihaghimayangit qaritauyami iliuraiviannit, uumanilu Kanatamiunut Uumayuliiyit taryurmiunit tingmiat iliuraiviannit qaritauyami. Tuhaumalaaqtut Ingilrutingit Una NPP qauyihagtit ikayuqtigiiktut aturniaqtangit malruk qauyihagturnikkut Tuhaumalaaqtut Illittuqhiyut (ADCP) nalunairvikhat: iliuraqhimayuuq ADCP aulapkaiyuq uvannat 38 kHz unalu ADCP aulapkailaaqtuq uvannat 300 kHz, katilviuhimayuuq uvunga CTD. Una 38 kHz nalunairvik aulapkaihimaniaqtuq umiaq ikaaliqqat, kihimi malikhimayakhaat naunaiyarvinga umikhimaniaqtuq imailuqqat: 1) Taryurmiuttat amaammaktittiyuktut niryuutit illitturnaqqat iluani 500 m ungahingnia umiarmiit. 2) Iluani 5 km ungahingnia quyaginngat Nunavut nunalingni. 3) Kivataanit hamannat Bylot Qikiqtami. Una naunaiyaivik atuinnaghunnguyaangit anginitqiyaanit 5 km ungahingnia nunamit atulaittangit kangiqhunnuami, kangiqhurmi, takiyaaqtut kangiqhuit, ikirahailu. 4) Iluani Navy Board Kangiqhua, Eclipse Ikirahaa, Mittimataliglu, ihumagivlugit maligahuaqhugit ihumaaluutingit naunaiyaivinga amihuaryuit tuugaaliit ingilravakkamik uvannat Ikpiarjungmit Mittimatalingmut. 5) Amirilluaqhimayangit imait haffumani Bylot Qikiqtaq Utiqtaqtut Tingmidjat

Unaguiqhiringit uuminngaluuniit Minnguirvit Kanatam Imangit.

Personnel

Personnel on site: 36

Days on site: 21

Total Person days: 756

Operations Phase: from 2018-08-23 to 2018-09-20

Activities

Activities

Location	Activity Type	Land Status	Site history	Site archaeological or paleontological value	Proximity to the nearest communities and any protected areas
Proposed Glider Operations Area - region where the autonomous glider would operate.	Scientific/International Polar Year Research	Marine	NA	NA	The communities closest to the glider operations area are Pond Inlet and Arctic Bay to the south and Resolute to the west. The Bylot Island Migratory Bird Sanctuary is just south of the area and the Prince Leopold Island Migratory Bird Sanctuary (PLIMBS) is in the operations area. The glider will not approach too close to PLIMBS.
Proposed Transect 1 - cross channel transect to measure ocean flow.	Scientific/International Polar Year Research	Marine	NA	NA	Resolute is approximately 20km straight line distance from the northern end of transect 1.
Proposed Transect 2 - cross channel transect to measure ocean flow.	Scientific/International Polar Year Research	Marine	NA	NA	Arctic Bay is approximately 100km straight line distance from the southern end of Transect 2.
Proposed Transect 3 - cross channel transect to measure ocean flow.	Scientific/International Polar Year Research	Marine	NA	NA	Transect 3 is more than 300km south of Resolute and more than 300km north of Gjoa Haven.
Proposed Transect 4 - cross channel transect to measure ocean flow.	Scientific/International Polar Year Research	Marine	NA	NA	Transect 4 is about 150km from Gjoa Haven and more than 175km from Cambridge bay.
Station 323 - long term science station. NPP will reoccupy to contribute and compare to past measurements.	Scientific/International Polar Year Research	Marine	Station 323	NA	Arctic Bay is about 140km straight line distance from Station 323 and Pond Inlet is about 170km straight line distance from Station 323.
Proposed NPP Cruise Track - an approximation of the path the ship will take.	Scientific/International Polar Year Research	Marine	NA	NA	The cruise track will take the ship to or near or for visits to these communities: Resolute, Arctic Bay, Pond Inlet,

					Gjoa Haven, Cambridge Bay, Clyde River, Qikiqtarjuaq, Pangnirtung, Iqaluit.
Prince Leopold Island - project filming location & bird observation location	Scientific/International Polar Year Research	Crown	Prince Leopold Island is a Migratory Bird Sanctuary.	NA	Prince Leopold Island is a Migratory Bird Sanctuary.

Community Involvement & Regional Benefits

Community	Name	Organization	Date Contacted
Information is not available			

Authorizations

Indicate the areas in which the project is located

Authorizations

Regulatory Authority	Authorization Description	Current Status	Date Issued / Applied	Expiry Date
Canadian Wildlife Service	Combined permit request for tourist access to Prince Leopold Island Migratory Bird Sanctuary (PLIMBS) by One Ocean Expeditions, filming request on PLIMBS, and a permit to take scientific samples in the restricted waters of PLIMBS.	Applied, Decision Pending		
Fisheries and Oceans Canada	Scientific fisheries permit to deploy plankton nets approximately once each day along the cruise track.	Applied, Decision Pending		

Project transportation types

Transportation Type	Quantity	Proposed Use	Length of Use
Water	0	Research/Tourist vessel Akademik Ioffe	

Project accommodation types

Other,

Material Use

Equipment to be used (including drills, pumps, aircraft, vehicles, etc)

Equipment Type	Quantity	Size - Dimensions	Proposed Use
Information is not available			

Detail Fuel and Hazardous Material Use

Detail fuel material use:	Fuel Type	Number of containers	Container Capacity	Total Amount	Units	Proposed Use
DAPI - 4',6-diamidino-2-phenylindole	hazardous	1	0.01	0.01	Liters	fluorescent dye for plankton DNA in fluorescence microscopy
glutaraldehyde (25%)	hazardous	1	0.4	0.4	Liters	plankton preservative
16.8 molality HCl	hazardous	1	1	1	Liters	seawater processing
solution of 1% glutaraldehyde and 0.1% paraformaldehyde	hazardous	1	1.2	1.2	Liters	plakton preparation
Ethanol	hazardous	2	2.5	5	Liters	preservative
formaldehyde (37%)	hazardous	2	2	4	Liters	preservative

Water Consumption

Daily amount (m3)	Proposed water retrieval methods	Proposed water retrieval location
0		

Waste

Waste Management

Project Activity	Type of Waste	Projected Amount Generated	Method of Disposal	Additional treatment procedures
Scientific/International Polar Year Research	Hazardous	less than 15 liters	Hazardous chemical waste from the shipboard science will be properly stored onboard until the ship reaches Halifax, Nova Scotia, where it will be properly disposed of.	None

Environmental Impacts:

The transient nature of this expedition, and the short duration of sampling stops (3 hours or less at each sampling station), should result in minimal environmental impact. Because only small samples will be collected, the impacts of the actual sampling procedures will also be minimal. However, the science team does recognize that the operating frequencies of the hull-mounted TRDI 38kHz Acoustic Doppler Current Profiler (ADCP) could have an impact on the behavior of marine mammals that are in the vicinity of the ship (when the sonar is active) and can perceive the sound produced by the ADCP. To mitigate these potential behavioral impacts, the proposed standard operating procedure for the NPP 2018 expedition will be to have the hull mounted 38kHz sonar operating when the ship is underway, except under these conditions: 1) Sonar operation will cease when marine mammals are detected within 500m of the ship. 2) The sonar will be off when within 5 km of any Nunavut community. 3) East and South of Bylot Island, the sonar will only be used when greater than 5km from land and will not be used in any harbor, bay, fjord, or channel. 4) 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, the sonar will be off while in Navy Board Inlet, Eclipse Sound, and Pond Inlet. 5) When in restricted waters of the Bylot Island Migratory Bird Sanctuaries or Parks Canada Waters, the sonar will be off.

Additional Information

SECTION A1: Project Info

SECTION A2: Allweather Road

SECTION A3: Winter Road

SECTION B1: Project Info

SECTION B2: Exploration Activity

SECTION B3: Geosciences

SECTION B4: Drilling

SECTION B5: Stripping

SECTION B6: Underground Activity

SECTION B7: Waste Rock

SECTION B8: Stockpiles

SECTION B9: Mine Development

SECTION B10: Geology

SECTION B11: Mine

SECTION B12: Mill

SECTION C1: Pits

SECTION D1: Facility

SECTION D2: Facility Construction

SECTION D3: Facility Operation

SECTION D4: Vessel Use

SECTION E1: Offshore Survey

SECTION E2: Nearshore Survey

SECTION E3: Vessel Use

SECTION F1: Site Cleanup

SECTION G1: Well Authorization

SECTION G2: Onland Exploration

SECTION G3: Offshore Exploration

SECTION G4: Rig

SECTION H1: Vessel Use

The URI NPP expedition will use the Akademik Ioffe, operated by One Ocean Expeditions. The ship will serve as the science platform for the NPP science activities. The ship will also have tourists on board and will make stops and put people ashore for those tourist activities. The NPP project's use of the Akademik Ioffe was arranged after One Ocean Expeditions had submitted their permitting proposals.

SECTION H2: Disposal At Sea

One Ocean Expeditions has a complete waste management plan for the Akademik Ioffe's operations in the Arctic. The One Ocean Expeditions plan is included as a project document.

SECTION I1: Municipal Development

Description of Existing Environment: Physical Environment

NA

Description of Existing Environment: Biological Environment

NA

Description of Existing Environment: Socio-economic Environment

NA

Miscellaneous Project Information

Identification of Impacts and Proposed Mitigation Measures

The transient nature of this expedition, and the short duration of sampling stops (3 hours or less at each sampling station), should result in minimal environmental impact. Because only small samples will be collected, the impacts of the actual sampling procedures will also be minimal. However, the science team does recognize that the operating frequencies of the hull-mounted TRDI 38kHz Acoustic Doppler Current Profiler (ADCP) could have an impact on the behavior of marine mammals that are in the vicinity of the ship (when the sonar is active) and can perceive the sound produced by the ADCP. To mitigate these potential behavioral impacts, the proposed standard operating procedure for the NPP 2018 expedition will be to have the hull mounted 38kHz sonar operating when the ship is underway, except under these conditions: 1) Sonar operation will cease when marine mammals are detected within 500m of the ship. 2) The sonar will be off when within 5 km of any Nunavut community. 3) East and South of Bylot Island, the sonar will only be used when greater than 5km from land and will not be used in any harbor, bay, fjord, or channel. 4) 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, the sonar will be off while in Navy Board Inlet, Eclipse Sound, and Pond Inlet. 5) When in restricted waters of the Bylot Island Migratory Bird Sanctuaries or Parks Canada Waters, the sonar will be off.

Cumulative Effects

The transient nature of this expedition, and the short duration of sampling stops (3 hours or less at each sampling station), should result in minimal environmental impact. Because only small samples will be collected, the impacts of the actual sampling procedures will also be minimal.

Impacts

Identification of Environmental Impacts

Construction																									
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-
Operation																									
Scientific/International Polar Year Research		-	-	-	-	-	-	-	-	-	-	-	N		-	-	-	N	U		-	-	-	-	-
Decommissioning																									
-		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-

(P = Positive, N = Negative and non-mitigatable, M = Negative and mitigatable, U = Unknown)