UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
ALASKA FISHERIES SCIENCE CENTER
NATIONAL MARINE MAMMAL LABORATORY
7600 Sand Pt Way N.E., Bin C15700
Seattle, Washington 98115-0070

Project Instructions

Date Submitted: July 31, 2015

Platform: NOAA Ship *Fairweather*

Project Number: FA-15-04 (OMAO)

Project Title: Arctic Aerial Calibration Experiments (Arctic ACEs)

Project Dates: August 17, 2015 to September 06, 2015

Prepared by: _____ Dated: 31 July 2015
Megan Ferguson
Principal Investigator
National Marine Mammal Laboratory

Approved by: _____ Dated: 7/31/15
Robyn Angliss
Principal Investigator / Deputy Director
National Marine Mammal Laboratory

Approved by: _____ Dated: 7/31/15
John Bengtson
Director
National Marine Mammal Laboratory

Approved by: Joe C. Bishop Digitally signed by BISHOP.JOE.C.1125064902 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=BISHOP.JOE.C.1125064902 Date: 2015.08.06 13:54:39 -07'00' Dated: 8/6/2015
Captain Douglas D. Baird, Jr., NOAA
Commanding Officer
Marine Operations Center – Pacific

CDR Joe C. Bishop, NOAA
Acting Commanding Officer
Marine Operations Center - Pacific

I. Overview

A. We propose to evaluate the ability of UAS technology (i.e., platforms, payloads, sensors, and software) to collect data to detect cetaceans, identify species, estimate group size, and identify calves and compare those results to conventional aerial surveys conducted by human observers in fixed-wing aircraft. We also propose to use the UAS data to estimate cetacean density and other parameters in the survey area and compare these values to analogous values obtained using data from the manned aircraft. This evaluation will enable us to provide recommendations for the types of cetacean study objectives that can likely be met by UAS currently and in the near future, describe improvements in UAS technology and imaging systems required to effectively study cetaceans in the Arctic (many of which will be applicable to cetacean surveys conducted elsewhere), and recommend adaptations to the traditional analytical processes for estimating density.

The project will be conducted with ship support from NOAA Ship *Fairweather,* scheduled to depart Nome, Alaska on August 17, 2015 for the study area. The ship is expected to arrive in the study area on August 19, 2015 and will depart the study area on August 30 for Kodiak.

B. Days at Sea (DAS)

Of the 21 DAS scheduled for this project. 0 DAS are funded by an OMAO allocation, 21 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded.

C. Operating Area

The study area is located offshore, approximately 12-80 nm from Barrow, Alaska (Fig. 1). This area was selected for UAS operations for three reasons. First, the study area is found in one of the three locations where the FAA plans to establish permanent operational areas and corridor routes (for access to coastal launch sites) in the Arctic for the operation of UAS per the *FAA Modernization and Reform Act of 2012*. Second, it is an area where large cetaceans, particularly gray whales, are reliably found in high densities during the open water (ice-free) season, which occurs from July to October. High densities of cetaceans are preferred in order to obtain the sample sizes (number of sightings) required to derive robust conclusions about the relative performance of manned aircraft and unmanned aircraft systems in a reasonably short amount of time. Third, the study area is located in international airspace, offshore of the coastal corridor where aircraft frequently transit between villages in the North Slope of Alaska. Operating in this low-traffic area increases the safety margin for the project by decreasing the probability of encountering other airspace users.

D. Summary of Objectives

Our overarching objective is to conduct a 3-way comparison of data and derived statistics from the following:

- Observers in the manned aircraft;
- Digital photographs from cameras mounted to the manned aircraft;
- Digital photographs from cameras mounted to the Unmanned Aerial Vehicle (UAV).

E. Participating Institutions

Bureau of Ocean Energy Management (BOEM); Naval Surface Warfare Center Dahlgren Division (NSWCDD); NOAA National Marine Mammal Laboratory (NMML), Alaska Fisheries Science Center, National Marine Fisheries Service; NOAA Office of Marine and Aviation Operations (OMAO); Office of Naval Research (ONR); Shell Oil Company; North Slope Borough

F. Embarked Personnel/Science Party:

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Helker, Van	Scientist	16Aug2015	30Aug2015	Male	NOAA	US
Heyman, Scott	UAS Pilot	16Aug2015	30Aug2015	Male	NAVY	US
Broad, Adam	UAS Pilot	16Aug2015	30Aug2015	Male	NAVY	US
Nesseth, Tim	Glider Tech	30Aug2015	06Sep2015	Male	NOAA	US
Ramsey, Jessica	PS	16Aug2015	06Sep2015	Female	NOAA	US
Castillo, Ana	AG1	20Jun2015	06Sep2015	Female	NOAA	US
Kings, Michael	AG1	16Aug2015	06Sep2015	Male	NAVY	US
Gallagher, Greg	HSTP Intern	16Aug	06Sep2015	Male	NOAA	US

G. Administrative

1. Points of Contacts:

Primary Project Phone: 907-855-0338
This is a dedicated project cell phone that will be at the launch and recovery site at Barrow, AK. This phone will be monitored during all flight operations.

Primary Project Email: aces@noaa.gov
This address can be used to contact the Chief Scientists of Arctic ACEs.

Chief Scientists

Megan Ferguson
National Marine Mammal Laboratory
7600 Sand Point Way NE
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Land-based Project Operation Leads

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Shipboard Project Operation Lead

Van Helker
National Marine Mammal Laboratory
7600 Sand Point Way NE
Seattle, WA 98115
206-526-4297
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Ship Operations Officer
LT Ryan Wartick
NOAA Ship Fairweather
1010 Stedman Street
Ketchikan, AK 99901
808-659-0054
ops.fairweather@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This project will be conducted under:

- A Marine Mammal Protection Act Scientific Research Permit issued by the NMFS Office of Protected Resources on June 30, 2015 to Dr. John Bengtson; Director of the National Marine Mammal Laboratory. Permit number 14245-03
- A Marine Mammal Scientific Research Permit issued by the US Fish and Wildlife Service on June 9, 2015 to Dr. Phillip Clapham; Program Leader at the National Marine Mammal Laboratory. Permit number MA212570-1
- A Certificate of Approval (COA) from the Federal Aviation Administration allowing flights of ScanEagle UAS in the vicinity of Barrow, between Barrow and the study area, and within the study area. The COA will be issued to NSWCDD. *COA number to be provided when available*
- A North Slope Borough (NSB) land use permit issued to the National Marine Mammal Laboratory. Permit number 15-731

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

8/14/2015: Initial UAS flights begin out of Barrow with vessel support provided by NOAA Ship *Ron Brown*

8/16/2015: Personnel from Dahlgren and NMML arrive at Nome, AK

8/17/2015: NOAA Ship *Fairweather* departs Nome, AK and begins transit to study area

8/19/2015: NOAA Ship *Fairweather* arrives at study area

8/30/2015: NOAA ship *Fairweather* offloads primary project personnel (Mr. Helker, Mr. Broad, and Mr. Heyman) and UAS equipment in Barrow, AK. Mr. Nesseth will board the ship at Barrow for the PMEL wave-glider recovery. *Fairweather* begins transit to Kodiak, AK.

9/6/2015: NOAA ship *Fairweather* arrives at Kodiak, AK

B. Staging and Destaging:

Staging will take place June 1 – 4 during NOAA Ship *Fairweather's* Kodiak in-port. At this time engineers from Dahlgren will integrate a ScanEagle ground control station (GCS) onto *Fairweather* and ensure the GCS is functional. Once satisfied with the GCS performance the engineers will uninstall components of the GCS that will impact shipboard operations in the two months between the Kodiak integration and the UAS project, leaving components in place that will have a negligible impact on ship operations such as cable runs. Uninstalled GCS components will be stored inside the ship and be protected from the elements. Helium tanks and other project-associated equipment will also be stored aboard until the end of the project.

Project equipment, including GCS components will be reinstalled during the ship's August 14 – 17 Nome in-port and during transit to the study area. It is also expected that miscellaneous items and components associated with the piggyback project will be loaded during the August 14 – 17 Nome in-port. These piggyback components to be loaded in Nome include two US Navy wave gliders and crates to house the two PMEL gliders upon recovery.

Destaging will occur at-sea and offshore of Barrow on August 30. It is expected that uninstallation of the GCS will take approximately ½ day. GCS components and personnel will be offloaded from the ship onto a contracted landing craft based out of Barrow (all GCS components pack into pelican cases and can be moved by hand). It would be helpful to have the ship's small boat available for personnel and equipment offload if, in the event of unforeseen circumstances, the landing craft is unavailable. Once equipment and personnel are offloaded and UAS operations have been completed, the NOAA Ship *Fairweather* will be free to begin transit to its next port of call and the ship's role in the primary project will end. We request *Fairweather*'s crew assist the project by offloading the helium tanks while pier side in Kodiak following completion of the project. The helium supplier will pick the tanks up from the pier.

C. Operations to be conducted:

The ship will provide support required to conduct unmanned aircraft flights over the Chukchi and Beaufort seas necessary to conduct cetacean surveys with UAS and assess the performance of a meteorological sensor. The project will require ship support in the following areas:

Offshore Ground Control Station: A GCS integrated onto *Fairweather* will expand the operational range of UAVs launched from Barrow by extending their command and control link further offshore. Without the presence of *Fairweather* the UAS range would be limited to radio line-of-sight, estimated to be ~50nm. Presence of the *Fairweather* will ensure full coverage of the study area.

UAVs will be launched and recovered from Barrow and transit to the study area via defined transit corridors from Barrow to the study area (figure 1). Once in the study area, control of a UAV will be transferred to the GCS and operators located aboard *Fairweather* for the duration of the survey. Control will be transferred back to the shore-based GCS prior to the UAV departing the study area. UAV flights may last for up to 14 hours between 0800 and 2200 local time. During UAS flights controlled by the ship-based GCS, the ship will need to maintain an appropriate heading to ensure the directional antenna mounted on the flying bridge is not blocked by *Fairweather's* superstructure.

UAV Imaging Payload Resolution Testing: The UAS team will bring a 6 ft by 14 ft fabric resolution target aboard for quantifying the UAV's imaging payload resolution. When the UAV is in *Fairweather's* vicinity the target will be laid on deck. The UAV will be commanded to fly at survey altitude (1050 ft AGL) over the vessel (or slightly offset) in order to photograph the target. Images of the target will be analyzed in post-flight processing to determine the payload's imaging resolution on each flight.

Weather Balloon Launches: A meteorological sensor will collect data continuously throughout UAS flights. The sensor is being assessed by the Office of Naval Research and will provide UAS operators with real-time information on meteorological conditions, including those that could lead to structural or carburetor icing on the UAS. Data collected by the sensor will be compared to data collected by weather balloons launched twice daily, both prior to launch of any UAV and following recovery of UAVs.

Aircraft Recovery: Water landings of the UAV(s) are not planned but may be necessary in the event of equipment malfunction. The project team and ship's command will work together to ensure the ship is within a reasonable range (2 hours) of the UAV(s) at all times should it be necessary to recover a UAV from the water. Special equipment to recover UAVs from the water will not be required as ScanEagle UAVs weigh about 50 pounds and have a 10 foot wingspan.

Situational Awareness and Presence in Operational Area: The ship will provide the project with increased situational awareness of weather and sea-state conditions offshore, which will assist the project team making the call whether to launch or not. In addition, the ship will provide the project with a manned presence in the operational area. When a UAV is being controlled by the shipboard GCS the UAS operators will make routine radio calls on appropriate air band frequencies and the OOD will be requested to broadcast *securite* calls routinely on marine VHF channel 16. We also request an OOD/JOOD maintain a radar watch and report any probable aircraft detected by ship radar to the project team when the shipboard GCS is active.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer.

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

Visibility and clouds: The Navy and FAA require the UAS operate in FAA Class E weather minima (3 statute mile visibility and 500 ft below, 1000 ft above, and 2000 ft horizontal separation from clouds). As such, the UAV will not be launched unless ceilings are greater than 1500 ft.

High sea-states: The project requires sea-states of Beaufort 5-6 or less to collect meaningful cetacean data. Surveys will not be conducted above Beaufort 6.

A review of historical weather data shows that approximately 30% of the days while *Fairweather* is stationed in the study area will meet the required sea-states and weather minimums. Each morning the weather conditions will be assessed. If weather is not initially conducive to survey operations the project will remain on standby, as weather conditions in the region often improve throughout the day. The project will provide *Fairweather* with as much notice as possible prior to UAS launch and will strive to provide the ship with a two-hour warning prior to UAS launch.

III. Equipment

A. Equipment and Capabilities provided by the ship

- Support during Kodiak integration to include:
  - Receive, load, and secure helium tanks while alongside in Kodiak
  - Provide integration team with intermittent use of ship's pickup truck

- Support in Nome to include:
  - Receive, load, and secure Navy gliders
  - Receive, load, and secure PMEL glider crates

- Support during UAS operations to include:
  - Adequate space for GCS and ScanEagle pilots in Data Plot 3
  - Ensure ship is located in appropriate region of study area through consultation with project team
  - Maintain appropriate heading while UAV is being controlled by shipboard GCS
  - Rapid response to recover any ditched aircraft
  - VHF radio, phone, and internet (bandwidth TBD) connectivity
  - Serial connection to the ship's IMU data feed

- Offload
  - Offload PMEL gliders in Kodiak or Juneau
  - Offload empty Navy glider crates in Kodiak
  - Offload helium cylinders for pickup upon ship's return to Kodiak

B. Equipment and Capabilities provided by the scientists

- The ScanEagle Ground Control Station is used to control a ScanEagle unmanned aircraft. The system consists of the following:
    - Directional antenna to be mounted on an unused radar mast
    - Antenna interface module
    - Rail mounted omni antenna
    - Omni antenna interface module
    - Data cables
    - Power cables
    - Computers and monitors
- Communication equipment additional to NOAA Ship *Fairweather's* include:
    - Satellite phone with rail mounted antenna
    - Air band transceiver with 6 ft antenna
    - VHF radio and rail mounted antenna
- Radiosondes
    - Weather balloons
    - Ten 300 cu. ft. helium tanks (9.25 in. by 55 in. and ~140 lbs each)
    - Radiosonde receiver

All embarked equipment can be packed into pelican cases and clamshells and will be offloaded onto landing craft while the ship is offshore of Barrow following the last UAS flight on August 30. The ship's crew will be requested to return helium tanks on the project's behalf during the Kodiak in-port following the project.

IV. Hazardous Materials

A. Policy and Compliance

The project will require carriage of ten cylinders of compressed helium gas (an inert gas) containing 300 cubic feet of helium each for weather balloon launches. Any ship SOPs regarding compressed gasses will be complied with.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

Fairweather's command and NMML have identified several piggyback projects that will be conducted on a not-to-interfere basis with the primary objective. These include:

- Hydrographic surveys: *Fairweather* may conduct hydrographic surveys in the vicinity of Barrow at night, or when other situations prohibit UAS operations. The project will

provide *Fairweather* with a two-hour warning prior to UAV launch to recover launches and reposition for UAS operations

- Recover two PMEL wave gliders. The wave gliders consist of a surface 6 ft by 2 ft surface float and a 5 ft tractor. These elements combined weigh approximately 325 lbs. Retrieval operations are expected to take approximately 2 hours for each glider. Storage crates will be loaded onto Fairweather during the August 14-17 Nome in-port. A representative from PMEL (Tim Nesseth) will board *Fairweather* during the UAS team offload on August 30 in order to oversee recovery operations during the transit between Barrow and Kodiak. Mr. Nesseth will oversee the offload of the gliders in Kodiak or Juneau.
- Deploy 2 Navy gliders. The gliders and their carts will be loaded during the August 14-17 Nome in-port. Deployment is expected to occur early in the project in the vicinity of Barrow. *Fairweather* will not recover the gliders and the carts will be offloaded on September 6 in Kodiak.
- PCO2 sampling: The project supports PCO2 sampling on a not-to-interfere basis
- CTDs at Distributed Biological Observatory (DBO) sites: The project supports DBO related projects at night or when other situations prohibit UAS operations

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization

meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at http://www.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event

that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.

(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA ship or Federal Facilities is not required for this project.

VIII. Appendices

1. Figure of study area and table containing study area coordinates.

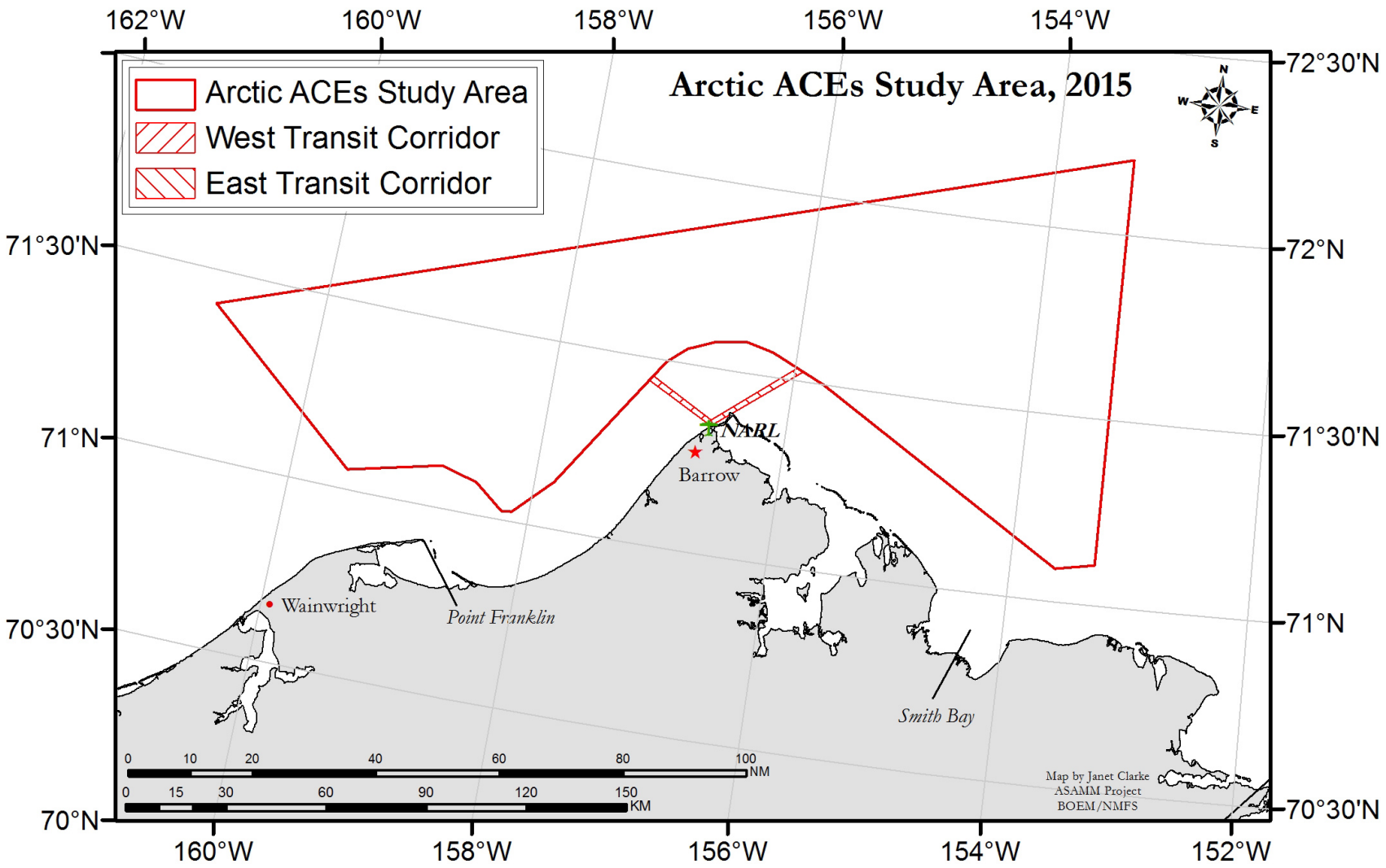

Figure 1: Study area located north of Barrow, Alaska for conducting strip- and line-transect cetacean surveys to compare the performance of UAS and manned aircraft. The inshore boundary of the study area is greater than 12 nm off the coast of Alaska.

Study Area. Surface to 2000 ft MSL, bounded by the coordinates below:	
Latitude	**Longitude**
71° 3.2 N	159° 32.2 W
71° 24.7 N	160° 54.0 W
72° 12.2 N	153° 19.4 W
71° 6.5 N	153° 18.0 W
71° 5.3 N	153° 37.4 W
71° 30.1 N	155° 44.5 W
71° 33.9 N	156° 12.2 W
71° 35.0 N	156° 26.5 W
71° 34.2 N	156° 41.3 W
71° 32.4 N	156° 55.4 W
71° 29.8 N	157° 4.9 W
71° 20.1 N	157° 25.0 W
71° 7.5 N	157° 50.2 W
71° 1.6 N	158° 8.4 W
71° 1.4 N	158° 13.4 W
71° 5.2 N	158° 28.3 W
71° 6.9 N	158° 46.4 W
71° 6.9 N	158° 46.4 W
71° 3.2 N	159° 32.2 W

West Transit Corridor. Surface to 400 ft MSL, bounded by the coordinates below:	
Latitude	**Longitude**
71° 21.1 N	156° 39.7 W
71° 26.4 N	157° 12.1 W
71° 27.1 N	157° 10.5 W
71° 21.7 N	156° 37.9 W

East Transit Corridor. Surface to 400 ft MSL, bounded by the coordinates below:	
Latitude	**Longitude**
71° 21.0 N	156° 36.5 W
71° 31.6 N	155° 55.7 W
71° 32.0 N	155° 58.6 W
71° 21.7 N	156° 37.9 W

Launch and Recovery Area. Surface to 400 ft MSL, bounded by a 1 nm circle centered on the coordinate below:	
Latitude	**Longitude**
71° 20.3 N	156° 38.2 W

Table 1: Coordinates, altitudes, and descriptions of the airspace to be used by ScanEagle UAS as part of the Arctic ACEs project.