

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

NOTE: *This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).*

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.
- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.
- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:

Papahānaumokuākea Marine National Monument Permit Coordinator

6600 Kalaniana'ole Hwy. # 300

Honolulu, HI 96825

nwhipermit@noaa.gov

PHONE: (808) 397-2660 FAX: (808) 397-2662

SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.

Papahānaumokuākea Marine National Monument Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Dr. Christopher Winn and Dr. Samuel E. Kahng

Affiliation: Hawaii Pacific University

Permit Category: Research

Proposed Activity Dates: July 23, 2012 through August 20, 2012

Proposed Method of Entry (Vessel/Plane): vessel

Proposed Locations: The waters surrounding several islands within the Monument including Nihoa, Necker, French Frigate, Gardner Pinnacles, Maro Reef, Laysan, Lisianski, Pearl and Hermes, Midway and Kure Atoll

Estimated number of individuals (including Applicant) to be covered under this permit:

7

Estimated number of days in the Monument: 30

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

help Monument managers monitor the monument to assess and understand the impact of ocean acidification. As a part of that work we are assessing calcite saturation state in the waters surrounding the monument as well as the concentrations of carbon system parameters and their variation in space and time. This will provide detailed knowledge of the state of the seawater CO₂ system at the current time, and, with repeated sampling, will monitor the impact of changing chemistry on monument ecosystems as a result of anthropogenic activity.

Standard hydrographic methods will be employed to collect water samples and physical data of seawater temperature, salinity and oxygen concentrations, as well as some optical qualities of the water column. Titration alkalinity and pH will be measured on all of the water samples collected and these two chemical parameters will be used to compute the remaining two parameters of the seawater CO₂ system (i.e., total dissolved inorganic carbon and the partial pressure of CO₂) as well as several other parameters including calcite and aragonite saturation state and bicarbonate and carbonate concentrations.

At the present time our goals are two-fold. First, we would assess the impact of organic matter production and coral reef calcification on the waters surrounding the archipelago.

Second, we would characterize reef metabolism by assessing diurnal changes in both DIC and alkalinity over the reef crests.

b.) To accomplish this activity we would collect water samples from the research vessel and small boats. Samples would be collected from the research vessel along "transects" from shallow water to distances of up to 15 kilometers from the reef. In this context shallow water is at a depth of about 60 meters. We are limited to this as a minimum depth given the safe operational limits of the research vessel. Our sampling takes advantage of available time on the research vessel and our CTD operations are therefore conducted at night. However, our specific sampling locations are dependent upon the islands that the research vessel will visit and therefore we cannot specify exact station locations at this time. All of our sampling will be done in the water column and we will not disturb the seafloor at any location.

In addition, we would use small boats during the day to collect discrete water samples at various locations over the reef. These water samples would also be measured for titration alkalinity and pH and these data would be used to characterize reef metabolism throughout the monument. We would also measure water temperature and salinity at the time of sample collection. Our sampling would be from the water column only and will not disturb the seafloor in any way.

We anticipate collecting no more than 600 250 ml water samples during the month-long cruise to the NWHI. The exact number will depend on the sampling opportunities that other ship operations will allow.

c.) This activity would help the Monument by ... assessing and documenting changing seawater carbonate chemistry with the monument. It is well known that many calcium carbonate producing organisms are threatened by the ongoing decrease in ocean pH and some evidence suggests that corals, even at low latitudes, may have already begun to be impacted. However, sufficient data to assess the rate of change in carbonate chemistry in the monument is not available. At present, our research is attempting to provide the baseline information on carbon system dynamics within the monument so that a well planned and effective long-term monitoring program can be implemented.

Other information or background:

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Christopher D. Winn and Samuel E. Kahng

Title: Associate Professor of Oceanography

1a. Intended field Principal Investigator (See instructions for more information):

Christopher D. Winn/Sam Kahng

2. Mailing address (street/P.O. box, city, state, country, zip):

Oceanic Institute

[REDACTED]

[REDACTED]

Phone: [REDACTED]

Fax: [REDACTED]

Email: [REDACTED]

For students, major professor's name, telephone and email address:

3. Affiliation (institution/agency/organization directly related to the proposed project):

Hawaii Pacific University

[REDACTED]

[REDACTED]

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):

Ms. Andrea Kealoha, HPU Graduate Student

Ms. Jessica Hellenbeck, HPU Graduate Student

Dr. Sam Kahng, HPU Faculty

Dr. Christopher Winn, HPU Faculty

unnamed undergradaute student

unanmed gradaute student

Section B: Project Information

5a. Project location(s):

<input checked="" type="checkbox"/> Nihoa Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Necker Island (Mokumanamana)	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> French Frigate Shoals	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Gardner Pinnacles	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Maro Reef			
<input checked="" type="checkbox"/> Laysan Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Lisianski Island, Neva Shoal	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Pearl and Hermes Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Midway Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Kure Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input checked="" type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Other			

Ocean Based

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:

Our sampling will be restricted to the water column. We will not be collecting live animals or collecting other types of samples within the monument.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
- Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
- Anchoring a vessel
- Deserting a vessel aground, at anchor, or adrift
- Discharging or depositing any material or matter into the Monument
- Touching coral, living or dead
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- Attracting any living Monument resource
- Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
- Subsistence fishing (State waters only)
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6 Purpose/Need/Scope *State purpose of proposed activities:*

Our research is designed to evaluate the impact of the calcium carbonate banks on the carbon chemistry of the surrounding ocean and to assess the impact of ocean acidification on the carbonate structures within the monument. Ocean acidification is a result of the accumulation of anthropogenic carbon dioxide that is added to the sea. Although mankind's activities inject carbon primarily into the atmosphere, as atmospheric concentrations rise, a portion of this carbon dioxide dissolves in the sea. At present about half of the carbon that has been added to the atmosphere has already entered the ocean and eventually all of the carbon added to the atmosphere is projected to be sequestered in the sea. The addition of this carbon alters the pH of the sea and threatens to impact the growth and viability of calcite producing organisms like corals.

The ultimate purpose of our research is to monitor chemical changes in waters of the Northwestern Hawaiian Islands and the impact of these changes on the coral communities within the monument. This work is critical to protecting the long-term viability of these precious environments. The scope of our research encompasses the entire island chain from waters offshore of the reefs to waters within the reef environments themselves. However, our sampling program is restricted to the water above and around the reefs and will not impact any of the organisms in the monument (see below).

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?

Our collection of small volumes of seawater from the water column surrounding the islands will not impact the emergent islands or submerged reefs in any way given that these samples are collected kilometers away from any emergent reefs.

Water samples collected from small boats near the reefs comprising the atolls are prescreened to remove particles larger than bacteria and therefore no animal life will be collected as part of our work. The mercuric chloride we use is needed to preserve water samples until they are analyzed in the laboratory upon return to Honolulu. One tenth of one milliliter of mercuric chloride will be added to each sample bottle after the sample is collected and no mercuric chloride will be released into monument waters. Given that we are collecting water samples in 250 ml aliquots and no substrate or animal life will be collected, our sampling protocols will have no impact on any cultural or historic resources within the monument.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?

We are aware of the cultural importance of the Northwestern Hawaiian Islands to Native Hawaiians as being a sacred place. It is understood that Native Hawaiians have always depended on the ocean as a resource (especially in the NWHI) for both sustenance and cultural activities. We look forward to expanding our knowledge on this topic at the required cultural briefing. Coral reefs and the ecosystem surrounding the Hawaiian Archipelago are an important natural resource as well as a cultural asset for Native Hawaiians and all U.S. citizens. These huge calcium carbonate structures may be severely damaged or even completely destroyed by the slowly declining pH in the global ocean. Our research is designed to better understand the carbon chemistry of the ocean waters in and around the Monument and will hopefully be useful in designing strategies for protecting these resources for future generations of Native Hawaiians as well as all people of the Pacific region.

Our sampling work will be compatible with management practices in the monument in that our work will have no impact on any cultural, historic or natural resources in the monument. Water samples will be collected only from the water column and will not affect any cultural, biological or physical features within the monument.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.

Our samples must be collected from monument waters in order to improve our understanding of the chemical processes within the monument.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?

One of the most fundamental processes within the monument is the precipitation of calcium carbonate by reef building organisms. Calcium carbonate is precipitated by a variety of reef organisms and calcium carbonate also dissolves through both biological and abiotic processes. At the present time, the rate of precipitation is almost certainly greater than the rate of dissolution throughout most of the Monument. However, as the carbon chemistry of the reef environments change it is anticipated that precipitation will decline and dissolution will increase. This is a result of the changes in the solubility of calcium carbonate resulting from a decrease in ocean pH and a simultaneous decrease the concentration of the carbonate ion. Our research will improve our understanding of the precipitation and dissolution of calcium carbonate and help to anticipate the impact of ocean acidification on these processes within the monument.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.

We will participate in month-long expeditions to the monument. Our visits will be part of ongoing observation and research by the Papahānaumokuākea Marine National Monument. We need to be in the monument for an entire month because we will be passengers on the ship that will return to Honolulu after approximately a month at sea.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

Dr. Winn and Dr. Kahng have considerable experience in this area of research. Dr. Winn has participated in research programs focusing on oceanic carbon chemistry for decades. Relevant experience includes participation as principle investigator on the Department of Energy's Global Carbon Survey as part of the International World Ocean Circulation Experiment (WOCE) and the National Science Foundation's Joint Global

Ocean Flux (JGOFS) program. These large scale research programs have included similar research on research cruises in virtually all of the world's oceans.

Dr. Kahng has been working in Hawaii's coral reef environment for many years. He has worked on mesopelagic coral species and has extensive experience and expertise in coral reef biology and Ecology. In addition, Dr. Kahng has been conducting a time-series carbon system measurement program in near-shore Hawaiian waters for the past year and has provided some of the first data on carbon system dynamics on exposed coral reef environments in Hawaii.

The students listed on this application have research vessel, CTD operation, and carbon chemistry experience.

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct. We are working closely with the Papahānaumokuākea Marine National Monument on this research effort and the monument is funding our participation.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.

Our sample collection and analysis procedures have been developed over years of similar research throughout the global oceans. Our research will not involve the collection of any live animals or other materials from the monument and we will collect a total of less than 40 gallons of seawater from monument waters during our month-long sampling program in the summer. Our students do not need to use scuba for sample collection and samples can generally be obtained from small boats. In some circumstances however, we anticipate that it may be necessary for sample collection to be conducted a short distance from the small boat. We are therefore requesting that our students be allowed to swim with snorkel gear when it is desirable to collect samples near, but not directly from, small boats.

i. Has your vessel has been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?

Yes

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.

We cannot foresee any conditions that would make issuance of this permit inappropriate.

8. Procedures/Methods:

Our research work involves collecting water samples from monument waters. Water samples will be collected from the research vessel using standard hydrographic methods and no live animals will be collected. Standard hydrography generally includes deploying a CTD, a Conductivity, Temperature and Depth measuring instrument, deployed on a hydrowire attached to a high-power winch onboard the ship. As the CTD is lowered through the water, continuous measurements are made by electronic sensors. The output from these sensors are transmitted to the ship via a conducting wire embedded in the hydrowire supporting the instrument. Onboard the research vessel, these output voltages are converted to physical and chemical measurements via complex calibration algorithms. In addition, a rosette is generally attached to the CTD in a circular arrangement surrounding the CTD. The rosette supports water sampling niskin bottles that can be closed at desired depths. Using this system, we will collect water at depth below the ship and obtain the necessary physical information to determine the precise position within the water column as well as the physical conditions at the depth where the sample was collected.

Our sampling plan involves collecting water along transects (i.e., sampling stations arranged in straight lines). Water samples will be collected from several depths from the surface to near the seafloor at each sampling location. 10 to 20 depths will be sampled at each location depending on the time we have available for sampling as well as the water depth. Water samples are collected in carefully cleaned 250ml glass bottles and will be returned to Honolulu for analysis. No waste of any kind will be introduced into monument waters.

In addition to the sampling work from the research vessel using a CTD, we will also collect water samples from small boats above coral reefs. This sampling will be done by hand. We will not disturb the seafloor or any living resources in the monument.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:

We will not collect any living specimens but we will be collecting seawater samples from the water column around and over monument reefs. We will collect roughly six hundred 250 ml samples for a total of less than 40 gallons of ocean water. These 600 samples include those collected from the ship in connection with standard hydrographic work and those collected from small boats over the reefs. All of these samples will be returned to Honolulu for analysis and no chemicals will be released in monument waters.

Scientific name:

& size of specimens:

Collection location:

Whole Organism Partial Organism

9b. What will be done with the specimens after the project has ended?

9c. Will the organisms be kept alive after collection? Yes No

- General site/location for collections:

Water column above the substrate from the surface to 1000 meters and to roughly with 15 kilometers of any emergent reefs.

- Is it an open or closed system? Open Closed

I don't believe that our sampling fits into either definition. All of our water samples will be drawn from the water column, preserved and returned to Honolulu for analysis

- Is there an outfall? Yes No

- Will these organisms be housed with other organisms? If so, what are the other organisms?

- Will organisms be released?

10. If applicable, how will the collected samples or specimens be transported out of the Monument?

Samples will be returned to Honolulu with the research vessel

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:

We anticipate exchanging a few water samples with other laboratories to ensure analytical accuracy and precision. Dr. Andrew Dickson's laboratory at Scripps Institution of Oceanography.

Contact Information:

Dr. Andrew Dickson

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

In addition, we may share samples with Dr. Andreas Andersson, also at Scripps institution of oceanography.

Dr. Andreas Andersson

[REDACTED]

12a. List all specialized gear and materials to be used in this activity:

We will utilize the ship's CTD, rosette, winch and hydrowire for sample collection. Use of the small boats during the day will allow us to collect discrete water samples closer to the atolls.

12b. List all Hazardous Materials you propose to take to and use within the Monument:

Small amounts of Mercuric Chloride. This chemical will be used for sample preservation only and will not be released into monument waters. We add this chemical to our water samples into order to preserve them for analysis in shore-based laboratories. This chemical is also used sparingly. We will use less than 30 milliliters during the entire month-long expedition

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:

No fixed instruments will be deployed

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:

Complete analysis and interpretation will require approximately one year following the completion of the cruise. Our data will be compiled in a data report that will be submitted to the NOAA Monument program. The data report for our 2009 sampling

season is now complete and the report for 2010 and 2011 will be completed once the analytical work for that year is complete. Our data reports will be submitted to the monument approximately 12 months after the completion of our annual sampling. We have already presented the results of our work at several scientific conferences and will be writing a manuscript for publication in the peer-reviewed literature after the completion of our sample analysis.

15. List all Applicants' publications directly related to the proposed project:

Please see attached C.V

With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as “confidential” prior to posting the application.

Signature

Date

**SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE
BELOW:**

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
FAX: (808) 397-2662

DID YOU INCLUDE THESE?

- Applicant CV/Resume/Biography
- Intended field Principal Investigator CV/Resume/Biography
- Electronic and Hard Copy of Application with Signature
- Statement of information you wish to be kept confidential
- Material Safety Data Sheets for Hazardous Materials