

Papahānaumokuākea Marine National Monument
CONSERVATION AND MANAGEMENT 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:
NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
nwhipermit@noaa.gov
PHONE: (808) 725-5800 FAX: (808) 455-3093

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: Michelle Barbieri Lino

Affiliation: NOAA Fisheries

Permit Category: Conservation and Management

Proposed Activity Dates: 7/1/2021-6/30/2022

Proposed Method of Entry (Vessel/Plane):

NOAA RVs Oscar Elton Sette, possibly Searcher, Imua, Kahana II, or US Coast Guard C130.

Proposed Locations:

Hawaiian monk seal research and recovery efforts will occur across all islands, islets and atolls in the Northwestern Hawaiian Islands. Work will be done predominantly on the shoreline of each island/islet.

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

25

Estimated number of days in the Monument:

150

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

support priorities identified in the Papahānaumokuākea Marine National Monument Management Plan (December 2008, hereinafter referred to as MMP); specifically Priority Management Needs: 3.2 Conserving Wildlife (Hawaiian monk seals), and 3.3

Reducing Threats to Monument Resources (Hawaiian monk seals), as well as the Co-Trustee's Conservation & Management Activity: Natural Resource Protection, as listed in section 6.3 of that Monument permit application.

NOAA aims to accomplish natural resource protection related to monk seals by conducting "...management actions to promote the conservation of Monument resources which includes activities necessary to carry out protection of species, such as carrying out existing recovery plans" to fulfill our obligations under the Endangered Species Act and the Hawaiian Monk Seal Recovery Plan (NMFS 2007).

b.) To accomplish this activity we would

be continuing three decades of effort to understand the biology, ecology and population trends of monk seals and identify threats to the species and implement actions to mitigate those dangers.

c.) This activity would help the Monument by ...

conducting population assessment and monitoring efforts across the NWHI archipelago in particular during the summer field camp season. Simultaneously we will collect information on the health, ecology and biology of monk seals and threats to the species and use these data to develop, implement and assess a multitude of recovery activities.

Recovery activities would include, but are not limited to, translocating seals away from danger and to areas of great survival, rehabilitation of undernourished seals, disentanglement from marine debris, mitigation of shark predation risks to pups at French Frigate Shoals, removal of marine debris, vaccination against morbillivirus, reuniting mothers and pups, and more.

Other information or background:

This is a brief summary of information relevant to monk seal research and recovery initiatives proposed here. More information can be found in the attached Recovery Plan for the Hawaiian Monk Seal.

- The Hawaiian monk seal is an endangered species numbering approximately 1,400 individuals, 1,100 seals reside in the NWHI.
- The Hawaiian monk seal has been the focus of research and recovery activities for over 30 years. This has resulted in one of the most robust population datasets for a large mammal species allowing the Program to develop and assess cutting edge recovery

actions.

- These recovery activities have resulted in the fact that a minimum of 28% of Hawaiian monk seals alive today are here because they directly benefited from an action or are the offspring of a female seal that benefited.
- In the PMNM, the key threats to the survival of the species include low birth rates combined with poor survival of juvenile Hawaiian monk seals to reproductive age. The majority of research activities are directed to understanding threats to the seals and mitigating those, particularly related to young female seals.
- All activities proposed here are permitted by the NOAA MMPA/ESA Permit 22677 (and associated NEPA docs etc.) and supported by the Revised Recovery Plan for Hawaiian Monk Seals.
- This permit also supports efforts conducted by our State and Federal partners that are directed towards monk seal research and recovery.
- To maximize the benefit from our limited time in this remote place, the Program will use a suite of methods to ensure that all areas are well-surveyed (including using technology to expand data collection, and requesting access to all monk seal haul-out areas).
- Unmanned aerial systems (UAS) will be used to conduct ecological surveys including surveying and monitoring monk seals, marine debris, and possibly other flora and fauna in the NWHI (as a by-product of habitat mapping or as requested by partners).
- UAS will be launched and recovered from land, NOAA ships, or small boats launched from those ships, and will be flown at altitude below 400 feet.
- UAS efforts will provide the ability to survey and map resources on the remote islands without (1) interference; (2) the potential for the introduction of invasive species; and (3) human disturbance to the natural resources. The UAS would increase the monitoring and surveying capacity in the Monument.
- While we work to minimize human presence on Mokumanamana, trained biologists familiar with the island may traverse Mokumanamana, using paths delineated by archaeologists and cultural practitioners familiar with the island, in the event that all seal haul-out areas cannot be surveyed through boat-landings or UAS flights at haul-out sites.
- This permit is comprehensive and includes ALL monk seal recovery activities that occur in the Monument including the mitigation of predation by Galapagos sharks on monk seal pups at French Frigate Shoals (FFS); the primary source of seal mortality at FFS.

- This is a continuation of permitted shark removal activities for monk seal conservation. The initial target of 20 sharks was determined based on data from the field whereby individually identifiable sharks (through tags or naturally acquired markings on their dorsal fins) that were engaged in predatory behavior on monk seal pups were enumerated. Shark biologists were consulted and ecosystem modeling efforts indicated that the Galapagos shark population, which is neither threatened nor endangered, was capable of sustaining this level of population reduction. Hence, the initial request of 20 sharks was based on an agreed upon minimum number of sharks that were exhibiting this behavior, paired with ecosystem based support.

Since the initial request of 20 made at the beginning of this project 7 Galapagos sharks have been caught and removed, leaving 13 remaining. The request for this year is for 13 Galapagos sharks. This is the balance of initially requesting removal of 20 sharks, minus the 7 that have been removed historically to-date. Fishing requires a great deal of effort, and catch-per-unit-effort is low, therefore we expect that reaching this initial target number is still a long-term goal.

Published data and consultation with Carl Meyer puts the population somewhere between 668 to just over 1000 sharks. The estimated removal would be between 1.3 – 1.9% of the population. Generally, we don't remove more than 1 shark per season or 0.1% of the population.

- Predation peaked in 1997-1999; it continues at a rate of 5-11 pups per year from 2000-2019 (usually 15-25% of the pup cohort each year). In 2019, 35 pups were born at FFS during the field season and Galapagos shark predation was confirmed in 3 pup deaths and strongly suspected in 6 additional disappearances, accounting for 25% of the pups born. Information from 2020 is not available because our field camps were not deployed due to COVID-19.
- Between 1997 and 2019, shark predation affected over 270 pups out of roughly 1150 born at FFS. Sharks have killed many pups and others were permanently maimed by severe shark bites and subsequently died.
- Since 1997, NMFS has engaged in a variety of actions to address this threat, including pre-weaning and translocating pups, predator deterrents, and targeted fishing activities to remove problem G. sharks. Translocating pups remains our most common intervention and in 2019, 14 pups were translocated.
- Removing the sharks exhibiting this behavior from the environment is the most effective means of preventing continued predation.
- NMFS has consulted numerous stakeholders including Native Hawaiians, animal welfare groups, conservation professionals, and the general public. Opinions and concerns are varied between individuals but no external group has requested NMFS cease this activity.

- This activity has been approved and undertaken safely and respectfully almost every year since 2010.
- Successful removal of these individuals could have a profound effect on the monk seal population at French Frigate Shoals while having negligible impact on the G. shark population.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Lino, Michelle B.

Title: Lead Scientist, Hawaiian Monk Seal Research Program

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

Hope Ronco (CV attached)
NOAA / NMFS / PIFSC / Hawaiian Monk Seal Research Program

[Redacted]

Mark Sullivan (CV attached)
NOAA / NMFS / PIFSC / Hawaiian Monk Seal Research Program

[Redacted]

Stacie Robinson (CV attached) - alternate
NOAA / NMFS / PIFSC / Hawaiian Monk Seal Research Program

[Redacted]

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

[Redacted]

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

Student: Kirby Parnell
Major Professor: Lars Bejder
Phone: [Redacted]
Email: [Redacted]

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

NOAA Fisheries

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):

Michelle Barbieri Lino, Veterinarian
Jessica Bohlander, Scientist
Claudia Cedillo, Scientist
Brenda Becker, Scientist
Thea Johanos, Scientist
Christy Kozama, Scientist
Tracy Mercer, Scientist
Mark Sullivan, Scientist and Field PI
Stacie Robinson, Scientist and Field PI alternate
Hope Ronco, Scientist and Field PI
TBD x 14, Scientist (seasonal field staff and program members)
TBD, Scientist (for collaborators/partners as priorities and berthing allows)
TBD, Vet Support

Note - this is a maximum list for all possible missions combined; berthing limitations will affect final head count for each mission and an updated CIS form will be provided prior to entry to the Monument.

Section B: Project Information

5a. Project location(s):

Ocean Based

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

NOTE: Shallow water is defined by water less than 100 meters in depth.

Remaining ashore on any island or atoll (with the exception of Sand Island at Midway Atoll and field camp staff on other islands/atolls) between sunset and sunrise.

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

Location Description:

Hawaiian monk seal research and recovery efforts will occur across all islands, islets and atolls in the Northwestern Hawaiian Islands. Work will be done predominantly on the shoreline of each island/islet.

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:*

All activities described in this application are directed towards understanding the biology, ecology, and population dynamics of the Hawaiian monk seal and identifying factors that impact the survival and recovery of the species. All of this information is then compiled to develop, implement, and assess the recovery actions described in this application.

***Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species? Yes No**

If so, please list the species you specifically intend to target.

Hawaiian monk seals

For a list of terrestrial species protected under the Endangered Species Act visit:

<http://www.fws.gov/angered/>

For a list of marine species protected under the Endangered Species Act visit:

<http://www.nmfs.noaa.gov/pr/species/esa/>

For information about species protected under the Marine Mammal Protection Act visit:

<http://www.nmfs.noaa.gov/pr/laws/mmpa/>

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?

All monk seal conservation and management activities conducted by the permit applicants will be carried out with strict safeguards for the natural, cultural and historic resources of the Monument as required by Presidential Proclamation 8031, and other applicable law and agency policies and standard operating procedures. All agencies have field protocols and best management practices. These practices and procedures will minimize or eliminate disturbance to wildlife, flora, habitats, and cultural and historic resources.

We have a rigorous training that all field staff undergo before being deployed to seasonal field camps. This includes monk seal based activities but also how to safeguard and minimize impacts to other natural and cultural resources. This will be further supported through providing Resource Monitor training for key field staff whenever possible as outlined by MMB recommendations.

Additionally, pre-access permit and cultural briefings will be conducted for all new personnel entering the Monument and annually for all.

In 2015, the UAS research team (including members from NOAA and USFWS) demonstrated that the APH-22 UAS systems could operate with virtually no impacts to cultural and natural resources within the Monument. In 2018, use of UAS to count monk seals allowed us to obtain full monk seal counts without a second boat landing or overland traverse, demonstrating how UAS can help to minimize human presence and impact and collect an important subset of the data that can be obtained during land surveys. As in all previous years, the UAS will be operated by trained NOAA staff and affiliates and all relevant Monument Best Management Practices and protocols specific to deployment and retrieval will be followed. The minimum altitude we will fly over monk seals will be 25 ft or 7.5 meters. Interactions with birds and other wildlife will be closely monitored and should significant interactions occur, UAS operations will be halted.

We are requesting the use of the APH-22 (used in 2015 and 2018) and DJI Mavic Pro GE at all PMNM locations, including Nihoa and Mokumanamana. These islands, especially Nihoa and Mokumanamana are of great cultural significance to the native Hawaiian community. Past discussions about Nihoa and Mokumanamana have identified at least two areas of concern to Hawaiian cultural practitioners: 1) capturing images of cultural sites and 2) generally operating over the islands themselves as it is the land, sea and air around the islands that are sacred. We hope to continue to have access to conduct UAS operations by only conducting flights over the coastal areas of these islands (rocky shelves and beaches) where monk seals and turtles haul out. We have no research need to fly over the upper reaches of the islands and we will not photograph any cultural sites. We can also work to minimize the amount of time for operations.

All photos and imagery captured by the UAS will be used internally for purposes of conservation and management activities. Images will be shared with all Co-Trustee agencies upon request and not disseminated for public consumption without first ensuring the appropriateness, from a cultural and natural resource perspective, of the information being disseminated.

To protect sensitive upland sites when traversing Mokumanamana, we will use minimal staff (typically 3 survey staff and up to 2 veterinary staff) which will include a qualified and experienced Resource Monitor. Mokumanamana and appropriate PMNM Best Practices would be observed.

Careful quarantine procedures will be followed at each island where personnel land. This includes use of gear purchased new and dedicated to each island / atoll. Thorough cleaning, biosecurity, and safe storage protocols are followed between field seasons.

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?

Our Program has conducted monk seal research and conservation activities in the NWHI for decades. We have a large presence in the NWHI and with that comes the potential to negatively impact a number of cultural and natural resources. We have worked hard over the decades to develop and refine our protocols to minimize the amount of time and impact on these resources as well as follow other established protocols.

For new and particularly sensitive activities we direct considerable energy to share information with our Monument partners on the need and justification for each activity. For example for the shark predation mitigation work that has been permitted multiple times and is included in this project we consulted extensively with our MMB and native Hawaiian partners in past years.

There has been extensive consultation with the Native Hawaiian community on this and many other Hawaiian monk seal research and conservation efforts since initiating this series of predation mitigation strategies in 2010. In 2010 -2011, we consulted with and received quality input from OHA and the Monument's Native Hawaiian Cultural Working Group (CWG). The feedback from the CWG and others was not homogenous with a diverse array of perspectives and opinions both supporting and opposing the activity. The CWG determined it was unable to offer an endorsement or censure of the proposed management activity and has not reviewed the activity since. In 2020, we were invited to meet with a representative of the CWG and answered some questions related to this activity. It was a good opportunity to reconnect and we welcome any opportunity to provide further information to the CWG at their request in the future.

Discussions with other members of the Hawaiian community have resulted in constructive feedback and improved understanding of the views of some representatives of the Native Hawaiian community on our proposed work. From these meetings, we also supported the participation of a number of Native Hawaiians in our shark predation mitigation work in 2010 and 2011.

In 2013 with the addition of seal flesh as bait, we were encouraged by the State of Hawaii Board of Land and Natural Resources to communicate with, and be responsive to, stakeholders regarding this activity. We alerted approximately 35 organizations and individuals about our field activities during the 2013 field season (including shark

fishing) and updated them on our plans for the 2014 season. To date, none of these entities has expressed questions or concerns.

We also undertook consultations regarding the use of tissue from previously deceased monk seals as bait with several Native Hawaiians with whom we have been working with on other monk seal issues. In this regard, we have held one-on-one discussions with several individuals (cultural practitioners, partners, and/or advisors). Input we received during these one-on-one discussions ranged from full support and understanding to acceptance without expressed support. No one we have spoken with regarding the use of seal tissue has voiced opposition or indicated that the use of seal tissue as we have proposed would adversely affect their productive relationships with our program or otherwise diminish their support for monk seal conservation. The overarching sentiment we have heard has been that as long as the seals would be dead of a cause beyond our control (which would be the case), using their bodies to try to save a still living seal, while admittedly difficult to consider or undertake, would be a reasonable effort in light of the endangered status of the monk seal population.

To safeguard the ecological integrity of the Monument, we propose to limit the scope of our removal actions as described above and also to avoid by-catch of any other wildlife to the greatest degree possible. Possible adverse effects on the coral reef ecosystem at FFS from shark removals were investigated using the EcoSim model (Parrish, unpublished data). Results from that work indicated that the removal of 20 sharks had a nearly imperceptible effect on the dynamics of the FFS ecosystem.

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.

There is not a practicable alternative location to the proposed activity outside of the Monument because this threat to the recovery of the endangered Hawaiian monk seal has only been identified in the Monument. While a small portion of the monk seal population lives outside of the Monument, in the MHI, the species will not likely avoid extinction without a healthy population in the NWHI. Recovery requires at least 2900 seals in the NWHI with at least 5 of the 6 main sub-populations above 100 individuals and increasing.

Specifically related to the shark predation mitigation component of these recovery activities: FFS shark predation must be mitigated to recover the FFS population. Losing a high number of pre-weaned and newly weaned pups to shark predation is a unique phenomenon at French Frigate Shoals only; therefore, we propose to manage this threat at this location only. We have tested other practicable alternatives (deterrents etc.) and they have not worked. We have taken this focused and targeted approach to maximize the limited federal resources and minimize adverse impacts to other Monument resources by conducting the shark removal activities at only in nearshore waters adjacent to monk seal pupping beaches where Galapagos shark predatory behavior is observed.

Related to UAS operations, the work proposed here is intended to be a regular part of Hawaiian monk seal research and recovery activities. The recovery of Hawaiian monk seals requires us to conduct this work in the NWHI. The use of UAS will help us to be more successful in obtaining full population counts (particularly of hard-to-observe areas) during more visits to the NWHI in the future.

Related to traversing Mokumanamana, the difficulty of landing at Mokumanamana has hindered our ability to fully assess the monk seal population in recent years. The ability to traverse the island in 2019 allowed us to conduct two full reliable ground counts whereas in 4 of the previous 5 years, we could only land at one site and only obtained partial counts. Cultural practitioners from the Office of Hawaiian Affairs (OHA) were included in 2019 to help our scientists identify and avoid disturbance to areas of cultural sensitivity. There has been continued dialogue between NOAA and OHA since that initial visit, resulting in the development of a more detailed landing/access map, protocol and risk assessment. Gaining this complete data is essential to accurately tracking trends in the species and making informed management decisions.

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

The intent of all activities are to foster the recovery of the iconic and endangered Hawaiian monk seals. Many safeguards are in place to minimize the potential for negative impacts to the natural and cultural resources of the Monument (i.e. biosecurity measures). To date our recovery activities have had a significant benefit to the monk seal population and we expect this will continue into the future.

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

This is a conservation permit for Hawaiian monk seals and covers activities that might need to be undertaken year-round as necessary. The majority of the work, however, is targeted from May to September to overlap with the primary breeding season for the species.

Some activities will be much more limited in scope. For example, Nihoa and Mokumanamana are typically only visited during our two research cruises each year (for field camp deployment and pick up).

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

The NOAA Hawaiian Monk Seal Research Program has been undertaking monk seal conservation and research activities in the Northwestern Hawaiian Islands since the early 80's. We have a long history of successful operations in the area and demonstrated measurable positive impact for the population. All seasonal staff receive extensive training in research activities, boat operations and safety, Monument BMPs and biosecurity protocols before being deployed to the NWHI.

Staff involved in UAS operations will be trained UAS pilots with previous experience working in the monument and have all necessary training and experience necessary to pilot the specific UAS platform (APH-22 or Mavic Pro GE as appropriate). The HMSRP intends to use UAS as a future tool to aid in their research, monitoring and emergency response of monk seals. All pilots and partners associated with this project will have training and experience relevant to the role they will play on the team.

Staff landing on Nihoa and Mokumanamana, and staff traversing Mokumanamana will be led by a team member with experience on the island and will include a trained Resource Monitor.

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.

Funding from the US Federal Government.

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.

Everything we are proposing in this permit has been assessed and approved in previous permits, with the exception of the trail cameras at Pearl and Hermes Reef (more detail below in 14b). We work hard to adhere to all Monument BMPs and regulations that overlap with our activities. We operate in areas related to our work to minimize impacting any other resource unnecessarily and many of our activities provide benefits to other resources (i.e. debris removal, entrapment walks, etc.).

i. Has your vessel 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.

All other necessary permits and approvals have been acquired for this work and applicants have been in compliance with previous PMNM permits.

8. Procedures/Methods:

The following list of activities is intended to promote the recovery of the Endangered Hawaiian monk seal at any or all breeding sites in the NWHI. For more information about these activities please review attached document MMPA/ESA Permit 22677. Activities may include:

A) Conservation Research Activities

i. Population Monitoring.

- a. Conducting seal assessments by visually identifying animals, marking animals, flipper tagging, pit tagging and other techniques approved under MMPA/ESA permit 22677 will occur across the NWHI.
- b. Deploying field staff in camps for months at a time at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, and Kure Atoll. Our presence at Midway Atoll is uncertain at this time given safety and logistical considerations for COVID-19. Any short duration stays at Midway will be coordinated with USFWS.
- c. Instrumentation of seals for post release monitoring or understanding ecology and behavior of monk seals will include seal mounted cameras, telemetry tags or other technology approved under MMPA/ESA permit 22677.
- d. Use UAS (APH-22 hexacopter or Mavic Pro GE) to monitor Hawaiian monk seal populations (including counts, individual identification, body condition assessment), marine debris, and possibly other flora and fauna on or around islets in the monument.

The APH-22 has a pilot in command (PIC) and a ground station operator (GSO) visual observer (VO) and is launched from land or the GSO/VO's hand. The Mavic Pro Ge is a vertical take-off and landing UAS that can be launched from land or boat but does not necessitate the use of a ground station or GSO. Operation of the Mavic Pro GE will also involve a VO other than the PIC. Once any UAS is launched, the VO monitors the UAS flight and scans the sky to see if there is any air traffic or bird activity requiring the landing of the UAS. The UAS will fly for a maximum of 30 minutes and will remain at all times within the pilot's visual line of sight and less than 0.5-nm.

General Operation Guidelines will include:
Operation in daylight hours only.

Operation in winds less than 25kts.

Only NOAA Certified Pilots trained specifically for the APH-22 or the Mavic Pro GE will operate the system.

Pilots will minimize multiple takeoffs and landing in a single location if birds are present to minimize repeat disturbance to birds.

DJI Mavic Pro GE Specifications:

Body: Quadcopter with 4 foldable arms

Diagonal size (excluding propellers): 13.2” (335mm)

Weight (including battery and propellers): 1.62 lbs (734 g)

Max Flight Time: 27 minutes

Range, Physical: 8 miles (13km, no wind)

Range, Max Transmission: 4.3 mi (7km)

Payload: Integrated camera on gimbal

Max Speed: 40 mph (65 kph)

For Mokumanamana visits, we will follow all appropriate Mokumanamana and PMNM Best Practices, as well as adhere to these General Guidelines:

Only traverse Mokumanamana when full surveys cannot be completed by multiple boat landings or UAS activities.

A qualified and experienced Resource Monitor would be present.

Minimum number of personnel would go ashore and undertake the hike.

e. Deployment of acoustic recording devices to capture underwater vocalizations of Hawaiian monk seals.

Passive acoustic monitoring via SoundTraps is a non-invasive method for studying underwater sounds. This study will use two SoundTrap ST500 HF underwater acoustic recorders at two sites (French Frigate Shoals and Pearl and Hermes Reef) to record the underwater vocalizations of Hawaiian monk seals and seasonal trends in their typical aquatic soundscape. It is important for increasing our baseline knowledge of their communication system and for measuring the level of man-made noise they encounter. Assessing the impacts of man-made sound on monk seal communication can inform our conservation decisions, particularly the development of noise mitigation measures and population monitoring through passive acoustics.

Other monk seal directed research as needed and authorized by MMPA/ESA permit 22677. All projects will be captured as a memo to file to ensure PMNM MMB is informed of all monk seal conservation research activities.

B) Recovery Interventions

- i. Disentanglement of monk seals from marine debris;
- ii. Health response, including but not limited to cutting umbilical cords, lancing abscesses, administering antibiotics, vaccinating animals and responding to disease outbreaks, and necropsy;
- iii. Anthelmintic treatment (‘deworming’) by field staff, which may include monitoring to detect improvement in body condition of treated seals versus control seals. Anthelmintic medications may include various cestodocides and nematocides (e.g. praziquantel, fenbendazole, ivermectin, emodepside) applied via various routes (e.g. oral, injectable, topical);
- iv. Translocation, consisting of the following types:
 - a. Intra-atoll: These translocations will include moving seals from areas of high risk where threats are imminent to safer areas, and moving pups to promote maternal fostering when necessary. Field staff will perform these movements; greater resources (e.g. veterinarian care) will not typically be necessary.
 - b. Inter-atoll: These translocations will include transport of weaned female pups from atolls/islands of low survival to those of higher survival.
 - c. MHI – NWHI: These translocations will include transport of main Hawaiian Island (MHI) seals that are considered a threat to themselves or humans because they have demonstrated a pattern of interacting with humans.
 - d. NWHI-captive care: Seals may be taken into temporary captivity for treatment at appropriate, federally permitted rehabilitation facilities in the MHI for release back in the NWHI (i.e. permitted for captive care of injured, ill or prematurely weaned seals) (see below).
 - e. Aggressive male seal translocations to areas with no pups or juveniles (see below);
- v. Reunion of nursing mothers and pups, when separated (includes instances of pup switches);
- vi. Mitigation of male aggression towards pups and juveniles (individual and multiple male-based aggression), including utilizing all federally permitted techniques (including, but not limited to, poles, rocks, slingshots and air horns). Mitigation tools will be applied as appropriate for the given context (i.e. the intensity, severity and frequency of aggression and the location, with regard to other species in the area such as birds). Mitigation may include temporarily separating males from juveniles by placing either in

temporary shore-pens (see below). Mitigation also may include removal of the male(s) from the area by:

- a. Translocation to a location where no pups or juveniles will be harmed;
 - b. Placement in an appropriate, federally permitted facility that is agreeable and permitted to care for a male indefinitely; or
 - c. Lethal removal; this type of removal will only be applied when the above two options are not feasible, possible or exhausted. The preferred technique for euthanasia will be via physical means (e.g. firearm, captive bolt, etc.), in order for the carcass to remain in PMNM and for culturally appropriate and environmentally proper disposal to occur. When necessary, chemical euthanasia and removal of the carcass from PMNM will be allowed;
- vii. Rehabilitation and care of compromised seals to administer veterinary care and/or food supplementation. Captive care may include the capture and transport of seals to shore-pens (in the NWHI) or facilities in the MHI. We will aim to return NWHI seals under care in the MHI to the NWHI when a licensed veterinarian deems them rehabilitated and transport is feasible. The seals will then be released to the NWHI site deemed most appropriate for their subsequent survival (determined on the basis of such factors as the intensity and severity of imminent threats to the seals and recent survival trends at each atoll/island);
- viii. Monitoring shark activity at French Frigate Shoals. Monitoring may include camping on islets with shark incidents on nursing pups and recording shark activity and shark-seal interactions via hand-held or mounted cameras (cameras will be mounted on a pole 15' or less with no guy wires to be used only during the field season and attended daily by field staff);
- ix. Placement of temporary shore pens at selected NWHI breeding sites to facilitate monk seal recovery activities described here within (e.g. translocations, captive care, or male aggression mitigation); and
- x. Establishment of field staff residence at all monk seal breeding sites to perform the monk seal activities described here within.
- xi. Remove marine debris, trash, and other materials (land and ocean-based) that pose threats to Monument resources, including but not limited to derelict fishing gear and following established Monument BMPs.
- a. Disentanglement of threatened and endangered species by authorized personnel, monitoring of sites that have been cleared of debris for recovery rates and effects of removal;

b. Location and removal of debris. Of particular note: If any debris removal activities do occur at Pearl and Hermes Reef, we will abide by best practices for biocontrol and work with the State and partners to ensure compliance with those practices and ensure any harmful algal fragments are contained.

xii. Shark Predation Mitigation Activities:

a. Fishing personnel and location: A team of 3-5 staff experienced and trained in safe and effective methods for shark fishing/removal will be tasked with monitoring and removal of G. sharks that they encounter within 700m of shore of any FFS islet where predatory behavior is observed. As such, capturing sharks will only occur in what is considered the shallow lagoon inside the atoll in close proximity to islets with the highest rate of shark predation. Handlines and harpoon will be used in shallow water, from shore or close to shore or from a small boat; bottomsets and drumlines will be used in deeper water, over sandy substrate at distances farther from shore (up to 700m away). Ability to set the gear as far out as 700m from shore will help ensure that it performs as designed by Meyer in 2009. Shallow depth, coral and snags make setting the bottomset at closer distances a challenge.

b. Fishing Methods: Four different methods will serve as a “toolbox” of options to safely remove a maximum of 13 Galapagos sharks: handline, harpoon, bottomset, and drumline. Each method has its advantages and drawbacks. The potential for shark wariness to humans in combination with extremely low CPUE near pupping sites indicates that such a “toolbox” is needed to successfully capture sharks at the numbers and in the areas we desire.

Handlines and harpoons have the advantage of being very specific and have been successful in the past.

Bottomsets and drumlines are, by design, restricted by habitat characteristics due to the potential for lines to become tangled, etc. Thus, bottomsets and drumlines are not recommended to be effective in very shallow depths. Bathymetry and currents are islet-sector specific; therefore, the distance from shore to achieve a feasible depth (approx. 25 feet) and appropriate substrate (sandy bottom) is also islet-sector specific; a zone of 700m around each islet will provide for this.

No single method is guaranteed to be successful given the unpredictability and individualistic nature of sharks. However, together, all the methods provide the greatest chance of success. The order in which the different methods will be applied will be at the discretion of the team and will be highly dependent on a variety of environmental and biological factors. If we employ more than one method at a time, we still expect that the total number of removals will be low based on the low CPUE in the shallow lagoon.

We will monitor the total number of baited hooks deployed across methods in order to remain within the proposed catch quota of 13 additional sharks. We will use the same bait type (large tuna heads, shark remains and tissue from previously deceased seals) and hook type (circle hook, size 18/0 to 20/0) as previously approved. Fish and seal tissue bait will be brought from outside the Monument. There may not be the opportunity to collect tissue from a deceased seal at French Frigate Shoals. Seal tissue and shark tissue bait will also be collected within the Monument as available.

We will tend the gear to avoid bycatch mortality (non-target species will be dehooked and released). It is assumed that bycatch will be minimal and primarily shark species, based on Meyer's crew's experience in 2009 and our bycatch in 2010-2015. Fishing staff will avoid lethal removal of non-target sharks through their proper identification. The only shark species that is likely to be confused with the G. shark is the grey reef shark. However, in G. sharks, there is a very distinct ridge along the back between the first and second dorsal fins. Also, the maximum size of 20 grey reef sharks caught across the NWHI was 159 cm (total length) in a 2003 study and in 2011 at Trig and Gin by our staff (3 5-foot grey reefs were caught and released). So, based on the absence of the dorsal ridge and a threshold size requirement above 200cm for removal, we will ensure that we do not misidentify and cull a shark that is actually a grey reef.

For handlines, a line will be baited from shore or small boat. A hand-held harpoon will be used from shore or small boat when a shark is observed. A barbed shaft, on the end of the harpoon pole will be delivered by hand and the tip will be attached to wire cable and connecting line that will be used to retrieve the shark. For these methods, captured sharks will be hauled out on to the beach for euthanasia.

Bottomsets will be made to the specifications identical to those used in the Meyer's project permitted in the Monument to catch sharks in 2009. Meyer's bottomsets had 10 hooks; we propose to use this many or less on each set. The gear is designed for sandy substrate with no potential for snagging. Approximately 200- 350m long 1/2 inch polypropylene mainline with overhand loops at regular intervals (40-60m) for gangion (branch line with hook) attachment will be used. Each end of the mainline will have a buoy line consisting of 1/2-inch polypropylene with a cleat at the top and a Danforth anchor (9-12 lb) at the bottom. The buoy line length will be contingent on target set depth (45-75 feet depending on depth of deployment allowed). Gangions will consist of a stainless steel lobster trap clip (snaps onto mainline loops) with 2m of 1/2 inch polypropylene, a large swivel, 2m of 7/19 strand stainless steel aircraft cable (bite leader) to a 20/0 Mustad circle hook. Sets will be made from a small boat, and with short soak times of a maximum of 3 hours (in the daytime only).

The drumline will be of either of the following 2 designs. It may consist of a large

buoy, with a chain trace attached to it and single baited hook, shackled to the other end of the chain trace. A baited hook will be suspended approximately 10 feet above the sea floor. A groundline will be shackled to the drum with a swivel, attached to a Danforth or CQR anchor and anchored to the bottom substrate. A scope of 3-4 times the water depth will be used. Alternatively, it may consist of 20ft of 1/2 in. polypropylene substituting for a chain trace, connected to the same branchline type used for the bottomsets described above. The opposite end of this mainline will be shackled to a float-line buoy that serves as the ‘drum’. A chain will be run through this buoy with the other end shackled to an 8’ yellow marker line. The other end of the yellow line will then be shackled to a large red buoy with the connected float line (same used for bottomsets). The drumline set-up is a modification of what was used in 2010 so that the single baited hook rests on the bottom and does not suspend in the water column. This is preferred because we are targeting a species that spends most of its time on the bottom feeding on demersal fishes. With this design, the drum-buoy functions as a ‘bobber’ that will sink or move when an animal is hooked.

c. Post-catch procedures:

When a shark is hooked or harpooned it will be brought to shore or to the side of the small boat and tail-rope and euthanized with a .44 caliber bang stick. HMSRP has established bangstick training and safety protocols and conducts an annual Operational Risk Management (ORM) for shark fishing operations. ORM is a continual process which includes risk assessment, risk decision making, and implementation of risk controls, which results in acceptance, mitigation, or avoidance of risk. It is standard for HMSRP to conduct ORM and risk assessment for projects that may involve risks such as this shark predation mitigation work.

Refresher training on use of the bang stick prior to fishing activities will occur boat-side on inert material.

HMSRP will perform a necropsy on captured G. sharks on site, including gut content inspection, morphometric measurements, and identification of sex and reproductive state. Procedures will mirror those done on monk seals, using the same kits, modified as necessary based on instructions in the Elasmobranch Husbandry Manual (editors M. Smith, D. Warmolts, D. Toney & R. Hueter). The main focus of shark necropsies will be to determine pregnancy and gut contents, provide remains for Native Hawaiian cultural practices (if requested, they have not been for the last several permit cycles), and take samples for scientific analysis.

Samples of muscle, liver, vertebrae for fatty acid and isotope/ diet analysis will be removed from the carcass after the necropsy and stored frozen. Vertebrae samples will likely be sent to Woods Hole Oceanographic Institute to be processed by Greg Skomal’s lab for isotope analysis. Fatty acid profiles will likely be analyzed

for data on prey recently consumed, likely Sara Iverson’s laboratory at Dalhousie University. Stomach contents will be screened for monk seal remains and provided to shark ecologists upon request. Some remaining tissue will possibly be retained for bait.

Thereafter, shark remains will be handled as deemed appropriate by cultural advisors and the State of Hawaii Office of Hawaiian Affairs. In recent years, shark remains have been returned to the ocean outside of the fringing reef and that will continue unless directed otherwise by our OHA partners.

d. Reporting: The MMB will be notified by NMFS when a shark has been removed. This will be done as quickly as possible and should normally be within 24 hours. A report that summarizes data concerning the removal of each shark will be submitted to the Monument in compliance with the Monument reporting schedules.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding.

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: Hawaiian monk seal
Scientific Name: Neomonachus schauinslandi
& size of specimens: 1000 varied
Collection location: All Locations
Collection type: Non-lethal (living organism, or naturally deceased)
 Whole organism Partial organism

Common Name: Galapagos Shark
Scientific Name: Carcharinus galapagensis
& size of specimens: 13 varied
Collection location: French Frigate Shoals
Collection type: Lethal (living organism)
 Whole organism Partial organism

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

- In the case of living seals collected for rehabilitation, these seals will be released back in the NWHI upon completion of rehabilitation (and clearance by veterinary examination).

- In the case of samples collected from seals (either biological specimens such as blood or tissue samples from living animals, or necropsy samples from dead animals), these will either be sent to appropriate research / diagnostic collaborators or archived in appropriate storage facilities at the NOAA IRC in Honolulu.
- In the case of samples collected from sharks (necropsy samples from dead animals), these will either be sent to appropriate research / diagnostic collaborators or cultural practitioners.

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

‘Yes’ will only apply to live monk seals taken into rehabilitation outside of Monument waters and then released. Some seals will be held for a short time in shoreline pens while waiting for veterinarian assessment and possible pickup or to help them acclimate to the wild prior to release after translocation or rehabilitation.

• General site/location for collections:

All atolls and islets within the Monument.

• Is it an open or closed system? Open Closed

• Is there an outfall? Yes No

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

This relates to seals that are captured and brought in for rehabilitation or transported as part of the translocation program. They will be housed with other monk seals.

• Will organisms be released?

Monk seals will be released after rehabilitation or translocation.

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

Samples will be shipped out of the Monument in appropriate media and containers on board the NOAA research or charter vessels supporting our activities.

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

The Hawaiian Monk Seal Research Program is the primary entity conducting research and recovery work on monk seals in the Northwestern Hawaiian Islands. All samples collected are covered under our MMPA/ESA permit 22677 and then are distributed to our partners. A complete list of partners is included in the attached document MMPA/ESA Permit 22677. This eliminates the likelihood of duplicative sampling or research happening related to monk seals. We collaborate with a wide variety of programs to share samples and conduct our research. Requests can be made to the HMSRP for samples and with sufficient biological/recovery justification samples are often shared.

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

A complete list of gear and materials is included in the supplemental material.

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

A complete list of hazmat is included in the supplemental material.

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

Propose to Install

- a. Temporary Installation polyvinyl tents for housing monk seal field teams at French Frigate Shoals, Laysan, Lisianski, Pearl and Hermes Reef and Kure. One tent at each site will also have a radio antenna extending upwards <10ft.
- b. Trail Cameras at French Frigate Shoals (Tern Island) and newly for 2021, at Pearl and Hermes Reef (North and Little North Islands). Trail cameras are compact, self-contained systems that are programmed to take a certain number of pictures per day capturing the presence or absence of animals in specific locations. Sizes of trail camera systems including external solar panels will be no larger than 16" x 12" x 12". Weights of systems including solar panels will be no more than 5 lbs. These are used to monitor for threats to seals, specifically entrapment (Tern Island) and male aggression (PHR).

At Tern Island, cameras will be mounted directly onto the seawall. The specifications and protocols for this project were included in greater detail in our approved 2020 application and can be provided again upon request.

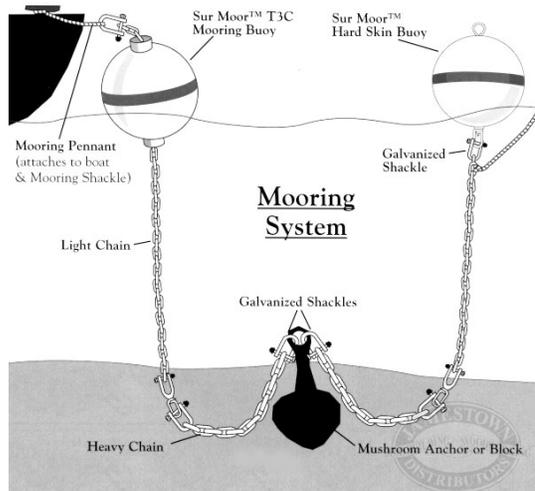
At Pearl and Hermes Reef, the cameras will be deployed staff from approximately June-August 2020 (during the field season) at North and Little North Islands to provide a more holistic understanding of adult male aggression because frequent direct observation is

impractical at this large atoll. Inclement weather at PHR often prevents boating for multiple days at a time, resulting in less observation time on North and Little North Islands. These cameras help to fill in gaps in survey coverage. Images will be reviewed weekly during the season to provide close to real-time information on male aggression to HMSRP leadership, which will help guide management and recovery decisions within the season, such as pup translocation. Additionally, the majority of pups at PHR are born at North and Little North, and the trail cameras may also provide incidental population assessment data on births and weaning events.

Cameras at PHR will be mounted via padded tripod or T-post, no more than 5' in height. Plastic or steel bird deterrent spikes will be added to the camera systems to deter birds from blocking the camera's view and excreting on solar panels. The cameras will be facing areas of previously observed or suspected male aggression, mainly near the southern portion of North Island, the northern portions of the North Island spits, and the northern portion of Little North Island. Weekly visits will be conducted, in which SD cards will be swapped out in the trail cameras to continue recording during the field season. Trail cameras and all associated equipment will be retrieved before field staff leave Pearl and Hermes Reef at the end of the season.

- c. Temporary (season-long) mooring systems to anchor two small boats at Southeast Island, Pearl and Hermes Reef and, in instances when the davit is unavailable, potentially at Tern Island, French Frigate Shoals. These systems are recommended over traditional anchoring for leaving boats unattended for long intervals, i.e. overnight, in high surge areas. etc. In many cases, a mooring system is the safest way to leave a boat in the water to prevent it from breaking free and coming ashore, which will cause damage to the boat and shoreline environment.

Permanent and/or semi-permanent moorings use less scope than traditional anchoring which reduces the "footprint" on the bottom, risk of damage to the environment and risk of wildlife entanglement/entrapment. Appropriate moorings are comprised of a suitable anchor, a light chain, and surface float. Additional line will be attached to an anchor onshore at Southeast Island and to the pier at Tern Island to ensure the vessels cannot float away if the mooring system were to fail in inclement weather. These mooring systems will be deployed on sandy substrate directly off the north side of Southeast Island and from the dock at Tern Island. The following image (credit to Jamestown Distribution) illustrates the type of system that would be temporarily installed if necessary.



- d. Recording Hawaiian monk seal underwater vocalizations using the SoundTrap ST500 HF

Study Objective

This study aims to record and describe the underwater vocal repertoire and seasonal trends in sound production for Hawaiian monk seals in the Northwestern Hawaiian Islands using two SoundTrap ST500 HF underwater acoustic recorders. One recorder would be deployed at each of two locations: French Frigate Shoals and Pearl and Hermes Reef. This study was proposed and approved in our 2020 permit application but has not yet been conducted due to COVID-19 impacts on the season. We propose to initiate this study in 2021 as opportunities allow.

Equipment

The recording units are Ocean Instruments SoundTrap ST500 HF (serial number to be determined). The full-scale response of this model is 173 dB re 1 μ Pa and the bandwidth is 20 Hz - 150 kHz \pm 3 dB. A SoundTrap user manual and specification sheet are attached to this protocol.



Software

SoundTrap Host software will be used to configure the instrument before and after each deployment. This software can be downloaded from the Ocean Instruments website (<http://www.oceaninstruments.co.nz/downloads/>). The first time the SoundTrap and then the device will be visible in the SoundTrap Host software. It will be listed as “SoundTrap serial number TBD” or “SoundTrap device is connected to the computer (via USB), drivers will be installed serial number TBD” depending upon the unit you have.

Data Storage – To be determined

Environment

Both SoundTraps should be deployed at 5-10 m depth in sandy substrates as close to land as possible. GPS locations for the SoundTraps must be taken immediately after deployment, and again when the units are “checked” to verify they have not drifted.

Duration of Deployment

Units would be deployed during the first month of the field team’s arrival. Units will remain in the water for the duration of the field camp and be retrieved prior to departing the camp.

Maintenance

Units will be checked regularly during the first week of deployment. If no issues are encountered (i.e., unit not drifting and still intact) within the first week, units will be checked once a week for the remainder of the camp duration. “Checked” means seeing the unit from the boat. GPS locations for the SoundTraps must be taken when the units are “checked” to verify they have not drifted.

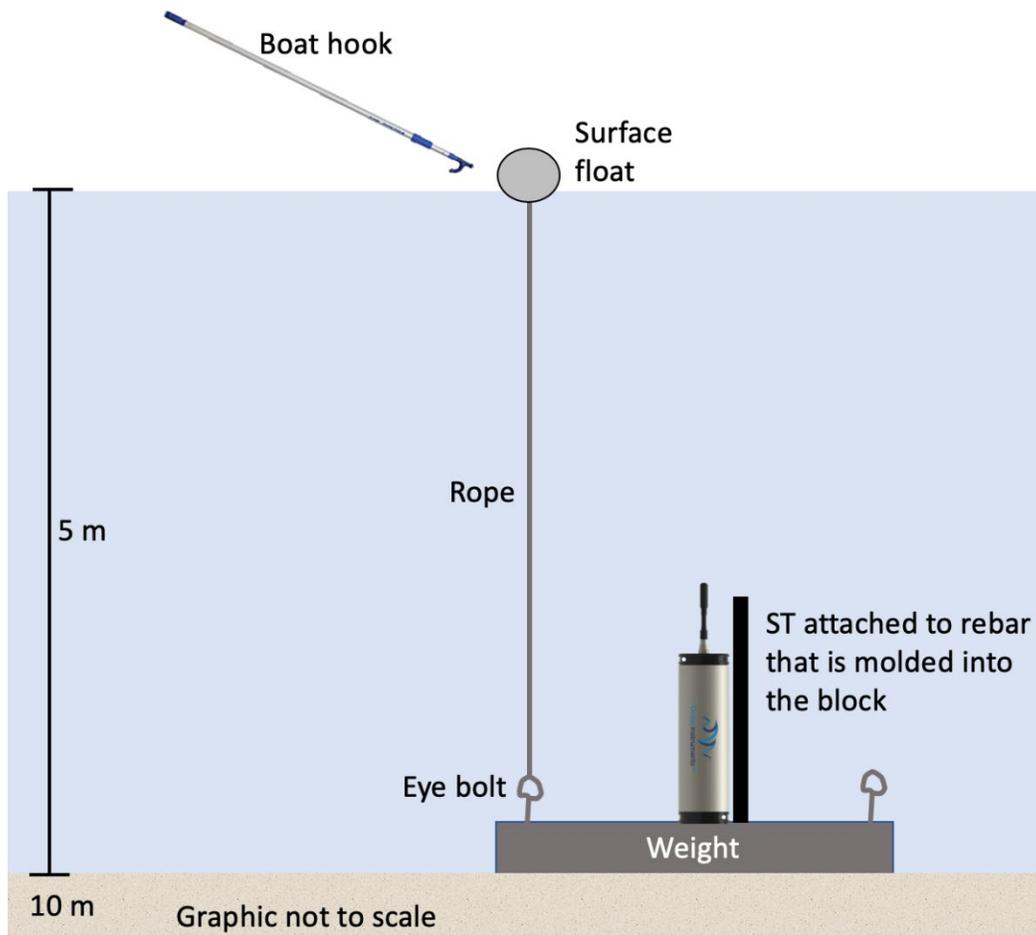
Equipment Configuration

Single anchored line with surface or sub-surface float (10 m total depth). The SoundTrap will be attached to a rebar stand molded into a concrete block (weight) with the

hydrophone facing the surface. The rope with the float will be tied to an eyebolt molded into the concrete block. Another eye bolt at the opposite side of the concrete block can be used for lowering the unit during deployment. Two grooves at the top and bottom of the SoundTrap housing provide attachment points for cable ties. The cable ties should be threaded through the associated holes so they cannot slip off. To minimize any possible entanglement risk of the rope, supportive padding material may be attached to it.

Deployment: Unit will be lowered down by rope threaded through the eyebolt. Once the unit is stationary, one side of the rope can be dropped into the water while the other side is pulled up through the eyebolt.

Retrieval: Grapppler anchor or boat hook catches buoy and unit is pulled upward towards vessel.



Propose to Maintain / Repair

a. Tern Island Entrapment Camera Project

In 2020, we initiated a pilot project to deploy rugged trail cameras on Tern Island, French Frigate Shoals in order to monitor wildlife entrapments. The camera systems were deployed in fall 2020 and we have not yet returned to the island to retrieve the data. In 2021, we aim to retrieve the camera cards and maintain/repair the camera systems as needed.

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

Population assessment data analyzed within 5 months.

Telemetry and UAS data analyzed within 12 months.

16. List all Applicant’s publications directly related to the proposed project:

More publications can be provided if necessary.

Brownell Jr. 2020. U.S. Pacific Marine Mammal Stock Assessments: 2019, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-629.

Population Summary for Hawaiian Monk Seals in 2019. PIFSC Internal Report IR-20-001; Issued 27 February 2020.

Baker JD, Harting AL, Johanos TC, London JM, Barbieri MM, Littnan CL. 2020. Terrestrial habitat loss and the long-term viability of the French Frigate Shoals Hawaiian monk seal subpopulation. U.S. Dept. of Commerce, NOAA Technical Memorandum NOAA-TM-NMFS-PIFSC-107, 34 p. doi:10.25923/76vx-ve75

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Robinson SJ, Barbieri MM, Murphy S, Baker JD, Harting AL, Craft ME, Littnan CL. Model recommendations meet management reality: implementation and evaluation of a network-informed vaccination effort for endangered Hawaiian monk seals. *Proceedings of the Royal Society B: Biological Sciences*. [2018] Jan 10;285(1870):20171899.

Kaufman AC, Robinson SJ, Borjesson DL, Barbieri M, Littnan CL. Establishing hematology and serum chemistry reference intervals for wild Hawaiian monk seals (*Neomonachus schauinslandi*). [2018] *Journal of zoo and wildlife medicine*. Dec;49(4):1036-40.

Comparative application of trophic ecosystem models to evaluate drivers of endangered Hawaiian monk seal populations

Weijerman M, Robinson S, Parrish F, Polovina J, Littnan C

[2017] Marine Ecology Progress Series. 582:215-229. doi:10.3354/meps12320

Estimating population size for Hawaiian monk seals using haulout data

Harting A, Baker JD, Johanos TC

[2017] Journal of Wildlife Management. 81:1202-1209. doi:10.1002/jwmg.21303.

Modeling a morbillivirus outbreak in Hawaiian monk seals to aid in the design of mitigation programs

Baker JD, Harting AL, Barbieri MM, Robinson SJ, Gulland FMD, Littnan CL

[2017] Journal of Wildlife Diseases. doi:10.7589/2016-10-238

2016 report on Hawaiian monk seal vaccination program

Pacific Islands Fisheries Science Center

[2017] Pacific Islands Fisheries Science Center, PIFSC Data Report, DR-17-010, 12 p.

doi:10.7289/V5/DR-PIFSC-17-010

Integrating multiple technologies to understand the foraging behaviour of Hawaiian monk seals

Wilson K, Littnan C, Halpin P, Read A

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Estimating Hawaiian monk seal range-wide abundance and associated uncertainty

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[2016] Endangered Species Research. 31:317-324. doi:10.3354/esr00782

Protozoal-related mortalities in endangered Hawaiian monk seals *Neomonachus schauinslandi*

Barbieri MM, Kashinsky L, Rotstein DS, Colegrove KM, Haman KH, Magargal SL, Sweeny AR, Kaufman AC, Grigg ME, Littnan CL

[2016] Diseases of Aquatic Organisms. 121(2):85-95. doi:10.3354/dao03047

Prevalence of interactions between Hawaiian monk seals (*Neomonachus schauinslandi*) and nearshore fisheries in the main Hawaiian Islands.

Gobush KS, Wurth TA, Henderson JR, Becker BL, Littnan CL

[2016] Pacific Conservation Biology. doi:10.1071/PC15029

Estimating contact rates of Hawaiian monk seals (*Neomonachus schauinslandi*) using social network analysis

Baker JD, Harting AL, Barbieri MM, Johanos TC, Robinson SJ, Littnan CL

[2016] Journal of Wildlife Diseases 52(3):533-543. doi:10.7589/2015-10-286

Testing marine conservation applications of unmanned aerial systems (UAS) in a remote marine protected area.

Brooke S, Graham D, Jacobs T, Littnan C, Manuel M, O'Conner R

[2015] Journal of Unmanned Vehicle Systems, 3(4): 237-251, 10.1139/juvs-2015-0011

Range-wide patterns in Hawaiian monk seal movements among islands and atolls

Johanos TC, Harting AL, Wurth TL, Baker JD
[2015] U.S. Dept. of Commerce, NOAA Technical Memorandum

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Benefits derived from opportunistic survival-enhancing interventions for the Hawaiian monk seal: the silver BB paradigm
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Gobush KS, Booth RK, Wasser SK
[2014] General and Comparative Endocrinology 195: 174-182. doi:10.1016/j.ygcen.2013.10.020

A two-stage translocation strategy for improving juvenile survival of Hawaiian monk seals
Baker JD, Harting AL, Littnan CL
[2013] Endangered Species Research 21: 33-44. doi:10.3354/esr00506

Dietary comparison of two Hawaiian monk seal populations: the role of diet as a driver of divergent population trends
Cahoon MK, Littnan CL, Longenecker K, Carpenter JR
[2013] Endangered Species Research 20: 137-146. doi:10.3354/esr00491

Body growth in Hawaiian monk seals
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U.S. Pacific marine mammal stock assessments: 2012
Carretta JV, Oleson E, Weller DW, Lang AR, Forney KA, Baker J, Hanson B, Martien K, Muto MM, Lowry MS, Barlow J, Lynch D, Carswell L, Brownell Jr. RL, Mattila DK, Hill MC
[2013] U.S. Dept. of Commerce, NOAA Technical Memorandum

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Bottein M-Y D, Kashinsky L, Wang Z, Littnan C, Ramsdell JS

[2011] Environmental Science and Technology 45(12): 5403-5409. doi:10.1021/es2002887

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Baker JD, Howell EA, Polovina JJ

[2012] Marine Ecology Progress Series 469: 175-189. doi:10.3354/meps09987

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Gobush KS, Farry SC

[2012] Aquatic Conservation: Marine and Freshwater Ecosystems 22: 751-761.

Persistent organic pollutants in the endangered Hawaiian monk seal (*Monachus schauinslandi*) from the main Hawaiian Islands

Lopez J, Boyd D, Ylitalo GM, Littnan C, Pearce R

[2012] Marine Pollution Bulletin. doi:10.1016/j.marpolbul.2012.07.012

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Hawaiian monk seals

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The Hawaiian monk seal in the Northwestern Hawaiian Islands, 2004

Johanos TC, Baker JD (comps. and eds.)

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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.

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