

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:

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: FRANK PARRISH, PHD AND ALECIA VAN ATTA

Affiliation: NOAA-NMFS-PIFSC/PIRO

Permit Category: Conservation and Management

Proposed Activity Dates: May 1, 2010- September 30, 2010

Proposed Method of Entry (Vessel/Plane): NOAA vessel- Oscar Elton Sette

Proposed Locations: French Frigate Shoals

Estimated number of individuals (including Applicant) to be covered under this permit: 10

Estimated number of days in the Monument: 150 days

Description of proposed activities: (complete these sentences):

a.) The proposed activity would... include monitoring of shark activity at select pupping sites and the removal of predatory sharks from these areas. The proposed activity would support the recovery of the Papahānaumokuākea Marine National Monument's endangered Hawaiian monk seals by reducing the likelihood of shark predation on seal pups at French Frigate Shoals. This activity, when combined with other conservation efforts, would help address the problem of low juvenile seal survival, a factor identified as one of the main causes of Hawaiian monk seal population decline in the Monument.

b.) To accomplish this activity we would monitor shark presence around pupping sites by observation from the ground, an observation tower, remote camera and/or patrolling near shore waters from a small boat (remote camera installation is permitted separately). Sharks observed in predatory behavior would then be caught by the following methods approved for use this applicant at this location in the past (between 2000 and 2007): 1) hand line, 2) hand-held harpoon, 3) drum-line, and/or 4) small 5-hook bottomset that was used by C. Meyer at FFS in 2009. A fifth and new method to be used is the "Net Surprise". For all methods, hooked sharks will be pulled into shore or along side a small boat, tail-roped and killed with a bang stick. Shark carcasses will be examined and desired remains retained to fulfill Native Hawaiian practices and to conduct scientific analyses;

thereafter, remains will be retained for bait or disposed of at deepwater locations outside of the atoll.

c.) This activity would help the Monument by ... conducting activities identified in the Papahānaumokuākea Marine National Monument Management Plan (December 2008, hereinafter referred to as MMP) Priority Management Needs: 3.2 Conserving Wildlife (Hawaiian monk seals), and 3.3 Reducing Threats (predation) 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.

The Co-Trustees, including NOAA, aim to accomplish natural resource protection 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 (MMP page 11). The activity of removing Monument wildlife (aggressive male monk seals) that threatens a Monument natural resource (monk seal pups) is listed in that permit application. However the activity of removing sharks is not, thus, the origination of this permit application.

In this application, we propose to monitor shark activity and remove sharks as a means of managing the threat of shark predation and thereby protecting Hawaiian monk seal pups and increasing the chances these pups will grow to adults and reproduce. Increased survival of pups is necessary for the species' recovery. Monitoring shark activity and removing sharks are both listed in the Hawaiian Monk Seal Recovery Plan (NMFS 2007) as necessary activities, critical to the species' recovery.

Other information or background:

A comprehensive 100-page Technical Memorandum titled "Shark Predation on Hawaiian Monk Seals II" details the lengthy history of shark predation of monk seal pups at French Frigate Shoals, predation mitigation and research activities undertaken to date, as well as a summary of the proceedings of a workshop conducted in November 2008 with various stakeholders (including the Monument, USFWS, State of Hawaii DLNR and leading shark experts) (Gobush in review). This memorandum serves as a reference of the information, background and best-available science to date on the issue; this report is meant to accompany this permit application. In an effort to avoid an overly lengthy Conservation & Management application here, the Executive Summary of the memorandum is included below. A summary of the 2009 field season's preliminary findings follows.

EXECUTIVE SUMMARY

The technical memorandum is divided into three sections. Section 1 summarizes the proceedings of the second workshop on Shark Predation on Hawaiian Monk Seals sponsored by the Hawaiian Monk Seal Research Program (HMSRP) of the Pacific Island Fisheries Science Center (PIFSC) and also the Pacific Islands Regional Office (PIRO) of the National Marine Fisheries Service

(NMFS). Section 2 reviews knowledge to date about shark predation on pre-weaned and newly weaned monk seals pups (*Monachus schauinslandi*) and NMFS' mitigation attempts at French Frigate Shoals (FFS) and elsewhere in the Northwestern Hawaiian Islands (NWHI), and provides a more comprehensive picture of the issues than time-permitted at the workshop. Section 3 summarizes HMSRP's premises about the nature of shark predation based on peer-reviewed science, inferences, expert opinions and field experience. HMSRP's positions on controversial aspects of the issue are stated and a number of appendices are included that detail plans to be executed in 2009 and mitigation ideas for the future.

Workshop II

Workshop II was held on November 5-6, 2008 in Honolulu, Hawaii. Representatives from the NMFS-PIFSC, NMFS-PIRO, Papahānaumokuākea Marine National Monument (the Monument), US Fish and Wildlife Service (USFWS), State of Hawaii Department Land and Natural Resources (DLNR), Marine Mammal Commission (MMC), and Hawaiian Monk Seal Recovery Team participated. The primary goal of this workshop was to exchange ideas and opinions from different management and scientific perspectives about the predation problem and suggest a logical course of action. Presentations describing the endangered status of the Hawaiian monk seal, the shark predation problem at FFS, and the first workshop on the issue set the stage for the second workshop's discussions. Hawaiian Institute of Marine Biology (HIMB) scientists reviewed past shark research in FFS, reported the results of their 2008 research efforts, and presented their research plan for 2009 aimed at gathering fine-scale movement data on sharks. HMSRP described 2008 mitigations activities and mitigation strategies for the future. The 2008 mitigation strategy focused solely on the application of a suite of deterrents and devices around Trig Island and translocation of weaned pups to "safe" islets, although lethal removal of select sharks had also received support at the Workshop I.

Outcomes of Workshop II included an evaluation of past research efforts, development of definitive statements about the predation problem agreed upon by all workshop participants, identification of knowledge gaps, and a prioritized list of suggested actions for upcoming field seasons. Workshop participants encouraged improved deterrent design, improved and informed removal of sharks displaying predatory behavior, and a need for analyses on past data and the collection of additional data on seal and shark behavior. Ideas, such as the use of barriers to keep sharks away from near shore areas and sonic tagging pups, were discussed and their development recommended.

Knowledge to Date About the Shark Predation at FFS and its Mitigation

The genus *Monachus* is in crisis; with just two extant representative species, the Hawaiian monk seal offers the best chance of its persistence. However the Hawaiian monk seal population itself is heading towards extinction. Numerous threats afflict the species across its range. Shark predation on pre-weaned and newly weaned pups contributes to a unique and extreme situation at FFS that peaked in 1997-1999 and stands out from the trends observed at other sites in the NWHI. Since then, predation has declined to 6-11 pups a year, an unsustainable rate due to falling birth rates. Galapagos sharks (*Carcharhinus galapagensis*) and tiger sharks (*Galeocerdo*

cuvier) both potentially feed on marine mammals; however, HMSRP has only observed Galapagos sharks attacking and killing pups in near shore water. Mitigation activities by HMSRP conducted over the last decade include harassment of sharks, intensive observation, translocation of weaned pups, deployment of devices to deter predation and shark removal (see 2009 findings at the end of this Executive Summary below).

HMSRP Premises, Positions and Post-workshop Developments

HMSRP has developed premises about the identity and number of sharks likely involved, shark wariness to human activity, and opinions about shark culling based on peer-reviewed science, inference, expert opinion and ample experience with the situation at FFS. Post-workshop, HMSRP systematically compared all mitigation actions proposed, detailing the potential benefits and drawbacks based on its premises, positions, Workshop recommendations and stakeholders' perspectives. A 2009 field plan was created that included: 1) logistical and financial support for HIMB shark scientists to conduct shark tagging studies at FFS, 2) the systematic application and comparison of 3 treatments (human presence, deterrents and a control) at 2 pupping sites, 3) the design and installation of a custom-made remote surveillance camera system on 1 pupping site, and 4) additional behavioral monitoring of sharks and seals.

Summary of 2009 Findings

In 2009, 34 monk seal pups were born, 20 weaned and 8 were lost to shark predation at FFS (NMFS, unpublished data). On Trig islet, Galapagos shark predatory activity was observed on 13 occasions during 28 camping days; additional attacks were recorded via remote camera (this video is currently being viewed and observations recorded). Shark predatory activity at Trig resulted in 6 incidents: 5 confirmed attacks on 5 pups (as evidenced by direct observation and presence of 1-6 shark-inflicted wounds on each pup), and 1 shark-induced mortality of a pup (i.e. the otherwise healthy pup's suspicious disappearance met our conservative criteria for shark-inferred mortality, see Appendix C of Technical Memorandum).

The incidence of shark predation was compared across three experimental treatments capitalizing on an apparent wariness of sharks experienced in the past. Treatments included 24-hour human presence, visual and auditory devices aimed to deter shark activity, and a control (no humans, no deterrents) at two pupping sites. Through the systematic application of these treatments, no significant difference in shark incidents existed across treatments (Trig only- Pearson's Chi square 3.5, $p=0.17$, 94 days; Trig & Gin- Pearson's Chi square 2.5, $p=0.28$, 140 days). The pattern of shark incidents appeared to be independent of device/deterrent placement at Trig. For example, a 36-day period with no shark incidents occurred in 2008 with the maximal deterrent effort and a 41-day period with no shark incidents occurred in 2009 with alternating deterrent effort. The number of pups attacked at Trig Island differed little when compared over the 3 years. In 2007, a year with no devices, 5 (27.8%) pups were attacked. In 2008, a year with devices for most of the season (until they failed to operate), 4 (25%) pups were attacked. In 2009, a year with devices for part of season (i.e. devices were deployed during the 'device treatment', totaling 28 days), 6 (31.3%) pups were attacked. Sharks were sighted on 10 of 35 days during the human presence treatment at Trig and Gin islets, demonstrating that sharks'

wariness to humans is variable, unpredictable, possibly individualistic and unreliable at these locations. The hypothesis that a lower percentage of pups born will succumb to shark predation when devices/deterrents are deployed compared to previous years was not supported. The hypothesis that fewer shark incidents will occur when humans are present or devices are deployed versus control periods was also not supported.

A pup behavioral study was conducted in 2009; 132 hours of scan sampling observations (on a 15-minute interval, totaling 528 scans) were recorded, primarily of mother-pup nocturnal activity (between 1800 to 1000 hours). A preliminary review of the data indicates that 14% of the time (75 occasions/scans), pups were in the water; 84% of these water entries were into the wavewash, the area where the water laps the shore. While in the water (wavewash or farther), pups were with their mothers 100% of the time and on 97.3% of those occasions/scans they were within 1 meter of her (for 2.7% of the occasions/scans they were within 2 meters of her). The maximum distance a seal pup ventured into the water was 50 meters from shore at Gin (1 occasion/scan) and 20 meters from shore at Trig (3 occasions/scans). These findings support the idea that seal pups enter the water infrequently at night and primarily do so to thermoregulate in the company of their mothers rather than to swim far into the ocean alone.

HMSRP logistically and financially supported a Galapagos and tiger shark tagging study conducted by Carl Meyer, PhD. of HIMB. Across the pupping season (May-August), 189 5 to 10-hook bottomsets were made, totaling 1570 hooks and 6850 soak hours. These bottomsets used large tuna heads and shark tissue as bait. Bycatch was minimal and limited to elasmobranch species. In total 68 Galapagos and 40 tiger sharks were tagged with sonic tags; additional individuals were tagged with spaghetti tags. Four Galapagos sharks were tagged near islets with monk seal pups (5.9% of the sampled population captured in a stratified fishing skeme that attempted to evenly fish across shallow and deep lagoonal areas and deep areas outside the breaking reef at FFS). HMSRP's human observations and video recordings and Meyer's tagging success support the hypothesis that a small subset of Galapagos sharks is primarily responsible for the predation of pups.

This tagging research represents the greatest effort in terms of time devoted to and catch success of sampling the shark population FFS to date (aside from commercial fishing in 1999). None of these tagged Galapagos sharks were present at Trig island during the video recordings of Galapagos shark attacks on pups or during the night the one pup disappeared that was inferred to be shark-caused at this location in 2009. Together these findings suggest that 1) using a small bottomset is a very effective way of capturing sharks and avoiding bycatch; 2) very few sharks utilize the shallow waters around the pupping sites; 3) catching sharks that are likely to prey on pups requires nearshore fishing (i.e. setting gear closer to the islets than what Carl Meyer's crew accomplished). However, it should be noted that a minimum depth and sandy substrate conditions are required to employ the 5-10 bottomset fishing method.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Parrish, Frank and Alecia Van Atta

Title: Chief (acting) of Protected Species Division, Pacific Islands Fisheries Science Center, NMFS, NOAA and Assistant Regional Administrator for Protected Resources, Pacific Islands Regional Office, NMFS, NOAA

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

TBD - We are currently working on our field teams but will not know specific participants until closer to the field season. This information will be provided to the Monument as soon as we have set the teams.

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

NOAA-Hawaiian Monk Seal Research Program

[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):

NOAA-NMFS-PIFSC-PSD and NOAA-NMFS-PIRO-PRD

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):

Charles Littnan, PhD, HMSRP Director; [REDACTED]

Kathleen Gobush, PhD, Research Ecologist; [REDACTED]

Jeff Walters, Monk Seal Recovery Coordinator; [REDACTED]

Shawn Farry, PIFSC Contractor; [REDACTED]

Mark Sullivan, PIFSC Contractor; [REDACTED]

TBA

Section B: Project Information

5a. Project location(s):

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

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

Location Description:

Vicinity of Trig and Gin Islands and/or other islets within FFS where monk seal pups are nursing and predatory shark activity is detected.

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:*

The purpose of the proposed activity is to support the recovery of the Monument's endangered Hawaiian monk seals by reducing the likelihood of shark predation on seal pups at French Frigate Shoals. This activity, when combined with other conservation efforts, would help address the problem of low juvenile seal survival, a factor identified as one of the main causes of Hawaiian monk seal population decline in the Monument.

To achieve the purpose stated above, we propose to monitor shark activity via human and/or remote camera observation at Trig, Gin, Little Gin and Round islets when Hawaiian monk seal pups are present to determine when predatory activity commences and what species of sharks are involved (remote camera installation is permitted separately).

We also propose to remove sharks observed to be pursuing, injuring or killing pups or are observed to be patrolling within 400m of the shoreline of Trig, Gin, Little Gin and Round islets when pups are present. The purpose of these actions is to mitigate predation of Hawaiian monk seal pups. These actions are recommended in the species' Recovery Plan to mitigate predation and are deemed necessary for the recovery of the FFS monk seal subpopulation (NMFS 2007).

A range of methods will be used to capture these sharks since sharks are known to be unpredictable, individualistic predators that are often difficult to catch. A 400-meter distance from shore will give staff a margin that includes some water depth and the ability to replicate Meyer's methods and success. Meyer's methods require setting gear over a sandy bottom. Our analysis of substrate maps and areal photos of the area indicates that this ideal sandy bottom type is located within the requested 400m distance. As discussed in the "Other Information or Background" section above, Meyer's methods are expected to be much more effective in capturing the target shark species compared to previous attempts made in 2000-2007. Based on consultations with Dr. Meyer and other shark experts at our recent workshops regarding the issue, we believe our relatively poor effectiveness in capturing sharks in the past was primarily a function of the limited fishing methods we employed and a function of shark wariness.

Captured sharks will be humanely killed with a bang stick. All proposed methods (except for the "Net Surprise") have been approved for use at FFS in the past. The NMFS monk seal team is highly supportive of a Native Hawaiian cultural practitioner being present to oversee and/or participate in these actions as deemed desirable and appropriate by the Office of Hawaiian Affairs and logistically feasible.

The actual fishing distance from shore can be adjusted based on the Monument's recommendations but should not be confined to the maximum seal pup distance from shore (~20 meters at Trig and ~40 meters at Gin) because safe, effective, repeatable fishing is difficult to achieve here due to shallow water depth and the possibility that handheld lines may incite or increase shark wariness. In past efforts, handheld lines and harpoons alone were not very successful. Having a range of fishing options, that includes these very nearshore methods as well as slightly deeper water methods proven to be successful (i.e. 5-10 hook bottomsets) increases the chances that this shark culling program reaches its conservation and management

objective to reduce the threat of predation. Killing 1-2 sharks for the season, the maximum that was accomplished using handlines and harpoons from shore in 2000, 2002, 2003 and 2005, is not likely to reduce the threat of predation as made apparent from that past effort. For this reason, we propose to use a range of fishing methods at a range of depths and to cull up to 20 sharks. A distance too far from shore (> 400m) or a high number of sharks (>20 individuals) is not consistent with the data summarized earlier in this permit application.

We aim to limit shark removals to Galapagos sharks (*Carcharhinus galapagensis*); this is based on HMSRP's observations over the last 10 years. This is the only shark species HMSRP has positively identified pursuing, injuring or killing pups from 1997 to present (prior to this time period, such observations were not recorded because predation levels were exceedingly low). However, USFWS recommended that removals not be limited to species but limited by behavior (i.e. any shark in active predation) in their memorandum dated April 17, 2009.

We aim to remove a maximum of 20 sharks between May 1 and September 30, 2010. Removals will not commence until shark activity (patrolling, pursuing, injuring or killing pups) near pupping sites (within 400m of shore at Trig, Gin, Little Gin or Round islet) has been observed (via human or remote camera observation). Translocation of pups to Tern Island will be attempted upon weaning as a part of a separate research permit.

HMSRP will perform a necropsy on culled sharks, including gut content inspection, morphometric measurements, and identification of sex and reproductive state. The deceased shark remains will be retained for Native Hawaiian cultural uses or practices as deemed desirable and appropriate by the Office of Hawaiian Affairs and as allowed under applicable Monument regulations. These desired remains will be removed from the carcass after the necropsy and stored frozen. Thereafter, any remains will be retained for shark ecologists (e.g. Carl Meyer, PhD, Jenny Schultz, PhD, R. Dean Grubbs, PhD, Greg Skomal, PhD) for scientific analyses (e.g. gut content and tissue analysis, vertebrae isotope analysis, fatty acid analysis, genetic analysis of the shark itself and its gut contents). Remains applicable to these tests will be removed from the carcass after the necropsy and stored frozen. Any remaining shark tissue will be disposed at multiple deepwater locations outside of the atoll or stored frozen and used for bait for future removal attempts that season.

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?

The activity can be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument. To safeguard the cultural

resources, we propose to include a Native Hawaiian practitioner to observe and/or participate in the shark removals, as well as retain remains of shark carcasses for the Native Hawaiian community as they deem desirable. We are also open to adjusting the details of the fishing procedure to fulfill Native Hawaiian wishes. We consulted with an Office of Hawaiian Affairs representative in April 2009 to continue a dialogue on predation mitigation; general perspectives and opinions were shared but detailed suggestions or instructions about procedures were not offered. The Office of Hawaiian Affairs supported our application that was subsequently withdrawn. For our current application, the Office of Hawaiian Affairs Monument Management representative suggested that we present our preliminary plans at a Native Hawaiian Cultural Working Group meeting to receive feedback; we plan to schedule a meeting with the submission of this permit application, likely to be in December 2009. In addition, all field staff will attend a Hawaiian Cultural Briefing and offered cultural literature provided by OHA before commencing activities proposed in this application. It should also be noted that in previous permit applications Dr. Bud Antonelis engaged several key members of the Native Hawaiian Community throughout the main Hawaiian Islands to explain the conservation crisis and receive valuable input and opinion on the proposed activities. We are dedicated to continuing this dialogue.

The overall objective of this Conservation & Management permit application is to fulfill needs of the Monument: to conserve wildlife (Hawaiian monk seals) and to reduce threats (shark predation) to Monument resources (Hawaiian monk seals). To further safeguard natural resources, we propose to limit the scope of our removal actions to 20 sharks observed to be patrolling, pursuing, injuring or killing pups within 400m of Trig, Gin, Little Gin and Round islets during the main pupping season only (May 1-September 30, 2010). We would like to limit the species culled to Galapagos sharks, but would respect the wishes of USFWS on the matter. With respect to Galapagos sharks, the removal of 20 individuals from the FFS represents a small percentage of the atoll's population (actual percentage depends on which abundance estimate is used).

Carl Meyer has offered to supply a "crude" abundance estimate before the next pupping season (2010) based on his recent research at FFS (2009); this figure is not yet available. The number of sharks culled is open for adjustment based on this figure, when it is supplied, but we would not expect to increase the total number removed.

Historic resources under the NHPA would not be affected or potentially affected by our proposed actions.

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; NMFS, in preparation). Results from that work indicated that the removal of 20 sharks had a nearly imperceptible effect on the dynamics of the FFS ecosystem. Expert opinion at our shark predation workshops supported these modeled results (NMFS, in preparation). With respect to bycatch, Carl Meyer was able to avoid bycatch by using large tuna head and shark tissue, large hooks (Mustad 18-20), short soak times (1-3 hours) and frequent monitoring of lines in his 2009 research in which over 100 sharks were captured (C. Meyer, unpublished data). We assume that if we use the same type of bait, hooks and also the same monitoring frequency for the bottomset and drumline methods, we will have similar bycatch rates. Bycatch should not be an issue with handlines or harpoons because bait will be pulled as nontarget species show interest in the bait.

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? Shark monitoring and removals will be conducted in a manner compatible with the management direction of this proclamation. As stated previously, the objective of these activities is to conserve wildlife and reduce a threat to a Monument natural resource

(Monument management needs 3.2. and 3.3). Also, these activities would facilitate the Monument's mandate to maintain biodiversity.

The extinction of the Hawaiian monk seal at FFS would adversely effect the Monument's biodiversity and trophic structuring at this location. A failure to mitigate the significant threat of shark predation may advance the potential for extinction and prevent recovery. Other methods executed in an attempt to reduce this threat have failed; it is believed that the activities proposed here will reduce the threat.

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.

In terms of alternative locations, there are no practicable alternatives to conducting shark removals in the Monument. This proposed activity can only occur within the Monument because we seek to mitigate this specific source of mortality for this specific subpopulation of monk seals in order to facilitate its population growth and recovery. Losing a high number of pre-weaned and newly weaned pups to Galapagos shark predation is a unique phenomenon at French Frigate Shoals only; therefore, we propose to manage this threat at this location only.

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 potential positive outcomes from enhanced monk seal recovery outweigh the adverse impacts associated with the loss of up to 20 Galapagos sharks because we believe that these actions will ensure the co-existence atoll-wide of the 2 species into the future.

If predation is not mitigated, the monk seal population may decline to a level that is unable to overcome demographic stochastic forces. If 20 Galapagos sharks are culled, a higher number of pups is expected to survive to be candidates for translocation and/or survive on their own to adulthood than would be the case if predation was not mitigated.

Increasing the number of juvenile seals reaching adulthood augments the population numbers in the short-term and if they are female, its reproductive potential in the long-term. At least 198 pups have been maimed and/or have died in their first months of life due to shark predation since the initial upsurge in FFS shark predation (starting in 1997). This is a minimum estimate based on highly conservative criteria established by HMSRP to determine cause of death (see Appendix C of the Technical memorandum). To give some context, the number of unique seals identified at FFS this year (2009) is estimated at 198 individuals and the total number of pups born in the NWHI this year is estimated at 118 individuals. If over the last decade, these 198 FFS pups had successfully weaned, a percentage would have likely been later killed by sharks, starved or become entangled in their first year of life. However, even if 20 female pups would have survived, the FFS population would be at a more stable place today than it currently is. Every breeding female is extremely valuable to the population at current population levels and birth rates.

We do not believe that other, secondary, impacts are likely to result from the removal because Galapagos sharks and other apex predators are relatively abundant compared to monk seals (see discussion above on abundance).

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

The activity is scheduled to coincide with the primary pupping season, but will not commence until and unless shark predation becomes evident. Historically, predation has commenced near the time that the first pup of the year reaches the age of 2 weeks (May) and continued as long as young pups were nursing (August- early September). The extended duration (end of September) of this application is a contingency in the event that seal births occur later than usual.

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

Members of HMSRP staff are experienced in shark fishing methods, gear selection, and relevant technology to minimize the risk of by-catch or other adverse effects from the proposed operation. For example, HMSRP engaged in shark monitoring at FFS in 1998-2004 and 2009 and shark removals at FFS in 2000-2007. To execute the

activities proposed in this permit application, we are exploring and aim to hire or contract shark fishers and/or shark scientists who have specialized experience in handling and capturing sharks.

In 2009, HMSRP conducted a Risk Assessment on shark fishing with Carl Meyer, his students and Bill Putre of NOAA (March 2009). During the 2009 field season, HMSRP accompanied Carl Meyer's shark tagging crew in FFS to learn shark capturing and handling techniques. In addition, Carl Meyer was consulted several times in 2009 and he provided general feedback on the gear design and methods described in this permit application. HMSRP is committed to ensuring that personnel taking part are fully trained or that experienced fishermen are hired onto the team to ensure safety and increase the likelihood of success.

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. The HMSRP has annually received funding adequate to perform the activity, and anticipates that 2010 funding levels will continue to suffice. If additional funds are required to mitigate any unexpected impact, resources would be available from NMFS PIR or NMFS Office of Protected Resources.

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.

The proposed removal methods and gear were all approved previously for past permit applications (2000-2007 permit applications for the Monument or Refuge), except for the "surprise net".

The proposed procedures (i.e. scope, timing, location, numbers, species of sharks to be culled) are appropriate to reach a goal of conserving wildlife (Hawaiian monk seals) and reducing the threat (shark predation) on a Monument resource (Hawaiian monk seals) based on the best-available knowledge about shark abundance, shark movement, shark predation, predation mitigation, seal behavior, seal movement, fishing catch rates and

fishing success rates (given location) at FFS. Please see the attached Technical Memorandum: Shark Predation on Monk Seals II (Gobush, in review) that accompanies this application for a comprehensive description of this knowledge. Adverse impacts to Monument cultural, natural, historic resources and ecological integrity are minimized as described in the discussion above.

Having a variety of fishing methods at our disposal is advisable based on the experience of shark-capturing crews at FFS, shark ecologists and fishing gear-makers. The fishing crew will not know ahead of time which method will work best until they experience the situation. Based on hours of observation from the tower in 2001-2003 and also video recording in 2009 at Trig islet, Galapagos sharks come into the wave wash and attack pups, circling out away from shore into deeper water for about ~20 minutes and often reappearing in the wave wash for another try at a pup. These attacks occur at varying times of day/season, in varying numbers and at varying frequencies. These sharks also appear to respond to human activity in various ways (i.e. wary versus not wary). For example, in 2009, attacks were most frequent in early morning hours, often for up to an hour. There were 1-2 Galapagos sharks that did not appear to be affected by the presence of human campers onshore. However in previous years, the pattern differed, for example wariness to humans was apparent and predation occurred primarily in the evening or night. In sum, the crew needs to be able to respond to the situation and the unpredictable and individualistic nature of sharks if they are going to have a chance at being successful.

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

The NOAA vessel R/V Oscar Elton Sette has been so equipped.

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

There are no other factors that would make the issuance of a permit for the activity inappropriate. This Conservation & Management permit application evolved from previous projects which underwent extensive review in-house, by members of the Hawaiian Monk Seal Recovery Team, the USFWS, and the State of Hawaii. The purpose, scope, methods and protocol of this application mirror and/or build upon the activities, insights and experiences of these previous projects.

8. Procedures/Methods:

This project encompasses two main components: shark monitoring and shark removals.

A. Shark Monitoring

Observation from the ground by overnight campers, a tower, patrolling small boats and/or remote cameras will be the primary methods of monitoring shark presence and movement patterns at the pupping sites (Trig, Gin, Little Gin and Round islets).

Ground observation will occur by staff on island. For Trig and Gin islets, staff will have the option of overnight camping, as was done in 2009, in order to observe early morning or late evening shark activity. The footprint of the camp will be minimal for 1-2 people to basically sleep, cook camp food and have safety equipment by their side. Camping will occur for up to 7 nights in a row at a time. Camping for 7 nights in a row occurred at a time at Trig and Gin islets for a total of 35 days between May and August 2009; no obvious adverse reaction by monk seals or other fauna was noticed.

The tower is a 12-foot structure made of scaffolding that may be erected on Trig, located approximately 40 meters from the south end of the island to improve visibility as needed. It was approved and used in 2001-2003.

The installation of a remote camera recording system on Trig islet will allow shark observation during days and times when HMSRP staff are not present; its installation a part of another permit application. It was successfully installed in 2009. Footage can be viewed nearly real-time from Tern and also reviewed on a daily or weekly basis as needed to help understand the shark predation patterns at that islet as the 2010 season unfolds. There were no bird strikes recorded for the duration of camera deployment.

For all observations, shark sighting/attack data, including identifying characteristics and behaviors, will be recorded on a standardized data form that was used in the 2009 field season.

B. Shark Fishing/Removals

1. Fishing personnel and location:

A crew of 2-3 staff experienced in safe and effective methods for shark fishing/removal will be tasked with shark monitoring and culling Galapagos sharks that they encounter within 400m of shore of Trig, Gin, Little Gin and Round islets. 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, harpoon and the "Net Surprise" will be used in shallow water, from shore or close to shore; bottomsets and drumlines will be used in deeper water, over sandy substrate at distances farther from shore (up to 400m away). The closest to Trig that bottomsets have been successfully to date has been approximately 400m away. Coral and snags make setting this gear closer difficult. We will make every attempt to set as close as possible to the shoreline of each islet given the gears' requirements for deployment.

2. Fishing Methods:

Five different methods will serve as a "toolbox" of options to safely cull a maximum of 20 Galapagos sharks: handline, harpoon, bottomset, drumline and the surprise net. 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; bottomsets with large hooks and bait were shown to be highly effective in 2009 across the atoll (i.e. Carl Meyer's crew caught 78 Galapagos sharks in the 2009 season), and drumlines and the "Net Surprise" hold promise.

However, handlines and harpoons were not very effective for catching sharks in past efforts. Twelve Galapagos sharks were removed by hook-and-line fishing or harpoon between 2000 and 2006, our fishing effort (number of hook hours) was low (ranged from 10-30 hours) and efficiency (removals per effort hours) progressively deteriorated throughout that period (speculated to be caused by shark wariness to humans). Thus, to adequately achieve the objective of this Conservation and Management permit, additional methods are needed. A failure to do so may result in a failure of this proposed management action to reach its goals.

Bottomsets and drumlines are, by design, restricted by habitat characteristics, otherwise lines can get 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 and appropriate substrate (sandy bottom) is also islet-sector specific; a zone of 400m around each islet will provide for this. However, drumlines resulted in no catch in 2007. This is believed to be the result of inadequate bait. Also, the majority of the bottomset catch in 2009 did not occur in the shallow lagoon areas and Galapagos sharks near the shore of Trig were not captured and tagged as a part of that effort.

Unfortunately, no one 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. 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 catch quota of 20 sharks, minimize bycatch and minimize accumulated bait. It is assumed that bycatch will be minimal and restricted to shark species, based on Meyer's crew's experience in 2009 with 6850 soak hours. Soak times will be limited to 1-3 hours (identical to Meyer's project). We will use the same bait type (large tuna heads and shark remains) and hook type (circle hook, size

18/0 to 20/0) as the Meyer's project. Tuna heads will be purchased in Oahu, transported up on the Sette and kept frozen. We will tend the gear to bycatch mortality (non-target species will be dehooked and released). Fishing staff will avoid culling non-target sharks through their proper identification. The only shark species that is likely to be confused with the Galapagos shark is the grey reef shark. The maximum size of 20 grey reef sharks caught across the NWHI was 159 cm in a 2003 study. Thus if a minimum size requirement for euthanizing is set above this figure, this confusion can be avoided (see Post-Catch Procedures below).

For handlines, a line will be baited (with large tuna pieces or shark remains from prior captures) from shore or from a small boat in the approximate area where a Galapagos shark has been observed. A hand-held harpoon will be used from shore or small boat when a shark is observed. A barbed shaft, shot from a spear gun or delivered by hand, will be attached to wire cable and connecting line that will be used to retrieve the shark. For both methods, captured sharks will be hauled out on to the beach or to the side of the boat and tail-roped 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, but will be adjusted to include 5 less hooks. The gear is designed for clean bottoms only (i.e. sandy substrate with no potential for snagging). Approximately 200m long ½ inch polypro mainline with overhand loops at regular intervals (40m) 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 polypro with a float at the top and a Danforth anchor (9lb) at the bottom. The buoy line length will be contingent on target set depth. Gangions will consist of a stainless steel lobster trap clip (snaps onto mainline loops) with 2m of 1/2 inch polypro, 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 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.

The “Net Surprise” is new technology that has been used to capture animals (seals) in shallow water. We will use it to capture Galapagos sharks in nearshore, shallow areas. The “Net Surprise” is the only method we propose to use to capture sharks that has not been approved for use by HMSRP in the past at FFS.

Faced with difficulties capturing animals in some situations and the desire to minimize disturbance, a radio-controlled net deployment apparatus has been developed by scientists at the Sea Mammal Research Unit, Scottish Oceans Institute, University of Saint Andrews, Scotland. This technology was created to enable the subtle deployment of tangle-nets in front of animals in shallow nearshore areas. The “Net Surprise” consists of a central 350mm diameter deployment tube (similar to a fire hose) containing a tangle-net (nylon, large mesh, approximately 4 inches) inside of it and an underwater mounted diving cylinder (with a regulator and 10 bar pressure release valve) and airline at each terminal end. The diving cylinder and airline supply air to provide thrust and quick deployment of the tangle-net. Buoyed receivers with small antennae are connected to the diving cylinders via solenoid valves, and can be remotely triggered from the beach using standard radio equipment.

We intend to set the deployment tube in discrete areas of the nearshore habitat in islet sectors where sharks have been observed to patrol or pursue pups. The tube will be laid in a semi-circle configuration, arcing out approximately 5-10m from the shoreline. The tube will be weighted to the seafloor bottom by clipping it to a heavy anchor chain

(8mm) of equal length to the tube; the terminal ends may also be attached to anchors on the beach to add stability. The net is only released upon trigger; it will not be released if large non-target animals (i.e. seals, turtles, birds, non-target shark species, large ulua) are in the water in the semi-circle area outlined by the tube or within 2m of the area outside of the tube or on the beachside opening. Multiple “Net Surprises” may be used to create a double-barrier design, creating two concentric arcs when deployed, in order to facilitate capturing a fast-moving shark. Multiple “Net Surprises” may be set adjacent to each other in the nearshore areas in order to facilitate capturing a fast-moving shark. In this case, only one “Net Surprise” would be deployed per capture event (each “Net Surprise” has its own dedicated radio-trigger). For example, at the beginning of the day, two “Net Surprises” would be laid at sector 2E of Trig islet, each arcing out 10m. If Galapagos sharks are observed patrolling and pursuing a pup in the area outlined by the first “Net Surprise” but circling out into the area of the second net, only the second net would be deployed. Once the net is released and a shark is tangled, the net will be pulled onto the beach and the shark euthanized. The “Net Surprise”, once set, will be under 100% attendance by HMSRP staff. HMSRP will thoroughly test the “Net Surprise” in Oahu before using it at FFS to ensure that it deploys as intended and can be pulled in quickly. Tests will occur in various wave surge conditions to determine when too much surge prevents proper function.

3. Post-catch procedures:

When a shark is hooked, harpooned or netted it will be brought to shore or side of the small boat and tail-roped and euthanized with a .44 caliber bang stick. HMSRP is currently developing bangstick safety protocols in conjunction with personal from OLE and other NOAA staff who have used bangsticks in the past (e.g. Robert Dollar). HMSRP conducted an ORM on March 19, 2009 lead by Chad Yoshinga and Kathleen Gobush for this effort. Refresher training on use of the bangstick will occur boat side on inert material here in Oahu.

A minimum size requirement for euthanizing a Galapagos shark can be set to ensure that only large adults capable of feeding on monk seal pups are culled. We propose a 200 cm fork length maximum; results of Meyer's project could be used to inform this figure (this data was not available to us at the time of this permit application submission).

HMSRP will perform a necropsy on culled sharks on site (Tern Island), 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 and take samples for scientific analysis.

Desired shark remains (i.e. teeth, belly skin) will be retained for Native Hawaiian cultural uses or practices as deemed desirable and appropriate by the State of Hawaii Office of Hawaiian Affairs and the Monument's Native Hawaiian Cultural Working Group. These desired remains will be removed from the carcass after the necropsy and stored as appropriate. 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. The laboratory that these samples will be sent to has yet to be determined; likely Sara Iverson's laboratory at Dalhousie University. Stomach contents will be screened for monk seal DNA by geneticist Jenny Schultz, PhD and provided to shark ecologists upon request.

Any remaining shark tissue will be disposed of at multiple deepwater locations outside of the atoll (for example outside of the breaking reef at depths of greater than 10 fm; latitude/longitude of the location will be recorded and avoided for future disposal for this project) or stored frozen and used for bait for future removal attempts that season.

4. Reporting:

A report that summarizes data concerning the removal of each shark will be submitted to the Monument one month after the expiration of this permit. This report will include environmental conditions at the time of removal, behavior or sightings of the individual prior to capture, identifying tags and physical features of the individual, location of the removal, method of removal, and method of euthanasia. Data about the carcass will also be included: morphometric measurements, gut contents, gender, reproductive status and the status of all remains (offered to the Native Hawaiian community, samples taken, use as bait or disposal and disposal location).

5. Evaluation:

The ultimate goal of the proposed conservation and management activity is to reduce the threat of shark predation to pre-weaned and newly weaned monk seal pups at FFS. The proximate goals are to monitor shark activity and remove up to 20 Galapagos sharks within 400m of shore of Trig, Round, Gin and Little Gin islets. We will consider the activity to have been successful if the proximate goals are achieved in 2010 and the achievement of the ultimate goal is apparent within 1- 2 years. We expect a lag time in any measurable increase in pup survivorship from shark removal because it is likely to take an entire season to catch the number of sharks requested given the low CPUE in the shallow lagoon.

If the number of sharks removed in 2010 approximates 20 (i.e. that recommended by Workshop participants), and no improvement in the proportion of pre-weaned and newly weaned pups lost to sharks (confirmed and inferred mortalities) is detectable within 1-2 years, then the idea of any additional shark removals will require careful consideration. If shark removal does not approximate these recommendations then such an improvement in survivorship from this source of mortality is not expected to be substantial. The number of restrictions placed on this activity directly influences its utility as a means of managing this threat to pup survivorship.

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:

Galapagos shark

Scientific name:

Carcharhinus galapagensis

& size of specimens:

20/adult

Collection location:

French Frigate Shoals, inside the atoll, near pupping sites

Whole Organism Partial Organism

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

Necropsy conducted, samples retained, tissues/teeth provided to Native Hawaiian cultural practitioners as desired by OHA.

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

• General site/location for collections:
inside the FFS atoll at pupping sites

• Is it an open or closed system? Open Closed
n/a

• Is there an outfall? Yes No
n/a

• Will these organisms be housed with other organisms? If so, what are the other organisms?
no

• Will organisms be released?
no

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

Biological samples collected from Galapagos sharks will be stored as appropriate (i.e. in vials with dms0, in liquid nitrogen, dry etc.). All samples will be transported out of the Monument aboard the Oscar Elton Sette.

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

Shark necropsy and tissue samples will be offered to HIMB and other shark ecologists.

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

Polypro mainline, buoy lines, gangions, bite leaders, lobstertrap clips, swivels, gaffs, meter caliper, leads, gloves, crimpers, cutters, hooks, knives, bolt cutter, buoys with anchor rode and anchor ., chain traces, danforth anchors, SS wire, 3/0 interlock snap swivel, mustad circle hooks (18/0 - 20/0), bangstick, ammunition (44 magnum catridges Remington), hand-held harpoon, nylon material netting with low stretch and good rot resistance (4 inch), Velcro, nylon cord, stainless steel clips, 20 bar working pressure fire hose, pvc, pressure relief valve, Stainless steel elbow, T-piece and hose fittings, airline, solenoid valves, regulators and 10bar pressure relief valve, diving cylinders, waterproof

housing buoys with waterproof connector and multicore cable, receivers and programmable trigger, bait cooler, bait (large tuna heads), camping gear, night-vision scope. Bottomsets will be made by Pacific Ocean Producers to be identical to that used in the Meyer's project only adjusted for 5 rather than 10 hooks. POPs made the sets for that project.

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

As listed on the Manager's permit: chemicals related to necropsy and tissue preservation (formalin, DMSO and/or ethyl alcohol for genetics and fatty acid analysis), also bangstick ammunition (.44 caliber magnum cartridges). An MSDS for all hazardous materials will be provided upon request.

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

none

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

Report to the Monument: October 30, 2010

Necropsies- immediately upon death

Preliminary gut content analysis- immediately upon death

Fatty acid, genetic (including genetic analysis of gut contents) and vertebrae analysis:

TBD- will be sent out for analysis

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

Gobush, K.S. In Review. Shark Predation on Hawaiian Monk Seals II
Technical Report of the Second Workshop & Post-Workshop Developments, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Pacific Island Fisheries Science Center, Honolulu, Hawaii.

Harting, A., G. Antonelis, B. Becker, S.M. Canja, D. Luers, and A. Dietrich. In Prep. Galapagos Sharks and Hawaiian Monk Seals: A Conservation Conundrum. Marine Mammal Science.

Hawn, D. 2000. Galapagos shark (*Carcharhinus galapagensis*) removal and shark sighting observations at Trig Island, French Frigate Shoals during the 2000 Hawaiian monk seal field season. Prepared for National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory. Contract Order 40JJNF000208. 25 pp.

Hayes, S. 2002. Galapagos shark predation of monk seal pups at Trig Island, FFS 2001. Unpublished report. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI. 22 pp.

NMFS, 2002. Environmental assessment for the proposed experimental shark removal to enhance preweaned monk seal pup survival at Trig Island, French Frigate Shoals, Hawaiian Islands National Wildlife Refuge. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI. 46 pp.

NMFS. 2003. Shark predation at Trig Island, 2002. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI. 38 pp.

NMFS 2004. Shark predation at French Frigate Shoals, 2003. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI. 56 pp.

NMFS 2005. Shark Predation at French Frigate Shoals, 2004. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI. 36 pp.

NMFS. 2007. Recovery plan for the Hawaiian monk seal (*Monachus schauinslandi*) 165 p. U.S. Department of Commerce, National Oceanic and Atmospheric Agency, Silver Spring, Maryland.

NMFS. 2009. Programmatic environmental assessment of the program for decreasing or eliminating predation of pre-weaned Hawaiian monk seal pups by Galapagos sharks in the Northwestern Hawaiian Islands. 76 p. U.S. Department of Commerce, National Oceanic and Atmospheric Agency, Honolulu, Hawaii.

NMFS. In Prep. Shark Predation on Hawaiian Monk Seals: Minutes of the Workshop Sponsored by the Pacific Island Fisheries Science Center and the Pacific Islands Regional Office. Prep. By Harting Biological Consulting, Bozeman, Montana for U.S. Department of Commerce, Pacific Islands Fisheries Science Center, Honolulu, HI. 66 pp.

Peschon, J.D. 2002. 2002 Trig Island shark project report. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI.

Peschon, J., D. Luers, B. Becker, and M. Niemeyer. 2003. 2003 French Frigate Shoals shark predation project report. Prepared under contract for U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Honolulu, HI.

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