UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

ENVIRONMENTAL ASSESSMENT ON ISSUANCE OF A PERMIT FOR FIELD RESEARCH AND ENHANCEMENT ACTIVITIES ON THE ENDANGERED HAWAIIAN MONK SEAL

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Lead Agency: USDC National Oceanic and Atmospheric Administration
National Marine Fisheries Service (NMFS), Office of Protected Resources

Responsible Official: James H. Lecky, Director, Office of Protected Resources

For Further Information Contact: Office of Protected Resources
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910
(301) 713-2289

Location: Hawaiian Archipelago and Johnston Atoll

Abstract: NMFS proposes to issue a scientific research and enhancement permit (No. 10137) for takes of endangered Hawaiian monk seals (*Monachus schauinslandi*) in the wild, pursuant to the Marine Mammal Protection Act and the Endangered Species Act. The permit would be valid for five years from the date of issuance and would authorize the NMFS Pacific Islands Fisheries Science Center, Marine Mammal Research Program to continue long-term population monitoring; conduct health, disease, and foraging research; and carry out activities to enhance survival of the species. The proposed permit would also authorize a new study to determine the efficacy of treating immature seals in the wild with medications to reduce intestinal parasite burdens. The goal is to enhance survival of the species by increasing survival rates of young seals, which at present is driving the species' decline.

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CHAPTER 1 PURPOSE OF AND NEED FOR ACTION

1.1 DESCRIPTION OF ACTION

In response to receipt of a request from the Pacific Islands Fisheries Science Center, Marine Mammal Research Program (MMRP, File No. 10137), NMFS proposes to issue a scientific research and enhancement permit that authorizes "takes"[1] of Hawaiian monk seals (*Monachus schauinslandi*) in the wild pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 *et seq*.), the regulations governing the taking and importing of marine mammals (50 CFR Part 216), the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.), and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226).

Permitting will be deferred for one enhancement activity requested by the applicant, translocation of up to 20 pup and juvenile seals annually between islands/atolls in the Northwestern Hawaiian Islands (NWHI). The NMFS Endangered Species Division requested additional time to complete the section 7 consultation for that activity. However, we are including the description and an analysis of this translocation method in this EA in anticipation of processing an amendment to the proposed permit to include this activity.

1.1.1 Background

The Hawaiian monk seal is the most critically endangered pinniped in the U.S. Surveys indicate counts are the lowest in recent history, with a projection that the population will fall below 1,000 within 5 years (NMFS 2007). Low juvenile survival, primarily due to starvation, is driving this decline (Baker 2008; Craig and Ragen 1999; Gilmartin et al. 1993). In addition to continuing research and enhancement activities employed since the 1980's, MMRP proposes to conduct a new study to test whether treating young seals to reduce intestinal parasite loads will improve their body condition and ultimately their survival in the wild. Additional changes to the field operations are proposed, such as deployment of small sonic tags on weaned pups to better inform management decisions related to mitigating mortality from shark predation.

1.1.1 Purpose and Need

The purpose of issuing the permit is to provide an exemption from prohibitions under the MMPA and ESA to allow takes of an endangered marine mammal for bona fide scientific research and enhancement activities. MMPA and ESA regulatory issuance criteria require that permitted take activities are consistent with the purposes and polices of these federal laws and would not have significant adverse impacts on the species or stock.

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1 Under the MMPA, "take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." [16 U.S.C. 1362(18)(A)] The ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

1.2 OTHER EA/EIS THAT INFLUENCE SCOPE OF THIS EA

NMFS Permits Division and MMRP co-prepared an EA (NMFS 2003) for issuance of Permit No. 848-1695 to the MMRP for takes of Hawaiian monk seals. This EA described and analyzed the majority of activities proposed by the MMRP, which have been standardized over decades of work with Hawaiian monk seals. The NMFS Marine Mammal Health and Stranding Response Program (MMHSRP) prepared a Final Programmatic Environmental Impact Statement (NMFS 2009) for activities pertaining to emergency response, rescue, rehabilitation, and salvage of stranded marine mammals, including threatened and endangered species.

Some activities proposed by the MMRP involve the rescue of Hawaiian monk seals or the salvage of parts from seals that die of natural causes (pursuant to MMPA section 109(h) and implementing regulations in conjunction with an ESA section 10 permit). While these activities could be covered by the MMHSRP, we propose to authorize such takes for the MMRP to carry out due to the remoteness of the NWHI and to ensure specific responses for these animals are available. The permit issued to the MMHSRP is typically used to authorize response activities on Hawaiian monk seals carried out in the MHI, where the NMFS Pacific Islands Regional Office's Stranding Coordinator is located.

Descriptions of standard research and enhancement methods proposed by MMRP are included in this EA with differences in take numbers and methods identified in relation to the 2003 EA. The analyses of the effects to the target species from standard research and enhancement protocols are updated and in some cases reference the previous analyses in the 2003 EA, and analyses of effects of activities not previously considered are presented.

Detailed descriptions of the geographic action areas are incorporated by reference from the 2003 EA. Effects and mitigation to minimize effects to the physical environment have been updated as appropriate. The analysis on the effects and appropriate mitigation for non-target species has been expanded from the 2003 EA to include other non-target species.

1.3 SCOPING SUMMARY

The purpose of scoping is to identify issues to be addressed and significant issues related to the proposed action, and identify and eliminate from detailed study issues that are not significant or that have been covered by prior environmental review. An additional purpose of the scoping process is to identify concerns of the affected public and Federal agencies, states, and Indian tribes. CEQ regulations implementing the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq*.) do not require that a draft environmental assessment (EA) be made available for public comment as part of the scoping process. A draft of this EA was not made available during the public comment period.

Consistent with the MMPA and its implementing regulations (50 C.F.R. §216.33), NMFS published a notice of receipt in the *Federal Register* (FR) and the application was made

available for public review and comment for 30 days (73 FR 12137; March 6, 2008). No comments were received from the general public. Comments were received from the Hawaiian monk seal Recovery Team (HMSRT), the Marine Mammal Commission (MMC), and the U.S. Department of Agriculture – Animal and Plant Health Inspection Service (APHIS). Comments received on the application, as summarized in section 1.3.1 below, were considered as part of the scoping for this EA.

1.3.1 Comments on application

HMSRT Comments

The HMSRT supported the application overall, and one comment affected the scope of the proposed action. The MMRP requested authorization to remove from the population (via permanent captivity, translocation, or euthanasia) five adult male seals known to attack and kill or seriously injure immature seals. The HMSRT recommended that the MMRP be permitted to take up to 10 adult males over the course of the five-year permit in the event mobbing attacks on female seals occur in the future, with two accidental mortalities associated with this action (see Recovery Plan item 7.1.2. "Remove aggressive males, translocate if possible, or euthanize; periodically review criteria for removing aggressive males").

In response to the HMSRT comments, NMFS proposes to authorize removal of up to 10 adult male seals to include removal of "mobbers" involved in mass attacks on female seals, and incidental mortality of two during capture operations. After discussions with NMFS, the MMRP agreed with having this authorization in the permit.

MMC Comments

Comments by the MMC affected the scope of the proposed action because the applicant revised protocols for the de-worming study and clarified protocols for translocations to occur in 2009.

First, the MMC provided the following recommendations regarding translocations of immature seals from one island/atoll to another within the NWHI: (1) that MMRP ensure on-site veterinary care is available; (2) that MMRP develop and incorporate adequate disease screening to evaluate seals that might be translocated; and (3) that MMRP provide for soft releases of animals translocated from one subpopulation to another.

MMRP clarified that a veterinarian would be present during any translocation between islands/atolls. NMFS, MMRP, and the MMC met on June 20, 2008 to discuss the MMC's recommendations on disease screening. It was determined that there are significant logistical and cost constraints associated with biological sampling and analysis for seals sampled in the NWHI. Only one location (Midway Atoll) has an airstrip to expedite shipment of samples to Oahu and certain samples must be shipped to the U.S. mainland for analysis. It was agreed that in some cases, it would be acceptable for the full disease analyses be delayed and performed post-translocation if, for example, seals

were to be translocated to atolls/islands where there is already a mixing of members of the two subpopulations and exposure already occurs. Also, a veterinarian would be on-site and only seals deemed in good health would be translocated. Whenever logistically feasible and in cases where subpopulations are far apart and mixing of animals does not occur regularly, it was agreed that full disease screening prior to moving seals is warranted.

Regarding soft releases, at the same meeting on June 20, 2008, it was discussed that some islands/atolls do not have the appropriate beaches (e.g., Nihoa Island), or there are other logistical constraints making it impossible to erect a shoreline pen for a soft release. Also, weaned pups do not tend to move far from release as they are naive and have not fully developed their foraging skills. Last, anytime an animal is placed in a captive setting, there is an increased risk of complications associated with stress. Therefore, it was agreed that soft releases would not always be feasible and may not always be necessary with translocations.

Second, the MMC offered suggestions to improve the proposed de-worming trial under the caveat that it recognized the limitations in sample sizes and control of variables, as well as logistical difficulties inherent in working with this species in the remote NWHI. The MMC suggested that the MMRP:

(1) weigh seals to obtain an objective determination of body condition (versus subjective visual interpretation);

(2) carefully select treatment and control animals, increase sample size, or reduce sources of variation to minimize confounding effects of multiple variables such as island, year, season, age, and sex;

(3) take fecal samples to confirm that pups carry sufficient parasite loads before including them in the study; and

(4) develop an analytical approach and manipulate design features to maximize the power of the study before treating any animals.

The MMRP agreed to weigh all seals in the study and determine the best age at which to treat pups. It was acknowledged that because of many factors (limited number of seals, logistics, etc.) it would be difficult to control variables and the study would likely need to be carried out more than one year. MMRP agreed to further develop the technique for analyzing the data.

After the NMFS, MMRP, and MMC met to discuss the MMC's concerns on these topics, and after numerous iterations of the protocols, the MMC approved the final study designs presented in this document. The MMC comments in their entirety, which include the rationale for these recommendations, are located in the MMRP permit file No. 10137 in the NMFS OPR, Permits Division.

The MMC also made general recommendations regarding what conditions should be placed on MMRP when performing permitted activities. These included: minimizing disturbance, suspending activities when the number of authorized mortalities is reached, providing humane care for pups orphaned as a result of researchers' actions, coordinating

research with other permit holders, and obtaining necessary permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for importing and exporting biological samples. Standard conditions contained in all MMPA/ESA permits address these recommendations and would be applied to the MMRP permit, if issued.

APHIS Comments

APHIS comments influenced the scope of this EA because NMFS incorporated conditions into the permit responsive to APHIS recommendations regarding Animal Welfare Act (AWA) requirements. Comments from APHIS regarding AWA requirements included the following: (1) the MMRP protocols need IACUC (Institutional Animal Care and Use Committee) approval; (2) all temporary holding enclosures used for translocation events must meet AWA space requirements for Hawaiian monk seals - as APHIS regulations do not include this species, APHIS provided space requirements for the applicant; (3) transports over two hours require a transport plan signed by the attending veterinarian and the accompaniment of the attending veterinarian or the use of experienced handlers in contact with the veterinarian; and (4) the use of sedation and resuscitation must be done under the direct supervision of a veterinarian and be in compliance with the Practice Acts of Hawaii.

Regarding item 1, the applicant confirmed that the University of Hawaii (UH) IACUC reviews and approves research protocols used on monk seals, as many of the MMRP staff are hired as contractors through UH. The scope of this EA could be influenced by results of the IACUC reviews if the IACUC did not approve a project or recommended further restrictions beyond those contained in the proposed permit. However, the IACUC could not give the MMRP permission to conduct activities beyond the scope of this EA and not covered by the proposed permit. Items 2 and 3 have been addressed as conditions in the permit. Regarding item 4, the applicant indicated that in Hawaii Statutes (Chapter 471 under Veterinary Medicine Section 471-2, subpart 4) there is an exception for veterinary licensure in the State of Hawaii for those employed by the U.S. government performing such activities as a course of their regular duties. Therefore, NMFS is satisfied that this comment has been addressed.

APHIS further commented that a one-time de-worming treatment as proposed by the applicant is not in conformance with standard veterinary practices; most domestic animals are treated at least twice and at intervals to address the parasite life cycle. Concurrent with changes made to the de-worming protocol in response to MMC comments, the MMRP included multiple treatments in the de-worming study, as presented in this EA.

APHIS also noted that the antiparasitic drug described in the permit application (praziquantel) does not pose a significant risk to seals or most fish, but the effects of introducing this substance into the marine environment has not been thoroughly evaluated. The applicant provided some information on the metabolism of praziquantel

but acknowledged that there is no published information on how the drug is metabolized in pinnipeds, and therefore, what end-products would be introduced to the environment.

The final de-worming protocol provided by the applicant and which is described in this EA includes the use of a second antiparasitic drug, fenbendazole, in addition to praziquantel. Effects of these drugs on the environment are addressed in Chapter 4, Environmental Consequences.

1.4 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

Appendix 1 summarizes applicable laws and federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action. NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action. Section 4.3 addresses the applicant's compliance with the following laws: MMPA, ESA, National Historic Preservation Act, Migratory Bird Treaty Act (MBTA), Magnuson-Stevens Fisheries Conservation Act (MCSFCA), Coastal Zone Management Act, Convention on International Trade in Endangered Species of Wild Fauna (CITES), and the Animal Welfare Act (AWA).

CHAPTER 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

This chapter describes the range of potential actions (alternatives) determined reasonable with respect to achieving the stated objective. One alternative is the "No Action" alternative where the proposed permit would not be issued. The No Action alternative is the baseline for the rest of the analyses. The Proposed Action alternative represents the activities proposed in the submitted permit application (as modified), with terms and conditions specified by NMFS.

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action alternative, no permit would be issued to the applicant for the activities proposed. In absence of a permit, MMRP activities aimed at emergency response and disease investigation could still occur pursuant to authorization under the NMFS Marine Mammal Health and Stranding Network's Permit No. 932-1489, with MMRP researchers authorized as Co-investigators. Activities that could still occur include removing hooks and disentangling seals, relocating pups from high risk areas, removing rogue adult males by non-lethal means, conducting health assessments and biological sampling during disease outbreaks or unusual mortality events, humane euthanasia of moribund animals, and necropsies.

2.2 ALTERNATIVE 2 – PROPOSED ACTION (Issuance of Permit with Conditions)

Under the Proposed Action alternative, NMFS would issue a permit to the MMRP to conduct activities described below, with standard permit terms and conditions, conditions

specific to pinnipeds, and conditions specific to the actions to be undertaken by the MMRP. Authorization for one project described and proposed in this EA, inter-atoll/island translocations of up to 20 pup and juvenile seals within the NWHI, will be deferred. The NMFS Endangered Species Division requested additional time to complete the analysis necessary for the consultation on this aspect of the permit. In order to maintain continuity in field research activities, the Endangered Species Division recommended NMFS issue the permit without inter-atoll translocations by the expiration date of the current permit (June 30, 2009). Otherwise, field researchers would have to stop on-going activities in the NWHI until the consultation was completed. NMFS is including a complete analysis of the inter-atoll/island translocations in this EA as we anticipate processing an amendment to the proposed permit No. 10137 upon completion of the ESA section 7 consultation and resultant biological opinion.

Overview

The MMRP proposes to undertake the following research activities to accomplish the objectives stated in Section 1.1.3:

- population monitoring
  - ground, vessel, and aerial surveys
- marking and measuring
  - bleach marks and photo-identification
  - flipper, PIT (passive integrated transponder), and sonic tags
  - standard morphometrics
- health and disease assessments
  - biological sampling
  - study and reduction of intestinal parasite loads in pups and juveniles
  - import/export of specimens for analysis
  - necropsies
  - opportunistic specimen collection
- foraging studies
  - instrumentation

The MMRP proposes to undertake the following enhancement activities to accomplish the objectives stated in Section 1.1.3:

- translocations of pups and juveniles
  - within the same atoll to mitigate pup switches or maternal abandonment
  - within same atoll to remove seals from imminent risk of mortality
  - translocate to different atolls within NWHI to improve survival
- removal of adult males known to kill immature seals or mob females
  - remove to permanent captivity
  - translocate to Johnston Atoll
  - euthanize
- disentanglements and removing hooks from seals

To carry out the proposed activities, the following research and enhancement takes would be occur annually:

- Level B harassment at any location in the Hawaiian Archipelago and Johnston Atoll
    - 1,440 seals of any age/sex could be incidentally disturbed from monitoring activities via ground, aerial, and vessel approaches (includes photo-ID)
    - 200 seals of any age/sex could be incidentally disturbed during all other research and enhancement activities at
    - 1,315 seals would be bleach marked and could be disturbed during that activity

- Takes at locations specified for each activity
    - 556 seals of any size or sex except lactating females and nursing pups would be captured, restrained, flipper and PIT tagged, measured, and flipper plugs sampled; this predominately involves tagging weaned pups, but also includes retagging older individuals whose flipper tags have come off or become illegible; locations include Hawaiian Archipelago and Johnston Atoll; up to 35 weaned pups at French Frigate Shoals would have sonic tags applied annually for three years

    - 70 healthy seals and 30 unhealthy seals of any age/sex excluding lactating females with pups and nursing pups would be captured, restrained, sedated, sampled for health and disease screening (swabs, fecal loop, blood, blubber biopsies), measured, and flipper tagged if necessary; of the healthy seals, 60 would also be instrumented with external tagging devices and weighed; location is the Hawaiian Archipelago

    - 75 immature seals would be relocated or translocated as follows:
        - 20 nursing pups of either sex that are abandoned or have been switched between two lactating females would be captured, restrained by hand or net, and relocated to a prospective foster mother or their natural mother, respectively; multiple attempts may occur to successfully unite pups with appropriate mothers; locations include the Hawaiian Archipelago and Johnston Atoll

        - 35 weaned pups of either sex would be captured, restrained by hand or net, sedated, sampled for health and disease screening, instrumented, and relocated via boat, vehicle, or aircraft from a high risk area (e.g., known shark predation) to a low risk area within the same island or atoll in the NWHI or Johnston Atoll; translocations in the MHI may be to a different location on the same island or to a different island in the MHI; locations include the Hawaiian Archipelago and Johnston Atoll

        - 20 weaned pup or juveniles of either sex would be captured, restrained by hand or net, sedated, sampled for health and disease screening, instrumented, transported and translocated via boat,

ship, aircraft, and/or vehicle to a different atoll or island within the NWHI only

- 200 seals of either sex, up to age 3 years, would be treated for intestinal parasites; treatment animals may include those captured for health assessments or foraging studies; location is the Hawaiian Archipelago, although the preponderance of activities would occur in the NWHI

- as warranted, seals would be disentangled and de-hooked to prevent injury or death; location is the Hawaiian Archipelago and Johnston Atoll

- necropsies would be performed on all carcasses; samples (molt, scat, spew, urine, placentae) would be collected opportunistically from beaches; samples would be import/exported/imported for analysis (world-wide); location of necropsies and sample collection is the Hawaiian Archipelago and Johnston Atoll

The following takes would be authorized to occur over the 5-year duration of the permit and would occur in the Hawaiian Archipelago and at Johnston Atoll:

- 10 adult males may be relocated, removed, or euthanized to enhance survival of immature animals and adult females (2 males may die incidental to captures)
- 10 moribund seals of any age/sex may be humanely euthanized or die incidental to handling during health assessment
- 4 incidental mortalities may occur during research and enhancement activities, with no more than 2 occurring in a single year

A take table that enumerates the takes by location to be included in the proposed permit (No. 10137) is in Appendix 2. While the takes described below and in the take table are separated according to the type of activity requested, it is possible that individual seals could be taken by more than one of the activities. Because the activities would occur at different times, both within a given year as well as over the proposed 5-year duration of the permit, it is not possible to predict the degree of 'overlap' of activities which may impact a given animal, or account for such multiple takes when providing annual permit summaries. Thus, MMRP has listed the takes under separate activities and identified the likelihood of multiple takes among tasks in the take table of Appendix 2.

Timing of Activities

Activities carried out in the NWHI during field camps (monitoring, photo-ID, bleach marking, tagging and retagging seals; disentanglement/collect marine debris; mitigating pup switches, shark attacks, aggressive male behavior, or other threats; lancing abscesses; conducting necropsies and collecting samples on the beach) would occur approximately from March through September annually, but may occur at any time of year. The goal is to deploy field camps prior to and beyond peak pupping in order to monitor births and flipper tag all pups in each cohort for objectives identified below. Timing of monitoring activities varies each year in the NWHI because of logistical and financial constraints.

The NWHI is an extremely remote location accessible by ship/boat and by air to Midway (and French Frigate Shoals on a limited basis). Activities conducted in the Main Hawaiian Islands (MHI) would occur at any time of year.

Instrumentation in the NWHI would occur primarily in the autumn – winter months, comprised of dedicated field efforts at a particular site annually (i.e., not necessarily during routine, long-term field camps). Health assessments are also conducted during dedicated efforts, and could occur at any time of year (especially in the event of an unusual mortality event). Antiparasitic treatments would occur year-round at specified intervals (i.e., summer, fall, winter, spring) with follow up assessments carried out between treatments.

Methodology

Population monitoring

Background/Purpose

Systematic beach counts of Hawaiian monk seals have provided the framework for assessing long-term trends since 1982, and represent the most consistent data series during the past 26 years by which a long-term population trend can be assessed. The proposed activity would continue to provide the best information on the status of the species. Virtually all NWHI monk seal population data are collected during field seasons that occur roughly from May (but as early as March) to August (but as late as September) each year at each island. Reports of activities are published annually (e.g., Johanos and Baker 2007). Continued annual monitoring of NWHI monk seal subpopulations, including all the attendant data gathering activities, has been identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007) as a Priority 1[2] research action. Data from seals in the MHI is collected year-round by MMRP staff, assisted by volunteer reporting (including a call-in number for public sightings and dedicated volunteer efforts). Annual monitoring in the NWHI and aerial surveys in the MHI has also been recommended by the Marine Mammal Commission.

Primary goals of population monitoring are to evaluate the status and trends of monk seal subpopulations, identify the threats to recovery, provide data that may be used to formulate recovery strategies for implementation, and collect data to evaluate the effectiveness of implemented recovery actions. Monitoring data are also provided for NMFS stock assessment reports. Monitoring allows personnel to mitigate threats to individual seals. Moreover, annual surveys are important to generate a data set of annual birth and death rates for comparison to the time series of oceanographic, meteorological, and productivity indices, in the hopes of discovering relationships that bear on the effects of environmental factors on the species.

Monitoring Methods

Up to 1,440 seals could be taken annually by incidental disturbance from monitoring activities, at any haulout site within the Hawaiian Archipelago or Johnston Atoll. The

[2] "An action that must be taken to prevent extinction or to prevent the species from declining irreversibly."

annual take totals are based upon site-specific enumerated subpopulation levels from 2007, with additional takes added to (1) account for potentially increasing subpopulation levels at each site over the 5-year duration of the permit, (2) account for possible movements of animals among islands, and (3) include estimated subpopulation levels at Necker, Nihoa, and Niihau Islands. Information collected during monitoring includes age specific survivorship, reproductive rate, pup production, incidence and causes of injury or mortality, condition, and abundance. Abundance is determined both by enumeration (marking/tagging, see below) and regular censuses. Seals of any age and either sex may be taken by disturbance, including pregnant and nursing females. Disturbances would occur during ground observations of seals (e.g., censuses), aerial and boat surveys, as well as from some routine field activities such as establishing and breaking down field camps.

The monitoring methods described in the 2003 EA are the same as for the proposed action with the exception of boat surveys, which were not previously described, and the number of animals authorized to be taken annually. The 2003 EA described takes of up to 1,500 in the current permit. The decrease from 1,500 to 1,400 animals represents adjustments in abundance estimates. The monitoring technique would be personal human observation, either on shore or via aerial or vessel survey. Most observations are made by biologists walking on shore adjacent to seals. Observations are made using field binoculars. Photo documentation of identifying scars or other noteworthy conditions, such as injuries, would be made using cameras equipped with telephoto lenses (most 50mm-200mm zoom).

Aerial surveys would involve censusing Hawaiian monk seals from either a helicopter (MHI and Kaula Rock) or a fixed wing aircraft (Necker and Nihoa Islands). Minimum distance from the survey aircraft to seals would be 500 feet (vector combination of vertical and horizontal distance).

Boat surveys typically occur in areas where biologists cannot access land or where sand spits occur that are too small to access. In the NWHI, the platform is an 18 foot whaler or similar small boat that circles a haulout site from a minimum approach distance of 10 meters. In the MHI, the boat platform varies opportunistically, depending upon what agencies or tour companies may be traveling to inaccessible areas where observations are important (e.g., remote areas of Kauai, Kahoolawe). The minimum approach distance is the same as in the NWHI, 10 meters.

MMRP Mitigation

Boats transiting lagoons would not divert from straight line paths necessary to transit between the islands, and boats would avoid landing on beach areas where seals are in the immediate vicinity. Observers remain as far away as possible from seals during monitoring activities to obtain the necessary data, using binoculars and telephoto lenses as necessary for documentation. All field staff are trained to be unobtrusive and to remain low to the ground whenever seals may alert to human presence. Seals are specifically given a wide berth when they are especially susceptible to disturbance, such as lactating females or molting individuals. For every observation collected by the

MMRP, a note is coded if a disturbance to the animal occurred, but the individual disturbed is not necessarily identified. A seal is considered disturbed if it moves in response to having seen the observer. The level of disturbance is assigned based upon how far the animal moved, or if it fled into the water.

Flipper and PIT Tagging and Measuring

Background/Purpose

Flipper tags have been successfully applied to Hawaiian monk seals since 1981, and PIT (passive integrated transponder) tags have been applied since 1990. Tagging/measuring is a necessary part of annual monitoring of the Hawaiian monk seal. The purpose of applying tags (flipper and PIT) is to assign a permanently identifiable fixture to individual seals, particularly seals of a known age cohort. Tagging, coupled with extensive monitoring efforts, can provide data on age-specific survival, age at first parturition, movements among subpopulations, and reproductive rates. Tagging also provides identity of males participating in attacks or mobbings of adult female and immature seals. Measuring weaned pups (girth and length) gives an indication of the condition of pups at weaning at each subpopulation, a measure correlated with survival (Craig and Ragen 1999).

Replacement of tags is essential for several reasons. For example, abrasion and illegibility of flipper tags on female seals often occurs at an age when the females are recruited into the breeding population. Replacement of tags is essential to determining age at first reproduction, reproductive rate, and survivorship, as well as for identifying aggressive adult males.

Tagging/Measuring Methods

Flipper tags would be applied to weaned pups of both sexes and to older individuals that may have not been tagged previously. Tags would be re-applied to individual seals whose tags have become lost, broken, or excessively worn, in order to maintain the individual identities of these animals. A total of 536 Hawaiian monk seals of any size or sex except lactating females and nursing pups would be taken by tagging or retagging annually within the Hawaiian Archipelago and Johnston Atoll.

Flipper tagging procedures would be identical to procedures authorized under Permit 848-1695 and analyzed in the 2003 EA, with the exception of take numbers which have increased slightly (up 20), and swab samples are no longer proposed to be taken as were included in the current permit. The increase in take numbers for tagging is primarily due to plans for increased efforts in the MHI and neighboring Nihoa and Necker Islands.

Seals would be manually restrained by hand, or in a stretcher net, hoop net, or throw net and tagged with two plastic Temple Tags®. Temple Tags measure 4 cm x 2 cm and are inserted through holes punched in the webbing between two digits of each rear flipper. During retagging old broken or unreadable Temple Tags may be removed. Restraint time would average ~5 minutes and would not exceed 15 minutes. After flipper tags have been applied, but while the seal is still under restraint, a single PIT tag would be injected.

Most PIT tags would be injected just below the blubber in the lumbar area, approximately 5 inches lateral to the dorsal midline and approximately 5 inches anterior to the base of the tail. However, alternate sites on the seal's posterior may be tested. The injection site would be cleansed with Betadine® and alcohol prior to PIT injection. Seals would then be measured (length and girth) using a flexible cloth tape. No sedating drugs would be administered to the seals during restraint for flipper tagging/measuring. Flipper plugs, resulting from punching the webbing of hind flippers to apply Temple Tags, would be retained and banked for DNA analysis. Plugs are fixed in DMSO, returned to the laboratory in liquid nitrogen, and banked in ultracold freezers.

MMRP Mitigation

Animals would not be handled during sensitive times in their life cycle. Because of the critical importance of pup survival, lactating females and nursing pups would never be tagged during the suckling period. Moreover, tagging molting seals would also be avoided due to the higher physiological demands to animals which are shedding and regrowing their entire epidermis.

The capture team has a briefing prior to an event to discuss roles of each team member and contingencies and responsibilities in the event of unanticipated results or action by the animal. Researchers would minimize stress from captures and restraint for tagging/measuring by keeping the handling procedures as short as possible and cooling the animal with water. For routine tagging which entails short restraint times, administering sedatives presents more of a risk to the seals than the stress which the sedative would relieve, and the procedure would add significantly to the restraint time. Similarly, a local anesthetic such as lidocaine could be administered to relieve the transitory pain experienced by the seal when a tag is applied, but this would add to the restraint time, presenting a higher risk. Prior to any animal capture the site would be evaluated for presence of environmental hazards that could present a risk of injury to the animal or the handlers. For example, seals would not be restrained or tagged if they are in proximity to rock ledges or hard substrate.

Seals are observed for a minimum of five and up to 20 or more minutes after being marked, disentangled, or handled for any reason (tagging, sampling, instrumentation involving sedation) to ensure they resume normal behavior (either going into water or resuming normal respiration rates on land). Seals going into the water would be observed until they are out of sight. Regular patrols and censuses of the area would be conducted to resight and monitor tagged individuals.

Procedures requiring physical contact with seals include precautions to ensure that humans handling seals do not inadvertently transfer pathogens between animals. All personnel who come into contact with the seal would wear protective clothing (coveralls, gloves, booties) which is either sterile or has been disinfected. All instruments/gear would be cleaned by washing thoroughly with soap and water and then disinfecting with 70% Isopropyl Alcohol, or a 1:20 solution of Clorox©, for a minimum of ten minutes. This includes such items as nets, tape-measures, calipers, pit tag applicators, tag hole punchers, cooler, and buckets, or other items touched after the capture and before

washing hands. All personnel involved in restraining seals would, prior to handling another animal, wash their hands in anti-bacterial soap, don a fresh pair of latex gloves (and cotton over-gloves if using), coveralls, and mask, and would dip their "rubber booties" in a 1:20 solution of Clorox.

Deploying Sonic-Flipper Tags to Weaned Pups

Background/Purpose

The MMRP proposes to deploy small sonic tags (attached to a flipper tag) on up to 35 weaned pups at French Frigate Shoals for up to a three year period. The primary purpose of sonic tagging weaned pups at French Frigate Shoals is to gain information on their movements and proximity to sonic-tagged sharks for the time period just after weaning. This data will be used to better inform management actions aimed at reducing shark predation, such as culling sharks. Shark predation at French Frigate Shoals has drastically decreased the number of pups that survive to weaning there, and reducing shark predation is an action recommended in the Hawaiian monk seal recovery plan (NMFS 2007).

MMRP is cooperatively working with shark scientists from the Hawaii Institute of Marine Biology to set an array of over 35 sonic tag signal receivers around the main pupping islets at French Frigate Shoals (Gins, Trig, Tern, East), where the primary purpose of this work is to tag Galapagos and Tiger sharks and track their movements. MMRP proposes to simultaneously track newly weaned pups using this same equipment. Additional goals of sonic tagging pups at French Frigate Shoals include monitoring movements of weaned pups relocated from areas of high shark predation to safer areas; and gaining data to inform future translocations or releases from captive care activities.

Sonic-tagging Methods

Sonic-tagging was not previously described in the 2003 EA. Sonic tags would be deployed concurrent with standard flipper tagging of pups when they wean, including those pups that may be relocated to safer areas to mitigate pup loss due to shark predation. All pups encountered are flipper tagged at weaning, and those that wean in high-risk areas at French Frigate Shoals where sharks predate on pups are captured and transported via small boat directly from weaning site to release site within the atoll (see translocation section below).

The sonic tag would be attached onto one additional flipper tag during standard tagging procedures, and it is estimated to take less than a minute to apply an additional tag. The sonic tags are 24mm long and weigh 3.6 grams in air and 2.2 grams in water. The sonic tag is about the size of the temple tag and would be attached to the flipper tag with two small zip ties and epoxy. The transmitters ring at 69 kHz. The sonic tag eventually would break off from the Temple Tag, leaving the flipper tag with the seal's unique ID.

MMRP Mitigation

Mitigation measures employed during flipper tagging would apply to sonic tagging, as these activities would be conducted concurrently using the same methods to apply tags.

Bleach Marking

Background/Purpose

Bleach marking seals is a well-established technique used by biologists studying pinnipeds to facilitate observation of otherwise unrecognizable individuals. Most of the seals to which marks would be applied would have been previously tagged and have an identity assigned. The presence of a highly visible mark facilitates identification of an individual from a longer distance, and obviates the need to attempt to read the seal's tags to confirm identity, thereby reducing incidental disturbance. Marking is a necessary part of the annual population monitoring program.

Marking Methods

Marking procedures would be identical to procedures described and analyzed in the 2003 EA, with the exception of take numbers. The 2003 EA considered takes of up to 1,500 seals annually, whereas for the proposed action, up to 1,315 seals of any age/sex (excluding lactating females) may be marked annually. The difference in take numbers represents a reduction in abundance for the species.

The technique for marking monk seals in the wild involves crawling towards a sleeping seal from behind and applying a unique identifier (usually a number) to the seal's pelage on the back or side. A bleach ring or "girdle" is also applied over the seal's circumference in the vicinity of the tail. The purpose of the girdle is to facilitate subsequent detection by observers that a seal has been bleached, even if the animal is lying on the previously applied number.

Bleach to be used would be a commercial cosmetic hair lightener, and would be applied from a squeeze applicator (similar to a condiment dispenser) without disturbance to seals asleep on the beach. Marks remain on the seals' pelages until the annual molt, with a maximum duration of one year.

MMRP Mitigation

Bleach is never applied to a part of the pelage which the seal could reach with a fore flipper, to ensure that the animal cannot rub any bleach on its face or in its eyes. Only seals which are asleep would be bleached. Moreover, molting seals, which are more restless and subject to disturbance, would be avoided. Seals would not be bleach marked if they are sleeping in close proximity to other sleeping seals or basking green turtles, or if extrinsic factors exist that could threaten their welfare if they are startled (e.g., rocks). Seals swimming in the near shore area sometimes approach another seal, which is in turn being marked. In such instances, the swimming seal may notice the biologist and vocalize, alerting nearby animals. Researchers would minimize effects on non-targeted animals by not marking seals when other seals are in the immediate vicinity, where they might be startled.

Seals are observed for five minutes after being bleach marked to monitor their behavior and assess the likely efficacy of the mark (bleach is not likely to have a good effect if the

animal goes into the water shortly after marking or the animal may roll onto the mark before the bleach takes, rendering the mark illegible). Follow-up sighting records are maintained of marked seals throughout the field season.

Health Assessment/Disease Investigation and Foraging Investigation - Instrumentation

Health Assessment/Disease Investigation Background/Purpose
Current knowledge of infectious diseases impacting Hawaiian monk seals is based on results of epidemiological surveys of live animals sampled during die-offs (Gilmartin et al. 1980; Aguirre et al. 1999; Aguirre 2000), necropsy examinations of individual dead monk seals (Gilmartin et al. 1980; Banish and Gilmartin 1992), and sampling of overtly healthy animals (Aguirre et al. 2007; Littnan et al. 2006). The purpose of the proposed research is to continue to collect data on pathogens which might impact Hawaiian monk seals, either individually or as a zoonotic or unusual mortality event (UME). Screening of debilitated seals would be to diagnose disease or other conditions which may be affecting an individual seal, or, in the event of a UME, a large number of seals. Screening of healthy seals would be done selectively to help gain a basic understanding of disease exposure to the population, and to establish normal baseline values for hematologic and biochemical parameters.

The specific objectives are to (1) establish normal baseline values for morphometric, hematologic, and biochemical parameters within age and gender classes and conduct baseline health assessment in the MHI; (2) opportunistically, in conjunction with other research in the NWHI, continue health surveillance through biomedical sampling; (3) monitor disease in the population through necropsy and pathological investigation; (4) conduct retrospective health assessment; (5) conduct prospective health assessment on issues of concern; (6) develop prevention and control strategies to mitigate the effects of suboptimal health; (7) develop contingency plans for high risk unforeseen circumstances; (8) explore the role of new potential pathogens as Hawaiian monk seals re-colonize the MHI; and (9) provide recommendations regarding health parameters for translocation and future captive care strategies as developed toward recovery of the population.

The proposed activities have been recommended as Priority 1 research and intervention actions in the Hawaiian monk seal recovery plan (NMFS 2007). Specifically, number 4.1.3 “Further develop protocols for improving early detection of diseases in seals by opportunistic sampling for diseases;” and 4.1.4 “Continue to examine sick animals in the NWHI and MHI to determine cause(s) of disease and treat them appropriately.”

Foraging Investigation – Instrumentation Background/Purpose
Protocols for instrumenting seals with external devices to monitor foraging and diving behavior included in the 2003 EA were limited in scope in comparison to that in the proposed action. In the 2003 EA, MMRP protocols included instrumenting up to 20 seals concurrent with health assessment sampling, where after samples were collected, an instrument package was glued to the dorsal pelage using epoxy adhesive. Improvements on the previous studies of geographic and vertical habitat use of monk seals are now

possible by integrating telemetry instruments that provide detailed information on diving patterns (i.e., vertical foraging habitat) with fine scale information on geographic habitat use to allow direct temporal and spatial matching of three dimensional habitat use. That fine scale integration is important for determining how foraging effort and foraging success of seals may by influenced by the foraging patterns and interactions with conspecifics and other competitors.

Investigating and mitigating factors affecting food limitation of Hawaiian monk seals has been identified as a Priority 1 research activity (Action 1) of the Hawaiian monk seal recovery plan (NMFS 2007). Data on foraging ecology may provide predictive power relative to survival of young seals, providing the ability to address food limitation as a factor limiting recovery of the species. It would also inform release criteria in potential future captive care recovery efforts (not the subject of this application).

Health/Disease Assessment and Instrumentation Methods

Health Screening Methods

Screening would include collections from (1) animals displaying debilitation, emaciation, or abscesses which may be symptomatic of a disease or a disease process; and (2) healthy seals.

Up to 30 unhealthy/ill and 70 healthy seals of any age/sex may be sampled annually (excluding lactating females with pups and nursing pups). Up to 10 moribund seals may be humanely euthanized or die incidental to capture for sampling activities. The methods described in the 2003 EA are largely as described in this document except for take numbers. The 2003 EA considered effects of sampling up to 20 healthy seals and 30 ill seals, and euthanasia of up to 5 moribund seals. The proposed increased take numbers requested by MMRP versus that authorized in the current permit is in response to recommendations in the revised recovery plan (NMFS 2007).

The type of samples collected from injured, ill, or otherwise debilitated seals, as well as the decision on site whether to use sedation on the animal, would be at the discretion of the attending veterinarian. Depending upon the condition of the animal, symptoms it is displaying, and an assessment of the animals' tolerance to restraint, samples would include up to 70 ml blood, viral and microbial swabs from all body orifices and wounds, a blubber biopsy, and morphometrics (girth and length). Seals would be flipper/PIT tagged if not previously tagged. Seals may be recaptured one time for subsequent health sampling.

Weaned pups and juvenile seals are sometimes observed in the wild with large dorsal lumps, which are in fact abscesses resulting from infection of scratches or bites inflicted by aggressive adult males. These abscesses sometimes eventually open and drain, but also may remain closed while the condition of the affected animal deteriorates. Treatment would involve manually lancing the abscesses and flushing them with water and hydrogen peroxide or similar disinfectant.

Procedures for sampling of healthy seals would differ from those used for sick seals. Sedation, if necessary, would be diazepam administered intravenously in the extradural vein at a dosage of 0.1-0.2 mg/kg. After the seal has become sedated, up to 90 ml of whole blood would be collected from the extradural vein using a standard syringe and external T-connector. Microbial and/or viral swabs would be collected from the following sites: eyes, nares, mouth, anus, genital orifice, and external wounds. Two blubber core samples (through the full depth of the blubber layer) would be collected from the dorsal pelvic region using a sterile 6 mm biopsy punch. Seals would be weighed, morphometrics taken, and flipper/PIT tagged if not done previously. Total handling time would depend upon the procedure, but would range from 5 to 20 minutes.

Milk would be collected opportunistically from lactating females during health assessments, only if the female has lost or abandoned her pup (and the pup could not be reunited). Milk would be collected by manual expression of the teat, but no hormones (e.g. oxytocin) would be administered. Milk would be collected in plastic containers and frozen at -20˚ F. Analyses would include proximate analysis of fat, protein, water, and ash.

All samples would be labeled with the identity of the animal being sampled, as well with standard collection data. Swab samples would be preserved via standard methods appropriate to the microorganism being cultured. Whole blood would be spun in the field, per procedures listed in the permit application and serum would be frozen in liquid nitrogen. Blubber biopsies would also be frozen in liquid nitrogen. Samples would be submitted to contractors as listed in the permit application for the following analyses, including but not limited to: tests for brucellosis, toxoplasmosis, leptospirosis, canine distemper virus , phocine distemper virus, herpesvirus, morbillivirus, environmental contaminants including heavy metals and hyrdocarbons, and fatty acid composition. Any samples not destroyed during analyses would be retained in ultra-cold storage by the MMRP. For export, appropriate CITES permits would be acquired.

Foraging Investigation—Instrumentation Methods

MMRP proposes to investigate the foraging ecology of the Hawaiian monk seal, using instruments attached to the seals dorsal pelage to determine foraging locations, diving parameters such as depth and duration, characteristics of foraging substrate, and in certain instances actual prey identification and foraging behaviors. Telemetry instruments may be applied to 60 of the 70 healthy animals sampled for health assessments as described above. Instrumented seals may be may be taken twice to remove the instrument and re-sample and/or if they display symptoms of illness after the first sampling.

A variety of instruments would be used and are specified in Table 1 below, ranging in total combined weight from 27 g to 1 kg (air weight) and would depend on the size of the seal to be instrumented and past deployments known not to have a deleterious effects on seals (see Baker and Johanos 2002; Littnan et al. 2004). Location would be anywhere in the Hawaiian Archipelago.

Seals would be captured and restrained using a hoop net or a stretcher net. Diazepam would be administered intravenously into the extradural vein at a dosage of 0.1-0.2 mg/kg. Atropine may be administered as a pre-medication, based upon the discretion and clinical judgment of the on-site veterinarian. Biological samples would then be collected, as described in health/disease screening above. Once samples have been collected, an instrument package would be glued to the dorsal pelage using epoxy adhesive. Instruments would be attached to the dorsal fur near the shoulder of the seal with a low exothermic adhesive, Devcon 10 Minute Epoxy Clear. Instruments are either recovered or fall off before or during molt. Seals would be monitored after release for normal behavior. MMRP's experience with seals sedated at the stated dosages is that the animals recover from sedation 15-20 minutes after administration of the diazepam. Total restraint time would average approximately 25 minutes, and would not exceed 60 minutes.

Table 1. Types of instruments proposed to be applied to Hawaiian monk seals

Instrument Type	Specifications	Application	Duration of Deployments	# Deployed/Year
MK9 TDR	6.7 cm x 1.7 x 1.7, 30 g in air	Recording dive behavior	Up to 10 months	Up to 20
MK10 GPS Recorder	9.0 cm x 5.0 x 1.2, 64 g in air	GPS Location, Satellite Location, Dive behavior	3-9 months	Up to 40
SPOT 5	6.5 cm x 3.5 x 2.0, 42 g in air	Location only satellite tracking	3-9 months	Up to 20
VHF Radio Tags	6.5 cm x 3.2 x 1.0, 27 g in air	Real time detection and location	Up to 1 yr	Up to 40
SMRU GPS/GSM Tags	10.5 cm x 6.5 x 4.0, 84 g in air	Dive behavior and GPS location transmitted through cell phone network	3-6 months	Up to 20
Crittercam Video System	7cm diameter x 20.2 cm long. 1 kg in air 40 g in water	Video Recording of underwater behaviors	3 d – 2 weeks	Up to 20

Lethal Take of Moribund Animals

Up to 10 moribund/unhealthy seals of any age/sex may be humanely euthanized or die incidental to handling over the 5-year duration of the permit. Euthanasia would occur if an experienced on-site veterinarian determines that there is a high probability of the death of the animal due to the injury or disease condition. In such instances, seals would be captured, sedated, and biologically sampled as described above for health assessments. Thereafter, seals would be injected with a lethal dose of Beuthanasia® (sodium pentobarbital) into the extradural vein at a dose of 1 ml/10 lb. Immediately after the animal has succumbed, a complete necropsy would be conducted, with samples saved from all major organs. Because of the presence of barbiturates in the carcasses, all soft parts not retained would be collected in plastic bags for subsequent environmentally safe disposal (e.g., incineration).

MMRP Mitigation

Mitigation measures described above for handling/tagging seals would apply to any capture activities. The capture team always has a 5-10 minute briefing prior to the event to discuss roles of each team member and contingencies and responsibilities in the event of unanticipated results or action by the animal. Procedures requiring longer restraints such as biological sampling (and instrumentation, see below) would involve the use of sedatives to calm the animal and reduce stress. Restraint times for normal handling without sedation are very short (less than 10 minutes). Because of this, if an animal is captured for health assessment (or instrumentation) but is not sedated within 8-10 minutes, researchers would discontinue efforts and would release the animal immediately.

During an animal's recovery from sedation, vital signs would be monitored, including alertness of eyes, respiratory rate and depth of respiration, and heart rate. In the event of adverse reaction, emergency procedures would be initiated under the advice of an on-site veterinarian. These procedures may vary depending upon the condition of the subject animal, but could proceed in the following order:

1) If respiratory arrest occurs, manual stimulation to restore breathing, including, as necessary, stimulation to face, chest compressions, intubation, and administration of atropine and/or Dopram®. Dopram will be administered IV at dosage of 5 ml (pups/juveniles) and 10 ml (subadults/adults)

2) If cardio-vascular arrest occurs, administration of epinephrine by the most effective means (IV, IM, pericardial, and/or via airway) at a dosage of 1 ml/100-200kg. Dexathmethasone or solu-delta cortef may be administered after arrest to reduce shock.

3) If the emergency appears to result from diazepam overdose, Flumazenil may be administered to reverse the effects of diazepam. Flumazenil will be administered IV at a dosage of 2.5 ml (pups/juveniles) and 5.0 ml (subadults/adults), repeated if necessary. At the discretion of the veterinarian other medications may be administered, including sodium bicarbonate, physiological saline, aqueous dextrose solution, and lactated ringer's solution.

De-worming with Antiparasitic Drugs

Background/Purpose

Hawaiian monk seal abundance is declining primarily due to low juvenile survival associated with food limitation and poor body condition. Monk seals host a variety of gastrointestinal parasites (Dailey et al. 1988, 2004). Reif et al. (2006) reported that young seals infected with tape worms tended to be in poorer body condition than those uninfected.

The proposed study is designed to test the hypothesis that temporarily relieving compromised young monk seals of their parasite burden would improve their chances of survival in a food limited environment. The evaluation of treatment effects would address two questions: (1) Does treatment of young seals improve their physiological condition (weight, body condition ranking, and parasite load)? (2) Is improved physiological condition (#1) sufficient to increase survival under favorable environmental conditions?

This study has been recommended as priority 2 research and intervention action in the Hawaiian monk seal recovery plan (NMFS 2007). Priority 2 action 4.1.7 states "Investigate whether controlled research on deworming could be conducted (on other species or on monk seals) in order to improve juvenile survival by reduction of parasite stress, including the potential negative impacts if not conducted properly."

Before de-worming would be implemented as an enhancement method authorized by the proposed permit, a research study would be conducted to examine efficacy of treatment. If the treatment is proven effective, 200 seals up to age 3 may be treated annually to enhance their survival in the wild.

De-worming Study and Treatment Methods

Based on data over the last 5 years, the maximum numbers of seals that may be included in the research study each year would be approximately 117, including the following: French Frigate Shoals - 47 seals; Laysan Island - 41 seals; and Lisianski Island - 29 seals. Sample sizes may be limited by the number of animals available at each site that match selection criteria below or by the ability of field teams to carry out the study in an allotted time. All available candidates would be used in the study and if limitations occur, MMRP would first sample animals most likely compromised by nutritional stress and parasites, but which are not moribund and unlikely to survive.

MMRP researchers would identify study subjects during standard ground surveys and would assess health status and body condition by visual inspection and examination of digital photos. MMRP uses body condition indices to subjectively score seals as good, medium, thin, or emaciated; indices are based primarily on visibility of the pelvic girdle, ribs, point of the shoulder, peanut head, and vertebrae. Emaciated seals too compromised to treat without high risk of mortality would be excluded from the research study. For future enhancement treatments, once the technique has been deemed effective and of low risk to seals based on results of the research study, MMRP would attempt to treat seals in

the least invasive manner (i.e., not capturing seals for assessments and sampling). Any seal (healthy to emaciated but not moribund) may be treated in the future after completion of the study.

Seals would be randomly assigned to a treatment or control group, or alternated systematically. The goal, to the extent feasible, would be to have equal numbers in each group, matched in age, sex, body condition, and location. Sex matching is important because sex has been recognized to influence worm burden and its effects on the host in other mammals (Wilson and Moore 2002).

The study would be conducted at multiple sites and years, which is necessary due to a high degree of variability in juvenile monk seal survival both temporally and spatially (Baker and Thompson 2006). The relationship between pup condition and survival also varies annually, apparently due to environmental stochasticity (Baker et al. 2007), predation intensity, and other factors (Baker 2008).

Laysan Island would serve as a study site each year as it has a large number of pups born annually, a minimum of mortality factors, and is logistically conducive to the study because it is a single island (as opposed to greater logistic difficulties at multi-islet atolls). Additional study sites include Lisianski Island and French Frigate Shoals. Lisianski is similar to Laysan in terms of known mortality causes and physiography. French Frigate Shoals may serve as an additional site if funding and logistics are available. Based on the results of the study, treatments may be expanded to any location in the Hawaiian Archipelago.

Seals would be handled for treatment (i.e., administration of worming medication or placebo) and follow up assessment (i.e., sampling and weighing) at intervals of spring, summer, autumn, and winter. Seals age 1-2 years would be treated during any of these times. Pups would not be treated during the summer unless confirmed to be weaned for at least 120 days. MMRP epidemiological sampling conducted from 1998-2000 (n=54 for weaned pups) indicated that 100% of pups sampled who were at least 120 days post-weaning (n=15) tested positive for tape worms or round worms. Conversely, only one pup sampled at less than 75 days post-weaning (n=39) tested positive. Therefore, based on those findings and the monk seal's annual birth pulse (peak parturition in May and June; Johanos et al. 1994), fall sampling of weaned pups would ensure that most pups would be infected.

All study subjects would be captured by hand and net, feces collected for subsequent determination of parasite burden/presence (voided feces or fecal sample collected via fecal loop or digital extraction; stored in 10 % formalin), measured and weighed, flipper tagged if necessary, and given an oral dose of praziquantal (Droncit, Bayer) at 5 mg/kg and 10 mg/kg fenbendazole (Panacur), and released. Oral dosing may be done either with a pill or paste form of the drugs, in accordance with protocols that have been used on Hawaiian monk seals (pills) and protocols developed for elephant seals (paste and pills) at The Marine Mammal Center (Sausalito, CA).

The purpose of fecal sampling is to use fecal egg count to evaluate worm burden. Up to three fecal samples per time point to be evaluated would be collected, and the mean fecal egg count would be determined to minimize error due to intermittent worm shedding (Reif et al. 2006). Control seals would be handled and sampled in the same manner as treatment seals, but would only be administered an equal volume of saline solution delivered orally via syringe or squirt bottle.

No sedation would be required for either treatment or control seals. However, the study may be facilitated by conducting it in conjunction with other research involving capture and handling of juvenile monk seals (e.g., foraging and health assessment studies), in which case protocols may involve sedation, biomedical sampling, and instrumentation.

MMRP would attempt to re-treat/capture all study subjects (same protocol as for initial treatment) during subsequent field sessions throughout the year (at approximately 7-12 week intervals) and over subsequent years. Thus, each seal may be treated up to four times per year (excluding pups less than 120 days post-weaning who would receive only three treatments). Additional treatments serve to clear adult worms that survive treatment (or are acquired thereafter) and migrating larva that mature after treatment. Controls would be handled at the same frequency.

Post treatment body condition and fecal egg counts would be determined by observing the seals, collecting scat from known individuals during MMRP monitoring patrols, and capturing and weighing seals. Because condition differences are most likely to be maximal at 2-6 weeks post de-worming, MMRP would attempt to recapture control and treatment seals for weight, measurements, and fecal parasite sampling approximately 4 weeks after each treatment. Thus, each seal may be handled up to 4 times per year post-treatment (excluding pups as discussed above). Visual assessment of condition would be recorded on an ongoing basis throughout the study, using standard MMRP subjective body condition scoring and feces would be preserved for detection of parasites.

Subsequent survival would be determined through visual re-identification during population assessment field research, supplemented by observations made during additional field sessions. The duration of the survival period would be dependent upon the timing of the initial field phase of the study relative to the assessment field season. That is, at those sites lacking a constant field presence, seals that are not observed in the subsequent field session may have died at anytime during the interim from the previous observation. The resolution of the survival assessment is therefore limited by the frequency of the field presence.

The primary statistical analysis would consist of modeling survival (either with capture-recapture or logistic regression) of treatment and control animals to determine whether there is evidence that anti-helminth treatment improves survival. Other factors that influence survival (e.g., predation) would be treated as covariates. Other important analyses would be a comparison of body condition change in treated versus control animals using both quantitative and qualitative measures, and the comparison of parasite loads in control versus treatment seals.

Parasite load would be determined from fecal egg count data, treated as a categorical covariate. Reduction of fecal egg count is the most widely used method to assess the efficacy of anthelminthics (Cabaret and Berrag 2004). Fecal parasite samples analyzed would be classified as low, medium, or high infection. Parasite load in any dead animals collected during the study would be determined through an absolute worm count.

Due to the volatility in annual survival rates of juvenile monk seals, definitive statistical conclusions may not emerge from the first year of the study. However, should preliminary conclusions suggest that the treatment is associated with a beneficial effect on monk seal condition the study may be scaled up (in terms of number of subjects and/or locations) during the subsequent field seasons. Upon determining this treatment effective in improving body condition and/or survival, maximally up to 200 seals up to age three would be treated annually as described above. However given logistical constraints and survival rates, it is unlikely that all seals would be treated four times per year.

Mitigation

Mitigation described for activities requiring handling and restraint would apply to this action. Seals would be monitored by follow up assessments as describe to determine the effects (positive or negative) of worming treatments. If there is any indication that the welfare of the subjects has been compromised by handling, treatment, or any other artifact of the study, MMRP would consult with the Monk Seal Health Care Working Group to evaluate the preliminary results.

Enhancement – Translocation

Background/Purpose

Low survival of pups and juvenile seals is a significant factor hindering recovery of the Hawaiian monk seal. Causes of juvenile mortality include reduced food availability (Craig and Ragen 1999, Gilmartin et al., 1993), shark predation, aggression by adult male seals (Johanos et al. 1999), exchange of nursing pups (Boness 1990), entanglement in marine debris (Henderson 2001), and interactions with fisheries (Ragen 1999). Increasing numbers of seals in the MHI has resulted in increased human interactions, and other threats in the MHI exist that are not present in the NWHI. Moving seals away from high risk areas to safer locations and intervening when mothers exchange or abandon pups is an activity which can enhance the survival of individual animals, and can collectively contribute to increasing the number of immature seals which are available to recruit into breeding subpopulations. The activity would remove seals from areas or situations in which their survival chances are compromised, and would help prevent post-weaning mortality which results from diminished suckling time. Translocations of seals to protect them from predation has been identified as a Priority 1 intervention action in the Hawaiian monk seal recovery plan (NMFS, 2007).

Translocation Methods

The 2003 EA analyzed all of the activities described below, with the exception of take numbers, which have been adjusted based on the number of seals included in

interventions in the past as well as to project increases. Three types of activities would occur, as described below. Seals may be taken more than once by any of the plans. In particular, attempts to unite abandoned pups with a prospective foster mother may occur up to three times or more with the same prospective mother. Other animals may be relocated more than once if they move to another hazardous site, or return to the hazardous site from which they were relocated.

1) Establish/reestablish maternal association: Annually, up to 20 nursing pups of either sex which have become separated from their mothers would be relocated annually to either reunite them with their mother or to another parturient adult female seal which has lost her pup (primarily in NWHI but as necessary at any location in the Hawaiian Archipelago). Abandoned nursing pups would be captured by hand or with a hoop net or stretcher net without sedation, and carried to a parturient female. The transport distance would usually be very short, generally no more than several hundred yards, so transport time would not exceed 30 minutes. In rare instances, intra-atoll transport via small boat may be necessary if the parturient female is located on a different islet from that on which the pup was abandoned. In such cases, the pup is secured by the net in the boat. No holding in a temporary enclosure would occur.

2) Risk alleviation: Annually, up to 35 weaned pups of either sex which have weaned in locations where there is a severely reduced chances of survival, such as areas of high shark predation (e.g., at French Frigate Shoals) or likelihood of human disturbance (i.e., in the MHI), would be moved to other beaches or islets which present less risk. Pups born within the NWHI would be moved to other sites within the same NWHI atoll, and pups born within the MHI would be moved to other beaches or islands in the MHI. Weaned pups in high risk areas would be captured using a hoop net or stretcher net, without sedation. In the NWHI, pups which wean in high risk areas would be captured with a net and transported via small boat directly from weaning site to release site within the same atoll or on the same island. This typically occurs at French Frigate Shoals, transporting from Trig Is. to Tern or another safe island, but could occur at any location in the NWHI where weaned pups are subject to severe and immediate risks of death.

In the MHI, weaned pups in danger of high human contact (and with the potential for exposure to disease, harm, or habituation to humans), transport would be in a cage on a vehicle (truck), boat, plane, or helicopter, and the duration of transport would not exceed 8 hours. Pups would be transported immediately after capture, and no temporary holding in a pen would occur.

Weaned pups at French Frigate Shoals would be instrumented with sonic tags to monitor post-release movements within the atoll (these takes are inclusive of sonic tagging takes as described above). Weaned pups translocated in the MHI would be health screened by an attending veterinarian (as described above), and instrumentation (VHF and/or satellite cell phone GPS tags, as described in Table 2 above) would be deployed to monitor the seals' movements and foraging behavior post-release (dependent on availability of external tags). Most animals transported in the NWHI would not be sampled, because the

transllocations would be of short duration, and a veterinarian is routinely not on any NWHI site.

Other activities under this category would include cutting an umbilicus from a neonate pup which is being encumbered by a placenta, and removing seals from behind the Tern Island seawall at French Frigate Shoals where they could be trapped from entering the water.

3) Survival enhancement: Up to 20 healthy weaned pups and juvenile seals of either sex which have weaned at atolls/islands where juvenile survival is low would be relocated annually to NWHI atolls/islands with higher rates of juvenile survival. Various methods would be used to translocate seals to different atolls/islands within the NWHI depending on locations, age of seals, logistics, time of year, etc. In some cases, seals would be captured with a hoop or stretcher net and transported to a temporary holding area located at the same atoll/island where the seal was captured. The holding pen would consist of a metal fence enclosure encompassing both dry beach area and water to a depth of at least 1 meter or in some instances requiring short temporary captivity (e.g., less than two days), a shaded holding pen may be erected in the vicinity of the field station, and seals would be wetted down periodically.

Transport from capture site to the holding pen would be in a small land cart or a small boat and would not exceed four hours. The duration of temporary captivity would be limited to the amount of time necessary to collect the desired number of animals prior to arrival of the ship or plane for transport and would not exceed to weeks. Seals held longer than 24 hours would be offered IQF (individually quick frozen) herring or locally caught reef fish daily. In some cases, seals may be captured, examined and sampled for health assessment by a veterinarian, instrumented, and released; and recaptured a few days later when transportation is available (e.g., when ship arrives), placed in a cage, and transported to release site. Transport to the destination atoll/island would be via various means, including small boat, ship, vehicle, or plane. Seals would be transported in individual cages under quarantine conditions.
Only seals which appear to be in healthy condition would be collected based upon a field evaluation including a physical, basic blood tests performed on-site, and consultation with an on-site veterinarian. Biological samples would be collected for health and disease screening from seals under veterinarian supervision. Sampling procedures would be identical to those described above for health assessment screening.

When deemed appropriate and feasible, a soft release would be done where a shoreline pen is erected at the release site and seals are held temporarily and offered locally caught reef fish when possible to acclimate them to the new location. Post-release monitoring would occur during regular beach patrols and/or censuses of the island/location of release. Animals would also be monitored post-release using satellite telemetry tags as described above. Survival of translocated seals would be compared to the cohort remaining at the collection location, as well as body condition (by visual inspection) and foraging behavior.

Detailed translocation methods would be submitted each year depending on environmental parameters and conditions of seals at different island locations. The translocation proposal for 2009 is provided in Appendix 3. This protocol is for a minimum two-year study; the first year of the study was approved and carried out in 2008 under Permit No. 848-1695. The MMRP proposes to carry out this study again in August 2009. NMFS has deferred authorization of this enhancement activity until the ESA section 7 consultation is completed for that activity. At such time, NMFS proposes to issue an amendment to Permit No. 10137 to include these takes.

MMRP Mitigation

Whenever possible, seals would not be collected when other seals are in the immediate vicinity to minimize disturbance to animals. When pups are secured by a net during transport by boat, care is taken to ensure the seal's face is visible to monitor respirations and eyes.

Intervening to reunite mother pup pairs or find a surrogate mother for an abandoned pup is a form of mitigation to prevent death of seals. When an abandoned nursing pup is being collected, biologists would not take the pup if it is the vicinity of other seals, particularly mother/pup pairs. To introduce the pup to a parturient female, biologists would need to approach close to the female to place the pup in close proximity to the female, which would result in brief harassment to the adult. The placement would be done quickly, generally by a single person.

All inter-atoll translocations would be conducted after consultation with guidelines delineated in Aguirre et al. 1999. Specifically, capture sites would be selected based upon documented threats to juvenile survival and low survival rates, and release sites would be only at locations where the subpopulation is self-sustaining, and seals do not exhibit signs of nutritional stress. Seals would be monitored post-release by instrumentation as described above as well as regular beach patrols and/or censuses of the island/location of release. Veterinary consultation would be available at all times, and any aberrant behavior or signs of illness would be reported from field staff.

Translocated animals and some relocated animals would be monitored using satellite telemetry or sonic tags as described above. Translocated animals would have been held in strict quarantine during any temporary captivity or transports so the risk of having acquired a disease and transmitting it to the wild population is minimal. All animals would be from the same stock, so genetic exchange is not an issue. Animals would not have been held for sufficient time to become accustomed to feeding by humans or to acquire detrimental behavior patterns.

Regular patrols and censuses of the area would be conducted to resight animals that have been moved. For attempted (re)introduction of nursing pups to parturient females, biologists would observe until it becomes clear whether the prospective foster mother accepted or rejected the pup. For translocations between islands/atolls in the NWHI, a veterinarian would be on site to respond to any aberrant behavior or signs of illness reported by animal care staff.

Enhancement – Adult Male Removal

Background/Purpose

Attacks by single adult males have resulted in monk seal mortalities. This form of single male aggression occurs at most or all locations and appears to involve behavior which ranges from normal pinniped male harassment of younger animals, to an aberrant level of focused aggression, especially directed toward weaned pups. This was most notable at French Frigate Shoals in 1997, where at least 8 pups died as a result of adult male aggression (Caretta et al. 2005). Many more pups were likely killed in the same way, but the cause of their deaths could not be confirmed. Observations and research indicate that male aggression is a learned male behavior, probably associated with male-biased adult sex ratios (Gilmartin and Alcorn 1987). Death typically occurs either from immediate drowning when pups are mounted in the water or from infections resulting from bite wounds.

The objective of removing aggressive adult males is to increase survival of pups and juvenile seals at selected sites where adult male seals have been documented and confirmed to be killing the young animals; and in the case of mobbings, subadult and adult females. The number of animals is based upon knowledge of the number of individual animals which have been involved in such attacks in recent years. Other means to change behavior of aggressive males (e.g., pharmacological use of testosterone suppressants) have been tested and did not prove feasible for use in the wild. The proposed action has been determined to be a Priority 1 intervention action by the Hawaiian Monk Seal Recovery Team (NMFS 2007). Specifically, action 7.1.2 states "Remove aggressive males, translocate if possible, or euthanize; periodically review criteria for removing aggressive males."

Adult male removal Methods

MMRP would remove adult male seals from sites in the NWHI in cases where the individual seals are known to cause mortality to nursing pups, weaned pups, or immature seals; or, in the event mass mobbing attacks are observed. Removal may include any of several options, including moving seals to sites within the MHI or Johnston Atoll, capture for permanent maintenance in captivity, or euthanasia. Adult males would be taken by capture, restraint, and sedation, sampling, transport, and release; or euthanasia. The applicant requested taking up to five adult males over the 5-year duration of the permit. However, the HMSRT recommended the MMRP be authorized to take up to 10 seals over a 5-year period in the event mass mobbing attacks occur in the future. The 2003 EA analyzed removal of 10 males, which is what is currently permitted. NMFS proposes to authorize the removal of 10 males (with 2 accidental mortalities) in the proposed permit. The purpose of this is to facilitate immediate action by MMRP in the event of future mobbing incidents or increases in adult male aggression toward immature seals. In addition, if non-lethal means were used to remove a large number of males involved in mobbings, NMFS would permit up to two incidental mortalities during removal activities such as capture and transport.

In all cases, animals to be taken would be adult males that have been positively identified as being directly responsible for fatal attacks on immature Hawaiian monk seals or on subadult and adult female seals. If an aggressive adult male is reported to be attacking seals, all options presented below would be considered before action is taken. Transports via vessel or aircraft would only occur after a permanent captive facility or translocation site were determined.

1) Permanent Captivity: Seals would be captured and restrained using a hoop net or a throw net, and diazepam would be administered intravenously into the extradural vein at a dosage of 0.1-0.2 mg/kg. Atropine may be administered as a pre-medication, or as an emergency drug for treatment of certain cardiovascular emergencies and complications (e.g., bradycardia), based upon the discretion and clinical judgment of an on-site veterinarian. Seals would then be transported either to a temporary holding pen located at the atoll of their capture or directly to a transport vessel. Local transport would be via either small boat or over land, as appropriate to the location, and would not exceed two hours.

Seals placed in a temporary holding pen would remain there until a vessel is available to transport them to an available facility or other holding site in the MHI. Seals in the temporary pen would have both shallow water and haulout space available to them. If seals are held longer than four days in the pen, reef fish would be caught and placed in the pen to give the seals an opportunity to feed. Seals may be again sedated with diazepam prior to their transport from the holding pen to the transport vessel. During transport on the vessel, seals would be maintained in individual cages and kept wet during daylight hours. Transport to the MHI holding facility aboard the vessel would not exceed one week. Seals would be offered herring daily on the ship during transport.

Currently no facility has been identified for temporarily holding seals on Oahu prior to transport to a permanent facility. Seals would not be brought in unless a site had been identified for temporary captivity and a permanent facility was willing to take the seals and obtain the necessary permits to accommodate them. Details on holding facilities would be provided prior to removing males from the wild for permanent captivity.

2) Relocation of adult males: Adult males would be treated identically to those taken for permanent captivity (above) except for their final destination. Seals would be transported to Johnston Atoll or the MHI for release. Animals would also be health screened in accordance with procedures listed above. Prior to release, each animal would be sedated and fitted with a satellite transmitter so that the animals' positions can be determined. This would provide information on the fate and destination of the seals, should they move away from the release site. Seals may be taken more than once if they return to the site from which they were removed and resume aggressive behavior against immature seals.

3) Lethal removal of adult males: If neither option described above is available, seals would be humanely euthanized. Seals would be captured, sedated, and sampled as described above. Thereafter, seals would be injected with a lethal dose of Beuthanasia®

(sodium pentobarbital) into the extradural vein. At least 60 ml (lethal dose 1 ml/10 lb) would be injected. Immediately after the animal has succumbed, a complete necropsy would be conducted, with samples saved from all major organs. Because of the presence of barbiturates in the carcasses, all soft parts not retained would be collected in plastic bags for subsequent environmentally safe disposal (e.g., incineration).

MMRP Mitigation

Seals would be captured at a beach which is accessible by small boat or transported over land using a portable cart or similar transport. If no cart is available on an island, an adult seal would not be captured unless it is on a beach accessible by small boat. Animals would always be kept wet throughout the duration of transports during the day.

Temporarily holding adult seals in a pen at other islands can be accomplished only if pen construction materials and sufficient staff for restraining adult seals and constructing a pen are available on-site. When MMRP has advance documentation of aggressive males, MMRP would be able to devote sufficient resources to consider temporarily holding adult males in a pen at the site. Seals placed in a temporary holding pen would remain there until a vessel is available to transport them to an available facility in the MHI or release location in the MHI or Johnston Atoll. This length of time held in a temporary pen should not exceed two weeks. If availability of a vessel within two weeks is not assured at the outset, seals would not be captured. In the event that seals are captured and placed in a pen, but circumstances delay arrival of the transport vessel, the condition of seals would be evaluated and other options for removal would be considered. If action is required on short notice at a site that lacks additional personnel and pen materials, if feasible, the MMRP would dispatch a vessel with transport cages and capture personnel.

During all restraint procedures, adult males seals would be sedated with diazepam to reduce stress during handling. Transported seals would be kept wet throughout all daylight hours, but would be otherwise undisturbed.

If seals are euthanized, sodium pentobarbital is a means of administering euthanasia accepted by veterinarians. The proposed action would result in the affected animals being permanently removed from the NWHI, including death. In all cases, the least intrusive alternative would be used. Other means to change behavior of aggressive males (e.g., pharmacological use of testosterone suppressants) have been tested and did not prove feasible for use in the wild.

Procedures for responding to emergencies to mitigate negative impacts from restraint or sedation would be followed as described above for health assessment sampling.

Enhancement – Disentanglements

Background/Purpose

Marine debris and derelict fishing gear have been well documented to entangle Hawaiian monk seals, which have one of the highest documented entanglement rates of any pinniped species (Henderson, 1984, 1985, 1990, 2001). Between 1982 and 2006, a total

of 268 entanglements of monk seals were documented, including 118 in fishing gear. There were 57 serious injuries (including 32 from fishing gear) and 8 mortalities (including 7 from fishery items). Of the 268 animals found entangled, 183 were released, 69 escaped unaided, 8 died, and 8 were not released, with their fate unknown. The number of annual entanglements has varied during the 25-year history of the program, with a documented high of 25 incidents in 1999 that represented 1.7% of the total population (Donohue et al. 2001). Despite annual efforts by MMRP staff to remove entanglement hazards from beaches, entanglement rates continued to increase until large-scale management efforts to remove debris from the habitat of the monk seal was initiated in 1999. In 2000, the number of entanglements decreased markedly, although this number has subsequently increased and is a cause for concern.

The objective of disentangling seals is to alleviate the effects of seal interactions with marine debris or fishing gear, by removing entangling debris or fishhooks which may afflict individual seals, thereby increasing chances of an individual's survival. Field camps with boats also remove debris from marine habitats when possible and have released seals entangled in offshore waters. These activities have been identified in the Hawaiian Monk Seal Recovery Plan (NMFS, 2007) as Priority 1 intervention actions. Specific actions are: 2.1 "Continue programs that facilitate the disentanglement of animals," and 6.1.5 "Mitigate mortality by removing hooks from seals."

Disentanglement and De-hooking Methods

MMRP biologists would release Hawaiian monk seals that have become entangled in marine debris, or remove fishhooks from monk seals that have become hooked to increase their chances for survival, as described in the 2003 EA. An unlimited number of seals of any size or sex would be taken annually from any site in the Hawaiian Archipelago, but typically this would not exceed 75 animals annually.

Seals which are observed to be entangled by nets, lines, or other marine debris would be freed via two possible methods: (1) Animals would be captured with a hoop net or a stretcher net, restrained, disentangled (by hand or by using a cutting implement), and freed; or (2) The entangling item would be cut free using a cutting implement attached to a long pole, with no attempted restraint of the animal. The choice/use of each technique would be at the discretion of field personnel performing the rescue. If a line or net fragment has become embedded in the tissue of the animal, the entangling item would be removed as carefully as possible to avoid further injury to the seal. This may require cutting the item at several sites to avoid pulling net knots out through tissue. Betadine® or similar disinfectants may be applied if warranted and available on site. Seals which are released may be either on the beach or on a near shore reef.

Hooks would be removed from seals by restraining the animal in a hoop net or stretcher net and removing the hook by hand. The animal may be sedated if necessary to ensure the safety of responding personnel. Sedation procedures would be identical to those described for health screening above, and would be done by a veterinarian. Any entanglements in the MHI to which PIFSC responds would be coordinated with the stranding coordinator at PIRO.

Field camps with boats (French Frigate Shoals, Pearl and Hermes Reef, Midway and Kure Atolls, and occasionally Laysan Is.) also remove debris from marine habitats when possible and have located and released seals entangled offshore. All occurrences of entangled individuals are recorded, including seals with fresh entanglement scars that were not previously observed. The entangling gear, or a sample thereof, is also collected and catalogued. Data are provided to the NMFS Stranding Coordinator at the Pacific Islands Regional Office (PIRO).

MMRP Mitigation

Disentangling seals and removing hooks is a form of mitigation to prevent serious injury and death to monk seals. Mitigation employed to minimize impacts to subject seals used during other monitoring/capture/handling events applies here. Biologists would attempt to remove entangling items without restraint (i.e., by using a long-handled cutting implement) whenever possible. If restraint is necessary, seals would be cooled with water if restraint is not near the waterline and is during midday times.

Necropsy Dead Seals

Background/Purpose

A review of the causes of mortality of a sub-set of seals necropsied did not reveal infectious disease as a significant cause of overall mortality (Banish and Gilmartin 1992). However, there have been three events during which mortality or reproductive failure raised concern over the potential role of disease: a die-off of at least 50 seals on Laysan Island in 1978, a cluster of four aborted fetuses on Laysan Island in 2000, and a die-off of at least 11 seals throughout the NWHI in 2001 (Antonelis et al. 2001). In 2001, the discovery of four dead seals on Laysan Island within one week led to the declaration of an unusual mortality event (UME) of monk seals in that year. The cause of the high mortality was not determined, although six carcasses examined were emaciated with no evidence of underlying disease. An Unusual Mortality Event (UME) contingency plan has recently been published by PIFSC for the monk seal (Yochem et al. 2004). Protocols have been developed for a variety of procedures including sample collection and banking, and necropsy examinations, and training has been instituted for field staff. Archives of tissues and samples have been developed by sampling all animals sedated for research purposes and by performing complete necropsies on all dead animals found. Cell cultures of skin, brain, lung, kidney and spleen have been established in laboratories for potential future analysis and isolation of pathogens.

Dead seals provide additional information on the health and ecology of the species. Examination of tissue samples can reveal illnesses which afflicted the seal and cause of death. Determination of parasite load provides information on the overall health of the animal, and examination of stomach contents can help determine food habits and foraging behavior. Samples of muscle, organs, or blubber can be examined for presence of environmental contaminants, the presence of which may be suspected in certain areas. Samples from long decomposed carcasses can nonetheless provide information on stock structure through DNA analysis, and skeletal samples can provide valuable reference

materials. Necropsies are intended to gather maximum biological information from Hawaiian monk seals found dead. The activities have been identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007) as a Priority 1 action (specific action: 4.3 "Maintain current disease monitoring programs").

Necropsy Methods

MMRP would conduct necropsies on carcasses of Hawaiian monk seals found dead in the Hawaiian Archipelago as described in the 2003 EA. Responses to dead seals in the MHI are coordinated with the stranding coordinator at PIRO. No take of live animals is involved, solely retention of marine mammal parts for determination of cause of death. The number of necropsies to be conducted is unlimited.

Carcasses of seals would be necropsied in manner normal for phocids and specific to Hawaiian monk seals (Winchell 1990) and protocols defined in the Field Manual for Hawaiian Monk Seal Research for sampling and analysis. The permit application specifies samples to be taken, appropriate method of sample storage, and sample analyses. Specimens would be retained according to the condition of the carcass. If the animal has recently died and the carcass is in good condition, samples from all major organs would be retained and life history and morphometric data recorded. If the carcass is in poor condition, a limited set of data would be collected, including size (measurements), sex, and general description. Skulls would be retained for subsequent measurement and additional skeletal materials may be retained. Necropsy data are given to the stranding coordinator at PIRO for completion of NMFS stranding forms.

Opportunistic Sample Collection

Background/Purpose

Examination of tissue samples collected opportunistically are used for multiple purposes. For example, tissues from reproductive failures may be particularly valuable, as abortions or premature parturition may be symptoms of zoonotic diseases (Smith et al. 1974, Gilmartin et al. 1976). Scats and spews provide an easily accessible source of digestive remains from pinnipeds. Examination of hard parts can provide valuable, though biased, information on some dietary preferences, and presently provides the best available long-term information on monk seal diet (Goodman-Lowe 1998; Longenecker et al. 2006). Evidence of gastro-intestinal parasites, including ova as well as intact organisms, can be found in scats and spews. Monk seals undergo an annual molt which, unlike most other pinnipeds, is termed 'catastrophic', wherein the epidermis is shed along with the fur. Fragments of molt therefore include tissue remnants (epidermis) which contain DNA, and may be useful in genetic analyses.

The objective of the proposed activity is to gather specimens which can provide important biological information but which would not directly take animals. This activity is intended to gather maximum biological information from Hawaiian monk seals and has been identified in the Hawaiian Monk Seal Recovery Plan (NMFS 2007) as a Priority 1 action (specific action: 4.3 "Maintain current disease monitoring programs").

Opportunistic Sample Collection Methods

As described in the 2003 EA, MMRP opportunistically collect specimens, including placentae, scats/spews, and molted fur/skin, at haulout sites of Hawaiian monk seals. No marine mammals would be directly taken during the specimen collection, but some animals may be incidentally harassed. Placentae are collected to be examined for possible causes of perinatal death; scats/spews are collected for dietary analyses; molt/skin would be collected and retained for DNA isolation.

Placentae would be collected only from pups which are stillborn, or which experienced perinatal death. Many of these placentae would still be attached to the carcasses of the pups (and would be therefore collected as part of necropsies), but some may be separated from the pup, particularly if the pup was alive for a short time after birth or if the pup carcass has been washed to sea.

Retrieval of most scats, spews, or molted fur/skin samples would occur after seals have departed the haulout locations to forage at sea, leaving behind samples of interest. In some instances the identity of the seal which left the sample or item would be determined if tracks are evident between a seal still on the beach and the item to be collected.

Preservation methods for all specimen items would be as described in the Field Manual for Research on the Hawaiian Monk Seal and in the permit application. Necropsy specimens and subsamples of placentae would be fixed in formalin for histopathological analyses, and the entire remaining placenta would be frozen. Molt/skin samples would be collected and kept dry. Some necropsy samples are frozen in liquid nitrogen. Scats would be stored in a solution of detergent/seawater, although subsamples of fresh scats would be preserved in PVA (polyvinyl alcohol) to be examined for parasite eggs. Whole parasites from scats and spews would be preserved in AFA (alcohol, formalin, acetic acid–for cestodes and trematodes) or AG (alcohol, glycerin–for nematodes). Other items from spews (bones, otoliths, scales, beaks, etc.) would be preserved in ethanol, although fresh flesh from spews may be frozen for ciguatera analyses.

Mitigation (necropsies and sample collection)

Researchers would reduce disturbance as discussed in mitigation measures for monitoring and other activities. Sample collections would not be made if seals are in the immediate vicinity and would likely to be disturbed by the activity. No placentae would be collected if the birth mother is still in the immediate vicinity and liable to be disturbed. Carcasses would be moved to areas away from where seals haul to avoid disturbance.

Import/Export of Biological Samples (Parts)

Biological samples (hard and soft parts) from Hawaiian monk seals may be exported/re-imported for analysis, per list of cooperating agencies in the permit application. Currently the only cooperators are in Canada. MMRP requests export (with subsequent re-import) to any country (world-wide) in the event additional cooperators are identified to run analyses. All exports would be from Honolulu, Hawaii, a U.S. designated port. Samples of Mediterranean monk seals (*Monachus monachus*) may be imported/re-

exported if necessary for analysis related to the conservation of monk seals. CITES permits would be obtained as necessary for all exports. The permit would only authorize import/export of samples already legally taken, and MMRP is not requesting the take of additional samples.

Incidental Harassment and Mortalities

Up to 200 seals of any age/sex may be incidentally disturbed while researchers conduct research and enhancement activities on other seals. Hawaiian monk seals hauled out on the beach may also react to human presence at field camps (i.e., living in tents). Seals may also react to small boat operations (transits and landings to support the work and set up camps).

Unintentional mortality or serious injury is possible as a result of capture/restraint activities. MMRP are requesting a total of five accidental mortalities of animals handled over five years, not to exceed two in a given year (excluding incidental mortalities of seriously injured or moribund seals). As described in the methods above, up to 10 moribund/unhealthy seals of any age/sex may be humanely euthanized or die incidental to handling over the 5-year duration of the permit. For the purposes of this EA, up to 10 adult males could be euthanized or removed from the population; and if a large number of adult males involved in mobbings were removed by non-lethal means, up to two incidental mortalities could occur.

Mitigation measures described above for each research procedure are intended to reduce impacts to seals, including reducing the potential for incidental harassment and mortalities.

CHAPTER 3 AFFECTED ENVIRONMENT

This chapter presents baseline information and a description of resources within the action area necessary for consideration of the alternatives. The effects of the alternatives on the environment are discussed in Chapter 4.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

Economic and social factors are listed in the definition of effects in the NEPA regulations. However, the definition of human environment states that "economic and social effects are not intended by themselves to require preparation of an EIS." An EA must include a discussion of a proposed action's economic and social effects when these effects are related to effects on the natural or physical environment.

Although there are a variety of human activities that may occur in the action area such as tourism (including ecotourism), shipping, military activities, and recreational uses (such as fishing and boating), the social and economic effects of the proposed action primarily involve the effects on the researchers themselves, as well as any industries that support the research, such as charter vessels and suppliers of equipment needed to accomplish the

research. Permitting the proposed research could result in a low level of economic benefit to local economies in the action area. However, such impacts would be negligible on a national or regional (state) level.

3.1.1. Native Hawaiian Culture

The NWHI is closely tied to the cultural heritage of Native Hawaiians, especially those islands in the eastern portion closest to the MHI. Numerous artifacts found on Nihoa Island establish a close relationship with the Native Hawaiian culture. There is evidence of habitation, religious ceremonies, agriculture, and burials at 88 archaeological sites on Nihoa. Artifacts at Necker Island suggest the island was used in prehistoric times for religious ceremonies. Of the 52 known archaeological sites, 33 are religious shrines. Many of the temple sites closely resemble those of the Marquesas Islands and Tahiti, possibly establishing a link to early Polynesian cultures. Oral history and identified artifacts demonstrate that these islands have also served as fishing grounds for the people of Hawaii for centuries. Both Nihoa and Necker Islands are on the National Registry of Historic Places. Green sea turtles (*Chelonia mydas*) also represent a cultural and natural legacy for the Native Hawaiian community.

The MMRP would conduct research on Nihoa and Necker islands and may incidentally disturb green sea turtles during research. The MMRP is required to obtain a permit to work within the Papahānaumokuākea Marine National Monument, and the permit would contain conditions to mitigate impacts to these cultural sites. To minimize disturbance to archeological sites on Nihoa Island, total duration on Nihoa would be minimized, and all activities would be restricted to the camping site, path of transit (either along shore or over the island), and beach. All researchers would receive a cultural briefing to increase their sensitivity of the cultural significance and

Native Hawaiian's spiritual and genealogical connection to the natural and cultural resources to these sites prior to entering the Monument, as required by the Monument.

In the MHI, there could be perceived impacts to native Hawaiian fishing communities, if, for example, rogue adult male monk seals are translocated to the MHI where interactions between seals and local fisheries is known to occur (Caretta et al. 2008). However, other options to remove aggressive males from the NWHI could be used by the MMRP including placing adult male seals in permanent captivity, translocating them to Johnston Atoll, or euthanizing the seals. In addition, the best estimate of the subpopulation in the MHI is 83 seals (Caretta et al. 2008) and the addition of a limited number of seals would not significantly impact interactions with local fishermen. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects. Therefore, this EA does not include further analysis of social or economic effects of the proposed action.

3.2 PHYSICAL ENVIRONMENT

The 2003 EA for Permit No. 848-1695 describes the locations of the action area: the Hawaiian Archipelago and Johnston Atoll (NMFS 2003; see Chapter 3.0, section 3.1, pp. 43-46). The Hawaiian Archipelago is comprised of the NWHI and MHI. NWHI locations include Nihoa Island, Mokumanamana (Necker) Island, French Frigate Shoals, Gardner Pinnacles, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll. MHI locations include Kaula Rock, Lehua Rock, Niihau, Kauai, Oahu, Molokai, Lanai, Maui, Kahoolawe, and Hawaii.

3.2.1 Sanctuaries, Parks, Historic Sites, etc.

On June 15, 2006, the Papahānaumokuākea Marine National Monument (hereinafter "Monument") was created by Presidential proclamation. The Monument is jointly managed by co-trustees including the NOAA National Ocean Service, the U.S. Fish and Wildlife Service, and the State of Hawaii Department of Land and Natural Resources. Permitting by the co-trustees provides authority to the researchers to operate in the following areas, which are overlaid by the Monument: Hawaiian Islands National Wildlife Refuge, Midway Atoll National Wildlife Refuge, Battle of Midway National Memorial, Northwestern Hawaiian Islands State Marine Refuge, Kure Atoll Hawaii State Seabird Sanctuary, and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.

The Monument is the single largest conservation area in the U.S. and encompasses the entire NWHI chain including 139,797 square miles of the Pacific Ocean (105,564 square nautical miles). In addition to providing habitat to over 7,000 marine species, the Monument is of great cultural importance to Native Hawaiians, as discussed in Section 3.1.1., Native Hawaiian Culture, above.

Current uses permitted in the Monument are limited primarily to management activities by jurisdictional agencies, research, education, Native Hawaiian practices, a small scale commercial bottomfishing and pelagic trolling operation (slated to close in 2011), and a small number of recreational trips and visits to historical sites at Midway Atoll.

The following locations in the MHI are special areas under jurisdiction of U.S. Dept. of Interior, National Park Service (NPS): Kalaupapa National Historical Park (Molokai), Volcanoes National Park (Hawaii), and Haleakala National Park (Maui). The State of Hawaii, Department of Land and Natural Resources has jurisdiction over the following special areas on Oahu: Manana (Rabbit) Island, Mokolua Islands, and Kaena Point Natural Area Reserve. The NOAA National Ocean Service has jurisdiction over the Hawaiian Islands Humpback Whale National Marine Sanctuary, which lies within the shallow (less than 600 feet) waters surrounding the main Hawaiian Islands. Military areas in the MHI include the Kaneohe Marine Corps Base Hawaii, Oahu and the Pacific Missile Range Facility, Kauai (including Kaula Rock). Johnston Atoll is a National Wildlife Refuge under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS),

and as such any observations there would require and be conducted under a Special Use Permit issued by USFWS.

3.2.2 Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated for many of the fish species within the action area. Details of the designations and descriptions of the habitats are available in the Fishery Management Plans of the Western Pacific Fishery Management Council. Activities that have been shown to affect EFH include disturbance or destruction of habitat from stationary fishing gear, dredging and filling, agricultural and urban runoff, direct discharge, and the introduction of exotic species. None of the activities in the Proposed Action are directed at or likely to have an impact on any designated EFH.

3.2.3 Designated Critical Habitat

Critical habitat for the Hawaiian monk seal (50 CFR 226.201) includes all beaches, sand spits, islets, and surrounding waters out to a depth of 20 fathoms in the NWHI, excluding Sand Island at Midway Atoll.

In July of 2008, NMFS received a petition by three conservation groups to establish revised critical habitat for the Hawaiian monk seal to include haulout areas and waters out to a depth of 200 meters around the MHI, and to extend NWHI critical habitat out to a depth of 500 meters. NMFS published a *Federal Register* notice on October 3, 2008 with a 90 day public comment period. A determination as to whether NMFS will modify critical habitat will be made in July 2009.

None of the activities proposed are likely to have a significant impact on designated critical habitat of the Hawaiian monk seal. In the NWHI, field camps are temporary structures erected under the permit authority of the Monument with appropriate mitigation in place to minimize impacts. Researchers would not impact USFWS plant critical habitat. MMRP would not erect permanent structures or otherwise modify critical habitat. Researchers would stay on footpaths whenever accessing beaches and would work with USFWS to identify critical habitat locations for USFWS plant species in the MHI in order to avoid those locations. However, no pens or other structures would be erected on plant critical habitat in any location in the Hawaiian Archipelago. Researchers are trained by USFWS prior to deploying field camps to avoid plant critical habitat in the NWHI.

3.3 BIOLOGICAL ENVIRONMENT

The target species of the proposed action is the Hawaiian monk seal, and the current status of the species is presented below. A variety of non-target species can also be found within the action area, and the following discusses the distribution and abundance of these species and whether and how the proposed activities may affect them. Research activities are proposed to occur at any time of year.

3.3.1 Hawaiian monk seal

The 2003 EA provides information on the species distribution, population trends, life history, and impacts of human activities on the endangered Hawaiian monk seal at that time. In 2003, the population size of Hawaiian monk seals was estimated to be 1,409 based on 2001 census data collected by MMRP (Caretta et al. 2003). In 2008, the best estimate of the population size was 1,208 (Caretta et al. 2008) based on data from 2006. The total of mean beach counts excluding pups at the main reproductive subpopulations in 2006 was approximately 66% lower than in 1958. The current 4% rate of decline suggests the population will fall below 1,000 individuals within five years (NMFS 2007). Based on data collected in 2008, the population estimate is 1,146 (C. Littnan, personal communication, December 9, 2008).

With few exceptions, low juvenile survival primarily due to starvation (Figure 1) has been widespread in the NWHI since 2000, resulting in the continued population decline. In contrast, the subpopulation in the MHI appears to be increasing (Baker and Johanos 2004), and seals in the MHI are in better body condition than those in the NWHI. The best estimate of the MHI subpopulation is 83 (Caretta et al. 2008). It has not been confirmed whether the MHI subpopulation is increasing, and numbers in the MHI appear to be too low to strongly influence trends for the species (Caretta et al. 2008). Additional threats to the species include shark predation, especially at French Frigate Shoals, and entanglements in marine debris. Commercial fishing operations in the NWHI are limited and will close in 2011. In contrast, fishery interactions are increasing in the MHI. Interactions observed include hookings and entanglement in near shore gillnets (Caretta et al. 2008). Additional threats in the MHI include potential spread of disease (e.g., leptospirosis and toxoplasmosis) from humans and domestic and feral animals; human disturbance and physical interactions with seals, especially on popular tourist beaches; and potential collisions and oil spills associated with high boat and ship traffic (Caretta et al. 2008).

Figure 1. Emaciated yearling monk seal at French Frigate Shoals, NWHI (Permit No. 848-1695).

3.3.2 Other Marine Mammals

Spinner Dolphin

Spinner dolphins (*Stenella longirostris*) occur in the Hawaiian Archipelago and may be affected by the proposed activities. The spinner dolphin is not listed as threatened or endangered under the ESA and is not listed as depleted or a strategic stock under the MMPA. Under CITES, spinner dolphins are listed on Appendix II; and under the IUCN as low risk.

Spinner dolphins that may be affected by the proposed action are part of the Hawaiian stock, and are referable to the subspecies *S. longirostris longirostris* (Caretta et al 2008). The most current population estimate for the Hawaii stock is 2,805 based on a 2002 ship survey; however, this may be low since limited effort was given to near shore areas where spinners are common (Barlow 2006). In the NWHI, atoll-associated communities at Kure Atoll range from 120-180 individuals; at Midway Atoll from 260-320 individuals; and at Pearl and Hermes reef approximately 350-450 individuals (L. Karczmarski, personal communication, January 14, 2009).

Up to 500 spinner dolphins may be harassed during boat transits within the lagoon waters at four NWHI sites (Midway Atoll, Pearl and Hermes Reef, Kure Atoll, and French Frigate Shoals). This incidental harassment could occur at any time of year, but would predominantly be during summer months.

Other Cetaceans

Humpback whales (*Megaptera novaeangliae*) mate and calve in winter months in the MHI, where aerial and vessel surveys of Hawaiian monk seals would take place, and have been observed in the NWHI, where vessels transit to deploy field camps. Humpback whales are listed as endangered under the ESA and are on CITES Appendix I. Abundance of humpback whales for the entire North Pacific Ocean is estimated to be 18,302 individuals, with over 50% of the population (approximately 10,000) estimated to winter in Hawaiian waters (Calambokidis et al. 2008). Most aerial surveys would occur during summer months when these whales are not present, but vessel and aerial surveys and transporting seals by air and boat could occur year-round.

Other cetacean species that may be encountered near-shore in the MHI would include (in decreasing order of encounters) bottlenose dolphins (*Tursiops truncatus*), pantropical spotted dolphins (*Stenella attenuate*), and pygmy killer whales (*Feresa attenuate*) (R. Baird, personal communication, January 6, 2009). While transiting among the islands and atolls in the NWHI, cetacean species that may be encountered include humpback whales, bottlenose dolphins, pantropical spotted dolpins, Blainville's beaked whales (*Mesoplodon densirostris*), false killer whales (*Pseudorca crassidens*), sei whales (*Physeter macrocephalus*), and rough-toothed dolphins (*Steno bredanensis*) (M. Hill, personal communication, January 13, 2009) as well as numerous other cetaceans known

to occur in the MHI that may also be present in the NWHI (R. Baird, personal communication, January 6, 2009).

However, none of these cetaceans would be affected by the researchers' activities as appropriate mitigation would be implemented to avoid harassment from aerial and vessel surveys and vessels transiting island locations. Aerial surveys would be conducted above shoreline areas; in the event cetaceans were encountered near shore, researchers would fly to an altitude of 1000 feet to avoid harassment. If encountered by boat, researchers would maintain a distance of 50 yards (150 feet) for cetaceans other than humpback whales, and a distance of 300 feet if a humpback whale is encountered. These approach distances are consistent with Federal Regulation (50 CFR 224.103) to avoid take if humpback whales are encountered and NMFS guidelines to avoid harassment of other cetaceans.

3.3.3 Green Sea Turtle

The 2003 EA provides information on the status, distribution, and effects of the proposed activities on green sea turtles (*Chelonia mydas*). Updated information is provided here. On land, sea turtles are under the jurisdiction of the USFWS and in water, under NMFS jurisdiction. The Pacific population of the green turtle nests in the NWHI and would be affected by the proposed activities when on land. The green sea turtle is listed as threatened under the ESA and endangered worldwide under the IUCN.

Since harvest practices stopped in 1974, the Hawaiian stock has increased and is believed to be 83% of its historical size, giving an estimate of 61,000 for the Hawaiian stock (Chaloupka and Balazs 2007). In 2004, over 500 green turtles were recorded nesting at the East Island rookery at French Frigate Shoals (Chaloupka and Balazs 2007), where over 90% of Hawaiian green turtles nest. Additional important areas for resident sea turtles include the coastlines of Oahu, Molokai, Maui, Lanai, Hawaii and at large resting areas in the reefs and islands surrounding French Frigate Shoals, Lisianski Island, and Pearl and Hermes Atoll.

Research activities may cause incidental disturbance of to up to 140 basking green sea turtles (under the jurisdiction of the USFWS) annually in the NWHI. The threat of boat strikes would be minimized by operating small boats at a moderate speed while watching for objects in the water including turtles. Special caution would particularly be paid in shallower waters within the atoll to avoid any disturbance to green sea turtles in water. Therefore, no takes of green sea turtles in water would occur.

3.3.4 Other Sea Turtle Species

Other sea turtle species found in Hawaii include *Dermochelys coriacea* (leatherback sea turtle), *Eretmochelys imbricate* (hawksbill sea turtle), and *Lepidochelys olivacea* (Pacific Ridley sea turtle). Only the hawksbill nests on the islands of Hawaii, Maui, Molokai, and Oahu, although nesting is not abundant (NMFS unpublished data). None of these species would be affected by the proposed activities because appropriate mitigation would be

implemented to avoid activities co-occurring in locations with these turtles and/or to avoid disturbance. Researchers do not work at night so no nesting animals would be disturbed. If turtles are sighted during the day, research activities would not occur in that area. Boat drivers would watch for turtles to avoid disturbance or collision.

3.3.5 USFWS Bird and Plant Species

Laysan Finch

The 2003 EA considered impacts to the Laysan finch (*Telespyza cantans*), listed as endangered under the ESA and vulnerable according to the IUCN. It is endemic to Laysan Island and was introduced to Pearl and Hermes Reef in the NWHI. Laysan finches are a single species and population numbers fluctuate widely, with current estimates to be 17,780 $\pm$ 2819 individuals (Bechaver et al. 2006).

Annually, up to 200 Laysan finches may be disturbed and unintentional mortality or serious injury of two Laysan finches is possible during monk seal research and enhancement activities on Laysan Island and Pearl and Hermes Reef.

Other ESA-listed Birds

As indicated in the 2003 EA, MMRP activities would not affect the following three of the four endangered birds in the NWHI (Nihoa millerbird, *Acrocephalus familiaris kingi*, Nihoa finch, *Telespyza ultima*, and Laysan duck, *Anas laysanensis*). All of these species occur primarily in the vegetated or interior areas of the islands and would rarely if ever come into contact with MMRP personnel.

Non-ESA Listed Sea Birds

Laysan albatross (*Phoebastria immutabilis*), the blackfooted albatross (*Phoebastria nigripes*), the masked booby (*Sula dactylatra*), the brown noddy (*Anous stolidus*), all nest in beach areas frequented by monk seals and could be incidentally harassed during the proposed activities. There is a limited risk of them becoming trapped in a shoreline pen. Effects to these species were not addressed in the 2003 EA. All of these birds are listed under the MBTA. Other sea bird species protected under the MBTA occur in the NWHI; however, researchers' activities would not co-occur with the nesting locations of these birds.

Plants

MMRP activities would have no effect on any of the endangered plants which occur in the NWHI (*Amaranthus brownii, Mariscus pennatiformis, Pritchardia remota, Schiedea verticillata,* and *Sesbania tomentosa*), as described in the 2003 EA. All MMRP activities would be on the beach or perimeter of the vegetation zone, and personnel do not enter the interior of the islands except at Tern Island, French Frigate Shoals, where personnel may transit on the runway. Moreover, MMRP maintains strict quarantine procedures

mandated by permits issued by the Monument to avoid introducing species which might adversely affect the native biota of the NWHI.

Because Hawaiian monk seal numbers are increasing in the MHI, and therefore researchers are conducting activities more frequently in the MHI than addressed in the 2003 EA, NMFS requested and received a species list from the USFWS for plant and animal species listed under the ESA and which might occur in the action area in the MHI - coastal beaches/areas where monk seals haulout. Based on the list provided by the USFWS, NMFS has determined that MMRP activities would not affect ESA-listed plant species that occur in the MHI. Some plants may occur on or near trail paths leading to beaches were monk seals haulout, including *Centaurium sebaeoides* (‘Awiwi), *Ischaemum byrone* (Hilo ischaemum), and *Panicum fauriei var. carteri* (Carter’s panic grass). These species are threatened by human disturbance and are known to exist in areas where humans access beaches. However, the MMRP would take all precautions necessary to avoid contact with these plants. This includes training MMRP biologists on the identification and locations of such plants and working with the USFWS to develop a training protocol to implement for work in the MHI. When accessing beaches via footpaths, MMRP researchers would stay on the path where no vegetation occurs.

It would be highly unlikely that MMRP biologists would encounter other coastal ESA-listed plant species, or they would be easily avoidable because of their obtrusive size; and thus, there would be no effect on these species. These include the following: *Achyranthes splendens var. rotundata*, *Chamaesyce celastroides var. kaenana* (‘Akoko), *Cyperus pennatiformis*, *Hedyotis st.-johnii* (Na Pali beach hedyotis), *Kanaloa kahoolawensis* (Kanaloa), *Marsilea villosa* (‘Ihi ihi), *Peucedanum sandwicense* (Makou), *Pritchardia affinis* (Loulu), *Scaevola coriacea* (Naupaka), *Schiedea apokremnos* (Napali coast schiedea), *Sesbania tomentosa* (‘Ohai), and *Vigna o-wahuensis*.

Other USFWS Species

Other ESA-listed species under the jurisdiction of the USFWS which may occur in coastal areas include *Branta sandvicensis* (Nene or Hawaiian goose), *Manduca blackburni* (Blackburn's sphinx moth), *Gymnothorax hilonis* (Anchialine muraenid eel), and *Macrobrachium grandimanus* (Hawaiian prawn). NMFS has determined that none of these species would be affected by the proposed activities. Nene do not occur on beaches where monk seals haulout and would not be encountered. The moth is extremely rare and primarily inhabits lowland forests and shrublands. The eel would not be affected because researchers do not capture seals on lava or in tide pools. MMRP protocols specify that seals would not be captured in streams, and therefore the Hawaiian prawn would not be affected by the proposed activities. In the event researchers do come into contact with and disturb threatened or endangered species under the jurisdiction of USFWS, MMRP would promptly notify the USFWS.

3.3.6 Other Species

The extensive coral reefs found in the Hawaiian Archipelago provide habitat to over 7,000 marine species, a quarter of which are endemic. Bony fish, sharks, and rays live within a variety of habitats including seagrass beds, coral or rocky reefs, sandy bottoms and the open ocean. Hawaiian waters contain hundreds of unique and endemic coral reef fish species, one quarter which are found nowhere else in the world. There are hundreds of species of invertebrates in the NWHI in addition to corals, including urchins, lobsters, crabs, snails, octopus, jellies, and sea stars. The NWHI supports about 70% of all coral reef habitat in U.S. waters. Source: http://hawaiireef.noaa.gov/.

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

This chapter represents the scientific and analytic basis for comparison of the direct, indirect, and cumulative effects of the alternatives. Regulations for implementing the provisions of NEPA require consideration of both the context and intensity of a proposed action (40 CFR Parts 1500-1508).

4.1 EFFECTS OF ALTERNATIVE 1: No Action

Not issuing the permit, i.e., permit denial, would obviate the potential adverse direct and indirect effects of the proposed research on the target and non-target species and any potentially adverse direct effects on the physical environment. Permit denial would also eliminate beneficial effects on conservation of Hawaiian monk seals that would be derived from the results of the research and enhancement activities, as discussed in the 2003 EA (Section 4.1.2) and here.

This alternative only involves denial of the single permit in question. The MMHSRP permit for stranding response for ESA-listed marine mammals would authorize disentanglements, necropsies, and moving seals in the MHI for the health and welfare of individual animals. MMRP researchers could also use the MMHRSRP permit for emergency response activities in the NWHI if necessary. However, researchers would not be able to conduct annual monitoring activities (ground, vessel, and aerial surveys), tagging, marking, foraging and health assessment studies, resulting in a gap in population census data for this. Without monitoring, documenting and responding to injuries, disentanglements, and seals in imminent danger would not be possible. There would be a lack of information from research studies to better understand the cause of the decline and inform future management actions. Euthanizing moribund animals during a UME could occur under the MMHSRP permit if necessary; but field presence is necessary to identify a UME in the NWHI.

Without authorization of the de-worming study, an important component of research directed toward recovery would not go forward. Only one in five monk seals in the NWHI survive to maturity, meaning recruitment of animals into the breeding population will diminish significantly in the future - the effects of which will be compounded when older breeding females become senescent based on the current population structure

(Figure 2). The de-worming study would help determine if anti-parasitic treatments can benefit immature animals in the wild to improve their body condition and ultimately survival. If results prove effective in these measures, this treatment could then be implemented as an effective and efficient enhancement tool to aid in recovery of the species. As well, data from sonic tagging weaned pups at French Frigate Shoals would be used by the Monument in consideration of permitting mitigation of shark attacks, such as culling sharks.

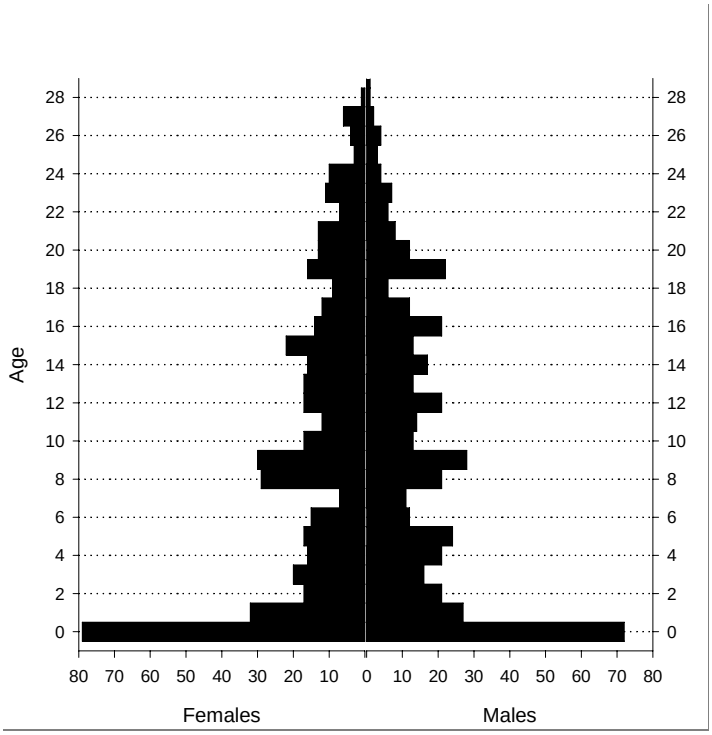

Figure 2. Age distribution for the Hawaiian monk seal population in the NWHI (NMFS MMRP).

4.2 EFFECTS OF ALTERNATIVE 2: Issue Permit with Conditions

4.2.1 Physical Environment

Effects on the physical environment in the NWHI have been described in the 2003 EA, including effects of using and anchoring small boats and large support vessels and establishing and breaking down field camps in the NWHI. In addition, to enter the Monument researchers are now required to possess a permit, which contains conditions to mitigate effects to physical resources within the Monument (see Appendix 4 for Monument protocols required for packing for field camps and moving between islands/atolls within the Monument). Camping on Nihoa Island to conduct monk seal monitoring activities could disturb fragile archaeological sites, which has been discussed in Section 3.1.1, Native Hawaiian Culture. We present below information not provided in the 2003 EA.

The construction of temporary shoreline or land-based pens to hold seals temporarily (up to 2 weeks) for translocations would not permanently alter substrate nor significantly impact water quality. A limited number of animals would be held at any given time, so feces and urine would not concentrate more than would from a natural aggregate of seals. Wastes would be diluted from currents and scats would be removed from the dry section of the pen. Pens would be dismantled after use and all materials would be removed, leaving only a temporary footprint.

External instruments deployed on monk seals for foraging and monitoring studies are sealed by plastic polymer resin. Therefore, no leakage of metals or other materials from batteries would occur in the water column or on haulout areas if researchers are not able to retrieve the instruments and they fall off when an animal molts.

Sensitive areas in the MHI (sanctuaries, national parks, etc.) would not be significantly affected by researchers' activities. No structures would be erected, substrate altered, etc.; and all work would be done in coordination with and where necessary, permitted by, the appropriate agency. MMRP routinely works with other agencies to facilitate monk seal research and enhancement activities. MMRP would obtain State permits for accessing Rabbit Island and Lehua Rock in the MHI. In Kalaupapa National Park, park service employees are required to escort MMRP staff into the park. MMRP would conduct boat surveys as much as possible to avoid sensitive areas; and if landing is required, would only access beaches.

4.2.2. Hawaiian monk seals

Effects of standard research and enhancement activities on the target species, Hawaiian monk seals, were described in the 2003 EA (see Section 4.3.2, Effects on Biological Environment, pp. 61-67) including the effects of monitoring (censuses, photo-ID, bleach marking), flipper tagging/PIT tagging/morphometrics, capture events with sedation (biomedical sampling and instrumentation), disentanglements, euthanasia/removal of adult males and moribund animals, necropsies, opportunistic collection of samples on the beach, and import/export of parts. Here we summarize effects of standard procedures and provide analyses of projects not previously permitted.

Overview of Takes Used in 2003-2007

The following summarizes the total number of take activities that occurred during 2003-2007 as reported by the MMRP:

- 24 seals were incidentally harassed during non-monitoring activities (total)
- 825 seals were flipper tagged (range 137-205/year)
- 51 seals were re-tagged (range 2-33/year)
- 2702 seals were bleach marked (range 327-630 seals/year)
- 41 seals were biologically sampled and instrumented (range 2-18/year)
- 103 weaned pups were relocated to improve survival (14-29/year)

- 20 nursing pups were moved to reunite with or find surrogate mothers (1-5/year)
- 9 seals were provided captive care (see below for more information)
- No adult males were removed from the population
- 58 animals were disentangled (range 6-16/year)
- 94 necropsies were conducted (range 10-25/year)
- 16 samples were exported to Canada for *Brucella* and fatty acid analyses

There were no notable differences in reactions to these activities as previously assessed in the 2003 EA, other than two mortalities described below. NMFS notes that the MMRP were delinquent on annual reporting for the majority of the current permit. The 2003-2007 report was the first report submitted for Permit No. 848-1695 (issued June 10, 2003). This report was received on May 30, 2008 and no other reports were received prior to that, although annual reports were due each year. NMFS proposes to add a special condition to the subject Permit no. 10137 in response to this delinquency, discussed below in Section 4.5.

Effects of Activities Proposed under Permit No. 10137

Effects of Monitoring and Bleach Marking

For every seal observation collected by the MMRP, a note is coded if disturbance[3] to the animal or incidental disturbance to those surrounding the individual occurred. Reaction behaviors typically include looking around, vocalizing at observer, moving a short distance away, or fleeing into the water. Previous data indicate that 2.4% of observations result in a disturbance, with approximate numbers of annual disturbances ranging from 300 to 1,400 occurrences out of 12,500 to 58,000 approaches. Approximately 50% of these disturbances involve seals' movement of less than two body lengths, and are not considered traumatic events. For the period of 2003-2007, less than 1% of observations resulted in seals fleeing into the water (MMRP Permit No. 848-1695 Annual Report 2003-2007). Individual seals would be observed multiple times, so regardless of the disturbance rate, it is possible that every seal in the population could be disturbed during monitoring at least once, several times, or not at all over the 5-year duration of the permit. The annual takes requested (1,440) are based upon site-specific enumerated subpopulation levels from 2007, with additional takes added to (1) account for potentially increasing subpopulation levels at each site over the 5-years; (2) account for possible movements of animals among islands; and (3) include estimated subpopulation levels at Necker, Nihoa, and Niihau where little information currently exists.

Based upon observations of seals at NWHI locations where airfields are present (Kure Atoll, Midway Atoll, and French Frigate Shoals), seals have reacted to aircraft landing immediately overhead by merely raising their head. Aircraft at survey altitudes do not

[3] A seal is considered disturbed if it moves in response to having seen the observer. Levels of disturbance are coded according to whether the seal does not notice the observer (0); alerts and/or moves less than two body lengths (1); moves two or more body lengths but remains on the beach (2); or flees into the water (3).

appear to illicit a behavioral response. Aerial surveys of seals in the MHI were conducted with no reactions to the survey platform (plane and/or helicopter) noted by observers (MMRP Permit No. 848-1695 Annual Report 2003-2007). Seals have been observed to rarely react to vessels approaching from a distances of 10 meters.

Bleach marking seals is a well-established technique used by biologists studying pinnipeds to facilitate observation of individuals. Biologists of MMRP have marked an average of 580 Hawaiian monk seals per year since 1995, and no increase in mortality or change in haulout behavior associated with this activity has been observed. Individual seals may awaken during bleach marking, with or without seeing the person applying the mark. Reaction behaviors are the same as described for monitoring. Short term effects are brief expenditures of energy. No long term effects are anticipated.

Effects of Research Procedures Requiring Capture and Handling

Capture and handling is necessary for tagging, biological sampling, instrumentation, some disentanglements, and during translocations and adult male removal activities. The MMRP has conducted studies to determine if research/handling activities have detrimental effects on Hawaiian monk seals, presented below.

Individual seals would experience some varying degrees of stress and discomfort when being restrained, depending upon the activity undertaken. Seals would experience temporary stress during capture and restraint for flipper tagging procedures, and some pain during the application of tags, but would suffer no long-term effects. Henderson and Johanos (1988) determined that capture, brief restraint without sedation, and flipper tagging had no effect on subsequent behavior of weaned pups and no measurable harmful effects.

Disentanglement from marine debris would also cause temporary stress, but will probably save the animal from death or serious injury. Once entangled, unless a seal can free itself or is freed by researchers, the animal may suffer from (1) increased hydrodynamic drag while swimming and pursuing prey; (2) severe wounds that may become infected and lead to secondary complications and death; (3) severance of vital tissues, particularly in the neck and head region; and (4) death by strangulation, drowning, starvation or shark attack.

Seals would suffer temporary pain during sample collection (blood, biopsy, swabs) and stress from capture/handling. Attachment of instruments would also increase stress, because the individual seals would be held for longer durations. Sedatives (valium) would minimize stress during these procedures. Valium has been used on Hawaiian monk seals for decades with no reported adverse reactions associated with its use. There is some risk to individual seals of infection at the blood/biopsy sampling site or unintentional mortality during restraint/handling. The proposed activities may also cause incidental harassment to seals other than the individuals being sampled. Restraint and harassment would result in increased energy expenditure due to the animals' movement.

Animals that go into the water post-release are observed until out of sight, and no incidents of shark predation have been observed by the MMRP.

Baker and Johanos (2002) conducted an extensive study to examine the effects of handling/ sedation, tagging, blood sampling, and instrumentation. The authors reported that there were no effects on survival, migration, or condition of the tagged seals observed a year after the handling event. Moreover, sample sizes were sufficient to detect a 9% difference in resightings. The authors concluded that conservative selection procedures and careful handling techniques had no deleterious effects on Hawaiian monk seals. Littnan et al. (2004) measured the impact of Crittercam attachments on the dive behavior of juvenile monk seals. They found that for short duration deployments (< 2 weeks) there was no detectable difference in dive behaviors (i.e., dive depth, dive duration, foraging trip duration) with or without the camera attached. Crittercams are the largest and least hydrodynamic of the telemetry instruments proposed to be used, so it is unlikely other technologies are impeding the seals' abilities to forage.

Moving seals away from high risk areas to safer locations and intervening when mothers exchange or abandon pups is an activity which can enhance the survival of individual animals, and can collectively contribute to increasing the number of immature seals which are available to recruit into breeding subpopulations. Exchange of nursing pups and fostering by adult females is common among Hawaiian monk seals (Boness 1990). This can result in disparate suckling duration, with the final outcome a 'superweaner' and a runt. Diminished suckling with attendant premature weaning severely compromises a pup's ability to survive during the post-weaning period when it relies on fat reserves as it learns to forage. Parturient females which have lost their own pup are known to adopt and nurse other pups through an entire normal nursing duration (Alcorn and Henderson 1984).

MMRP biologists have simultaneously observed lost/abandoned/orphaned pups which are actively seeking a nursing female, and parturient females which have lost their pup actively seeking another pup to nurse. Sometimes the animals unite and a mother/pup bond is established, but at other times, due to distance or other barriers, physical contact is not established. In the latter instances, the abandoned pup dies or disappears, and the female will generally depart the area within 24-36 hours.

The proposed activity would help prevent post-weaning mortality that results from diminished suckling time. Abandoned nursing pups that are relocated to a potential foster mother would experience stress and risk injury due to possible aggression by a non-receptive female. However, abandoned pups are certain to die if they do not suckle, so the potential benefit of being able to suckle far outweighs stress or injury the animal may receive soliciting milk from a non-receptive female.

Another activity aimed to increase survival of young seals is relocating seals away from imminent danger, such shark predation. In 2007, 21 pups within French Frigate Shoals were relocated from high predation areas (i.e. Trig, Round, or Gin Islands) to areas of low predation (Tern Island and East Island). After translocation, none of the weaned

pups were observed with shark bites or disappeared due to shark predation for the remainder of the field season, whereas in the past, all pups left at Trig post-weaning were preyed on by sharks. A more detailed account of results of other translocation activities is presented below.

Mortality

There is some risk to individual animals of mortality during restraint. Baker and Johanos (2002) describe accidental mortalities of five adult males captured from 1982-1999, three of which were attributable to capture stress; causes of two were undetermined, but one seal may have had an underlying medical condition prior to capture. Based on results of that study, the mortality rate for handling monk seals was determined to be 0.1% (Baker and Johanos 2002).

More recently, two incidental mortalities occurred during research and enhancement activities during 2003-2007 (MMRP Permit No. 848-1695 Annual Report 2003-2007). One occurred at Midway Atoll in 2006. The animal that died was a medium juvenile female that died in captivity from complications associated with stress. Such incidents have been reported before for compromised juveniles undergoing captive care, and the applicant provided information on veterinary oversight for future occurrences. The second mortality occurred in the MHI in 2007. Researchers captured an immature female seal for health sampling and instrumentation. During the initial capture event and before the seal was under control, it hit its head on lava rock (substrate where seal was hauled out) and subsequently died due to blunt trauma to the head. Mitigation has been implemented by the MMRP to avoid this occurring again, and seals are not captured if they are hauled out on such substrate or where other hard surfaces, e.g., rocks, are present.

NMFS is proposing to authorize a total of four accidental mortalities of healthy animals handled over 5 years, not to exceed two in any given year. The likelihood of this happening is extremely low based upon past performance (Baker and Johanos 2002). Given the most recent population estimate of 1,146 (based on data collected in 2008), and an approximate annual decline of 4%/year, the removal of two individuals would represent a maximum loss of approximately 0.2% of the population in any one year. In the very unlikely event that the maximum allowable loss over the 5 years was realized, the proportional loss would be far lower than 0.2% as the removals would be spread over multiple years in the context of a population experiencing natural turnover (births and deaths). These loss rates would not appreciably reduce the likelihood of survival and recovery of the species, especially given that any losses would likely involve both females and males (and such small scale male removals could have little or detectable impact on demographic trends). The proposed activities would be undertaken to inform decisions on management of the species and to directly carry out enhancement activities necessary to mitigate factors impacting survival. The need to conduct activities delineated in the recovery plan to promote recovery of the species outweighs the risk of handling animals, which is proven from past experience to be very low.

Moribund Seals

The MMRP has not routinely examined or sampled emaciated, moribund, injured, or otherwise debilitated seals. It is likely that such animals may succumb during sampling; therefore, the applicant has requested humane euthanasia or incidental mortality of up to 10 moribund seals of any age/sex, over the 5-year duration of the permit. The 2003 EA analyzed the effects of euthanasia or mortality of five seals. As discussed in the 2003 EA, the effects to the population of euthanizing these seals would be equivalent to the animals not being handled, because the animals would die regardless. Once an animal reaches a certain negative condition, the probability of that animal dying or disappearing is very high, especially for emaciated seals. Hawaiian monk seal carcasses are rarely recovered; therefore, causes of death are often uncertain (Baker 2008). In order to understand why these animals are dying, sampling them before they disappear would provide investigators with information imperative for monitoring the disease status of the population. This action is consistent with the Recovery Plan (NMFS 2007; Action 4.0, "Minimize exposure and spread of infectious disease" – which includes developing protocols for early detection of diseases and examining sick seals to determine causes of disease).

Adult Male Removal

The 2003 EA analyzed the effects of removing up to 10 adult rogue males known to kill or severely injure immature seals (Section 4.3.2 Effects on the Biological Environment, pp. 65-66). The 2003 EA also provides background information on past incidents of male aggression (see Section 1.3.6 Purpose and Need for Adult Male Removal, pp. 10-12). The most notable incident occurred at French Frigate Shoals in 1997, where at least eight pups died as a result of adult male aggression (Carretta et al., 2007). Most recently, in 2007 at Laysan Island, a weaned male pup died from injuries incurred by male mounting, and a subadult female disappeared after receiving severe mounting injuries. However, the rogue male seal was not identified. The possibility remains that such a scenario could develop at any time.

Previous efforts have halted such mortalities, and the MMRP is prepared to take action again if the situation dictates. The proposed action would reduce pre-weaning and early post- weaning mortality of monk seal pups at the location of taking. This increased early survival may enhance recruitment into the population in subsequent years if the additional pups that survive as a result of the action live to recruitment age. Surviving female pups in particular would prove valuable to the population as they would in turn be a source of future pups. In addition, mobbing (mass attacks on single female seals by more than one male) is a phenomenon that has occurred in the past, predominantly at Laysan Island (the 2003 EA provides background information on mobbing in section 1.3.6, Purpose and Need for Adult Male Removal). While mobbing attacks have not been observed in recent years, the Hawaiian monk seal Recovery Team (HMSRT) recommended that the MMRP be permitted to remove up to 10 adult males identified as participating in mass mobbing attacks in the event this happens again in the future. NMFS is proposing to authorize the removal of up to 10 adult male seals by the various means described above.

Hawaiian monk seals are polygynous; and therefore, removal of up to 10 adult males would not adversely affect the species. Additionally, if non-lethal removal methods (i.e., captivity or translocation) were used to remove large numbers of males involved in mobbing, NMFS would authorize incidental mortalities of up to two seals. The benefits of enhancing the survival of female pups attacked by rogue males outweigh the removal of the males from the population. The same analysis would apply to removing adult males involved in mass mobbing attacks on adult or subadult females. Not taking action against aggressive adult male seals known to kill or injure other seals could have detrimental impacts to the population.

Effects of Deploying Sonic Tags

Up to 35 pups at French Frigate Shoals would be tagged with sonic tags concurrent with flipper tagging at weaning each year, over no more than three years. The effect of attaching one additional Temple tag with a sonic transmitter is expected to be consistent with effects of standard flipper tagging. There would be short-term stress from restraint and pain when the hole is punched and tag is applied, but it would not significantly increase the duration of restraint (it would take less than a minute to apply an additional flipper tag). The weight of the sonic tag (3.6 grams in air and 2.2 grams in water) is not expected to significantly increase the drag associated with the flipper tag or cause the flipper tag to pull out, and it would eventually come off of the flipper tag. Having one additional flipper tag (i.e., three tags total, two on one hind flipper and one on the other) is not expected to have significant impacts. Multiple flipper tags have been applied to seals in the past (e.g., rehabilitated and translocated seals have had four tags applied, two on each flipper to distinguish birth and release locations) with no recorded impacts above that for standard flipper tagging. The sonic tags would transmit signals at 69 kHz. This frequency is outside of the hearing range for Hawaiian monk seals (Thomas et al. 1990); and therefore, we do not anticipate monk seals would be affected from the sound produced. Effects to non-target species such as predatory sharks are discussed below.

Effects of Translocating Seals

Analysis of Past Efforts

The following analysis of past translocation and other similar enhancement projects designed to improve immature female survival is taken directly from the recent "Report of the Hawaiian Monk Seal Captive Care Workshop, Honolulu, Hawaii, June 11–13, 2007" (Baker and Littnan 2008) and personal communications with the MMRP during 2008. This analysis presents updated information since the 2003 EA.

From 1981-1991 at Kure Atoll, in response to low recruitment of adult females, a "head start" program was conducted to protect weaned female pups from shark injury and attacks by adult male seals. During this time, 32 pups were collected and held in a large shoreline enclosure during summer months. Live reef fish and invertebrate species were introduced into the water in the fenced enclosure. Average first-year survival of the penned native seals (85%) was the same as non-penned seals. None of the seals died during the temporary captivity at Kure.

In 1990, five healthy weaned pups were translocated from French Frigate Shoals directly to Kure Atoll, where they were "soft" released by holding them for a few weeks in a fenced shoreline enclosure and offering them live local reef fish prey. A sixth translocation of a weaned pup from Oahu to Kure was conducted in 1991. Survival of these translocated seals was similar to Kure native-born seals for the first two years of life, and none died as a result of handling, transport, or temporary captivity.

During 1984–1995, undersized weaned female pups and some ill juvenile seals in poor body condition were collected from French Frigate Shoals and transported to Oahu for captive care involving feeding and medical treatment for approximately 6 months to a year, and released at Kure and Midway Atolls. Of 103 female seals collected, 16 seals (16%) died during rehabilitation, and nearly the same number was deemed non-releasable and placed in permanent captivity. In 1992, the effort was expanded to handle more immature seals because more were dying in the wild. In this case, post-release survival was below average because of a number of factors: poor condition of animals; quality of treatment per individual was compromised due to lack of resources; and the release site was changed from Kure to Midway. Pups collected in 1995 contracted an eye disease of unknown etiology, which caused blindness in 10 of the 12 pups. These animals were deemed non-releasable, and this event caused cessation of the rehabilitation effort. To date, a definitive cause of the eye disease has not been determined.

Resighting data suggest that translocated seals move away from the recipient atoll more than native seals. In 2005 at Kure and Midway, the number of living seals that had undergone captive care or descended from those seals was at least 32 and more likely on the order of 45.

After an 8-year hiatus, captive care of Hawaiian monk seals was resumed in 2003 when a prematurely weaned female pup was cared for in a shoreline pen at Midway in the summer. This animal was last sighted in November 2003 and is presumed dead.

In 2006, a rare set of twin female Hawaiian monk seals born on Midway and undersized at weaning were flown to Oahu for captive care. These animals were transported back to Midway and placed in a shoreline pen. Four weaned pup females and one yearling female were collected for inclusion in the captive care project on Midway. The yearling died from complications associated with stress in captivity, similar to what was observed with juveniles collected in 1992. The remaining six seals were released in March 2007 and were instrumented with satellite-linked global positioning system (GPS) dive recorders, and VHF radio tags. All animals have since disappeared.

In May 2008, a male neonate rejected by his mother was captured on Kauai for rehabilitation on Oahu under the MMHSRP Permit No. 932-1489. While in captivity, he developed bilateral corneal opacities and temporary blindness of unknown origin, similar to that observed in 1995 (however, no conclusive evidence was presented to determine if the disease was the same). After learning to feed and gaining sufficient weight, the animal was health screened and examined by opthamologists; and no cause of the eye

disease was determined. No infectious disease agents were identified. In December 2008, the pup was released on Molokai and is being monitored using satellite and VHF tags. He appears to be exhibiting normal foraging behavior and is not seeking human attention. The seal will be monitored visually and re-captured for eye exams and disease screening every three months for a year beginning in March 2009 (under the MMHSRP permit).

In July and August 2008, the MMRP captured, sampled, and instrumented six weaned pups (three of each sex) at French Frigate Shoals and translocated them directly to Nihoa, the island in the NWHI closest to the MHI. This was the first translocation effort in which seals were captured for examination, sampling, and instrumentation; released and recaptured a few days later (versus temporary holding) to be put on the support vessel. This was the first translocation of animals to Nihoa, and the seals were released from a small boat near the beach. The subpopulation at Nihoa has not been well studied, but animals there appear to have moderate body conditions – better than what is seen in the most of the NWHI but not as robust as the MHI. This study would be conducted again in 2009 (see Appendix 3). As of May 2009 a minimum of 50% of the seals translocated from French Frigate Shoals to Nihoa were known to be alive and foraging normally in comparison to seals born at Nihoa, while at French Frigate Shoals the current survival estimate for the same cohort is 27% (C. Littnan, personal communication, May 11, 2009).

Disease and Other Considerations of Translocations

Risk of disease introduction to the recipient translocation site is one possible effect of translocation. Epidemiological studies of monk seals have revealed spatial differences in some hematological and morphological data that may reflect differences in health status or foraging efficiency between islands, but did not show significant differences in presence of diseases (Aguirre 2000; Reif et al. 2004; Aguirre et al. 2007). Disease monitoring results suggest that Hawaiian monk seals have been exposed to caliciviruses, herpesviruses, adenoviruses, *Chlamydia* spp., *Brucella* spp., *Toxoplasma gondii*, *Leptospira* spp., and *Dirofilaria immitis* (Reif et al 2004; Littnan et al. 2006; Aguirre et al. 2007). A novel herpesvirus isolate has been identified from captive and wild monk seals (Goldstein et al. 2006) and has been theorized as a possible cause of the eye disease in rehabilitated seals. To date no epidemics of infectious disease have been identified.

While disease effects on monk seal demographic trends are uncertain, there is concern that diseases of livestock, feral animals, pets or humans could be transferred to naive monk seals in the MHI and potentially spread to the core population in the NWHI (Yochem et al. 2004; Littnan et al. 2006). Increased use of the MHI by monk seals increases the risk of their exposure to infectious diseases such as leptospirosis that are currently present in humans and animals on the main islands. However, MMRP is not proposing to translocate seals between the NWHI and MHI.

Genetic exchange is not a concern as the species is considered one stock, and has extremely low genetic variability (Schultz et al. 2009). Behavioral considerations such as acclimation to and dependence on humans for food are not of concern since the translocations proposed would not involve holding animals for more than two weeks. As

with any capture event, seals would experience temporary stress with capture, handling and transport; seals would have to acclimate to their new location; and seals could die during capture events.

In summary, the MMRP would undertake translocations with the goal of enhancing the recovery of the population. All six of the primary breeding sites in the NWHI are now undergoing protracted periods of low juvenile survival. The MMRP proposes to undertake interventions that will improve the survival probability of individual seals by translocating them to a site that is growing or which displays other indices of favorable conditions. Such actions are the best option currently available for preserving the reproduction potential of young seals and buffering against further system-wide population decline. The net benefit from this action, at a population level, outweighs any detriment of removing seals from the host site. However, if the donor site demonstrates multiple successive years of increased juvenile survival, the MMRP would reevaluate additional translocations. Measures would be in place to ensure no disease transmission between donor and recipient sites, and a veterinarian would be present to conduct the health assessments and monitor the health of animals during capture and transports. The MMRP would take into consideration past efforts summarized here in order to maximize the success of future translocations. The MMRP would proceed slowly and cautiously, while remaining highly attentive and responsive to any indications that do not support the hypotheses on which an intervention is conceived.

The permit would be conditioned to require that specific protocols are provided to NMFS at least three months in advance of undertaking a translocation. In this process the MMRP would be required to provide specific reasoning for site selection and the number of animals to be moved. For example, in the specific case currently under consideration (presented in Appendix 3), evidence indicates that survival at the host site (French Frigate Shoals) is well below that of the recipient site (Nihoa). There is also evidence that Nihoa could hold more animals than are currently there based on: (1) an increasing trend in counts; and (2) pup size at weaning is better at Necker and Nihoa than at the six main NWHI subpopulations, suggesting that mothers are experiencing greater prey availability. Hawaiian monk seal pups appear to lack necessary knowledge for long range oceanographic orientation, the physical prowess, or the motivation to engage in the long range movements that would deliver them to other sites with more favorable conditions than their natal site. Therefore, the great majority of pups are effectively locked into conditions at their natal site, regardless of the prevailing conditions there. Translocation is meant to enhance the survival of young seals by moving them to areas where their chances of survival are greater.

Effects of De-worming Treatments

Fenbendazole (a benzimidazole anthelmintic) and praziquantel (a prazinoisoquinoline derivative anthelmintic) are proposed to be administered orally to monk seals in the wild to remove intestinal roundworms and tapeworms, respectively. Both drugs are routinely used in pinnipeds undergoing rehabilitation, domestic animals, and humans. Fenbendazole works by damaging cells in parasites, and there is a wide margin of safety

for this drug because of its affinity to the parasite rather than the mammalian host[4]. Fenbendazole is marginally absorbed by the host after oral administration and is metabolized to the active compound oxfendazole (sulfoxide) and sulfone. In sheep, cattle, and pigs, 44-50% of a dose of fenbendazole is excreted unchanged in the feces, and less than 1% is excreted in the urine (Plumb 1999). Fenbendazole is well tolerated at higher doses in domestic animals and is safe in pregnant dogs and other domestic species. Hypersensitivity reactions secondary to antigen release by dying parasites may occur, and vomiting has been documented to infrequently occur in dogs or cats receiving fenbendazole (Plumb 1999).

The exact mechanism of action of praziquantal has not been determined - it appears to impair the function of the parasite's suckers or result in paralysis of the parasite. The dying parasites are dislodged and may enter systemic circulation or may be destroyed by phagocytosis[5]. However, in some cases entire tapeworms are passed in the feces (NMFS unpubl. data). In humans, praziquantel is rapidly metabolized by the liver to inactive mono-and polyhydroxylated derivatives, which are mainly excreted in the urine. Within 24 hours after a single oral dose, 70 to 80% of the metabolites were found in urine, but less than 0.1% of excreted compounds were found as the unchanged drug[5]. Praziquantel also has a wide margin of safety and is safe for use in pregnant dogs and cats. When used orally, praziquantel has caused anorexia, vomiting, lethargy and diarrhea in less than 5% of incidences with usage in dogs (Plumb 1999).

MMRP has administered the drugs proposed in this study, praziquantel and fenbendazole, to Hawaiian monk seal pups and juveniles undergoing rehabilitation beginning in 1986 with no severe adverse effects recorded. Approximately 25% of seals (8% of all treatments) were reported with side effects such as lethargy post-dosing. However, all of these seals were either in poor condition, ill, lethargic, or undergoing other treatments around the time of dosing, making it difficult to clearly attribute causes of clinical signs to use of worming medication (NMFS MMRP unpubl. data). Most recently, dosing was applied to pup and juvenile monk seals during captive care studies at Midway Atoll in 2006-2007 under Permit No. 848-1695. During this project, no changes in feeding or behavior were observed following de-worming treatment for all but one animal that was slow to feed a day after treatment, but quickly regained normal appetite (NMFS MMRP unpubl. data).

The Marine Mammal Center indicated in a letter to the applicant that over the past 20 years, praziquantel and fenbendazole have been administered to at least 1,000 California sea lions and 100 harbor seals and elephant seals with no side effects of treatment observed. Dead tapeworms are commonly observed in the feces of sea lions after treatment with praziquantel, as are dead nematodes after fenbendazole dosing. Mystic Aquarium also indicated to the applicant that they have used praziquantel (Droncit) routinely on stranded phocids (harbor, harp, hooded and gray seals) for many years with

4 http://www.3dchem.com/molecules.asp?ID=322

5 http://www.righthealth.com/Health/Praziquantel

out any adverse effects following the basic canine dosing regime and proved highly efficacious against the common cestodes encountered with stranded phocids.

Parasites are likely not a primary cause of mortality in monk seals, however they may further compromise animals already in ill health due to food limitation, thereby increasing their likelihood of dying (Gulland 1992). A high rate of virulence of a parasite implies removal of large amounts in host resources, which leads to reductions in host fitness (de Lope et al. 1998). High parasite loads may lead to inanition and may have been contributing factors in the deaths of some juvenile Hawaiian monk seals undergoing rehabilitation in 1992 (Sloan 1999). Reif et al. (2006) reported that young seals infected with tape worms tended to be in poorer body condition than those uninfected; and this age class is experiencing the lowest survival rates for the species. The goal of decreasing intestinal parasite burden is to improve body condition through increased appetite and weight gain, and improved fitness of the treated animals. Gulland et al. (1993) showed that anti-helminth treatment increased the probability of survival in Soay sheep during a period of high overall mortality.

Other studies have shown benefits of treating wild animals with antiparasitic drugs. Fenbendazole has proven effective for treating intestinal parasites in wild birds (Bustnes et al. 2006) and captive and wild lizards (Fenner and Bull 2008). Bustnes et al. 2006 found that treating nesting glaucous gulls with fenbendazole not only reduced parasite burdens, but also removed the negative effects of organochlorine concentrations on nesting success, indicating parasite burdens play a role in fitness when other stressors are present. It is not known if or to what extent parasite burden compounds the effects of other stressors in monk seals, but it is possible that reduction in parasite loads could lessen such effects if present (Bustnes et al. 2006). The NMFS Alaska Fisheries Science Center, National Marine Mammal Laboratory treated northern fur seal (*Callorhinus ursinus*) pups with an antiparasitic treatment (ivermectin) to control prevalence of hookworm infections (under NMFS Permit No. 782-1812). Results of that study indicated clear efficacy of treatment in decreasing worm burden and increasing growth and subsequent survival of treated versus non treated seals (Delong 2007).

Although survival is the ultimate measure of success of de-worming monk seals in the wild, survival is a function of many factors (e.g., physiological condition, environmental conditions, shark predation, entanglement in marine debris). De-worming may not be sufficient to boost survival in all cases. Under severe environmental conditions, animals might show an improvement in condition but not survival. However, that same increase in condition may be sufficient to boost survival under more moderate environmental conditions. There also may be different patterns in the effect of worming treatment on seals depending on their life stage. Young of the year are likely to lose weight regardless of treatment as they lose their excess blubber as they learn to forage - in this case the goal would be for treated seals to show a less precipitous decline in mass and condition than non-treated individuals. Seals in their second year of life would do well to maintain condition and demonstrate some weight gain. Those starting their third year of life could gain weight and condition relative to non-treated animals.

4.3.2 Other Species

Effects on Spinner Dolphins

Permit No. 10137 would authorize annual harassment of 500 spinner dolphins within the lagoon waters at four NWHI sites (Midway Atoll, Pearl and Hermes Reef, Kure Atoll, and French Frigate Shoals). Harassment would occur primarily during summer months but may occur year-round. Spinner dolphins may alter their behavior and approach a small boat transiting within the lagoon of these locations. The level of disturbance is temporary and dolphins typically approach researchers, versus showing avoidance behaviors. There are few other disturbances to spinner dolphins in the NWHI concurrent with MMRP research activities, as a limited number of people are able to access the Monument via a permit issued by the Monument, and such permits would not authorize harassment of spinner dolphins unless an MMPA permit were issued. There are no other permits authorizing harassment of spinner dolphins in the NWHI. Permit No. 1007-1629-01 issued to Dr. Leszek Karczmarski, Marine Mammal Research Program, Texas A&M University, authorized research on spinner dolphins in the NWHI over a six-year period, and expired on August 31, 2007. A new application has not been received to continue this work.

Effects on USFWS Species

Green Sea Turtles

Monitoring efforts and capture/handling procedures (for tagging, sampling, instrumentation) may cause incidental disturbance to up to 140 basking green sea turtles. Green sea turtles which are asleep and basking on the beach are generally unaware of unobtrusive human presence such as observing seals. However, some activities, such as small boat transits and landings, capturing a seal, and other research activities may waken basking turtles, causing them to flee into the water. No nesting or hatchling sea turtles would be affected, as permit conditions would require mitigation to avoid affecting such animals.

Laysan Finch

Both NMFS and USFWS maintain camps at Laysan Island. Laysan finches are tame to human presence, thereby entering these field camps (and those at Pearl and Hermes) in search of food and water. Laysan finches would alter their behavior to search the campsite for unattended food, food scraps, or standing water; and therefore, may be more nutritionally supported than their conspecifics that do not interact with camps. A permanent field camp occupied and maintained by USFWS personnel is present at Laysan Island, so it is unclear to what extent the additional presence of an MMRP field camp (with 3 personnel) would significantly increase ‘camp following’ behavior of finches.

A total of 200 individuals may be disturbed numerous times during routine field camp activities. Unintentional mortality or serious injury of Laysan finches is possible. Despite efforts to prevent it, finches have in the past drowned in camp containers which filled with rainwater during cloudbursts when biologists were away from camp, or have become trapped in camp gear. Carcasses of any dead birds are frozen and given to USFWS. Based upon past occurrences, the applicant anticipates no more than 2 mortalities annually.

Non-ESA Listed Sea Birds

Sea birds which nest in proximity to where monk seals haulout could be disturbed by researchers' presence on the beaches. There is limited risk that seabirds, particularly albatross that require a long straight-line ground trajectory to become airborne, could fly into a shoreline or inland pen fencing with resultant injury. Temporary pens were seasonally maintained by MMRP at Kure Atoll, Midway Atoll, and French Frigate Shoals for ten years during summer months with no incidents of seabirds becoming entangled in the fence. However, during a three-month maintenance a temporary pen at French Frigate Shoals in 2006, a single Laysan albatross flew into the fencing and was injured, with no mortality. Appropriate mitigation described in Section 4.5 would be implemented to prevent this happening again, and to prevent disturbance to nesting sea birds.

Effects of Sonic Tags on Non-target Species

Up to 35 pups at French Frigate Shoals would be tagged with sonic tags concurrent with flipper tagging at weaning each year, over no more than three years. The sonic tags would transmit signals at 69 kHz. This frequency is outside of the hearing range for elasmobranchs (Casper et al. 2003, Casper and Mann 2006, Myrberg 2001). Therefore, we do not anticipate that predatory sharks would be attracted to the tags. Other fish species hear outside of this frequency (A. Scholik, personal communication, March 31, 2009), with the exception of some clupeids (Popper et al. 2004). Only a few species of clupeids are found in Hawaiian waters (e.g., the clupeid *Spratelloides delicatulus* is found from Oahu to Kure[6]), and if these fish can hear within the frequency emitted by the sonic tags it is highly unlikely that there would be any significant effects on these fish. Sea turtles have a hearing range from approximately 100 to 1000 Hz (Bartol et al. 1999, Ridgway et al. 1969), and also would not be affected by the sonic tag transmissions. While spinner dolphins that occur in lagoon waters of French Frigate Shoals have an estimated auditory range of 150 Hz to 160 kHz (Southall et al. 2007), it is not likely that the presence of these tags on up to 35 pups would have a measurable impact on dolphins.

Effects of Antiparasitic Drugs on Non-target Species

The pharmacokinetics (i.e., absorption, distribution, metabolism, and excretion) of fenbendazole and praziquantel in pinnipeds has not been determined, and the material

6 http://filaman.ifm-geomar.de/Country/CountrySpeciesSummary.cfm?c_code=840B&id=1457

safety data sheets for these drugs do not contain information on ecotoxicity. Therefore, we cannot precisely determine the effects to non-target species in the environment from administering these drugs to Hawaiian monk seals. However, these drugs are routinely used in domestic species (including food animals), the aquarium and aquaculture industries, and in humans. As described above, fenbendazole is metabolized to the active compound oxfendazole (sulfoxide) and sulfone, and a large portion is excreted unchanged in the feces. Praziquantel is metabolized to inactive mono-and polyhydroxylated derivatives, which are mainly excreted in the urine.

Fenbendazole and praziquantel are used regularly in the aquarium and aquaculture industries (e.g., at doses of 2mg/L for 6 hours and 10mg/L for 3 hours, respectively; Schmahl 1998), and it is expected that the excreted compounds and metabolites in the water column would be well below concentrations used for treating fish species. Bath treatments using praziquantel and fenbendazole, respectively, have been effective in treating ectoparasites in eagle rays, *Aetobatus narinari* (Janse and Borgsteede 2003) and eels, *Anguilla Anguilla* (Buchmann and Bjerregaard 1990).

Oh et al. 2006 conducted a study to test toxicity to aquatic bacteria and plankton from chronic exposure to various benzimidazole-based anthelmintics, including fenbendazole. It was determined that survival, reproduction, and growth of a planktonic crustacean (*Daphnia fischeri*) were significantly impacted at chronic exposures to 1.25 to 4.1 ug/L fenbendazole. However, chronic, concentrated exposure would have to be present to have a significant impact to plankton in the ocean. Drugs released into the environment from the proposed study on monk seals would result in only intermittent and temporary exposure to non-target organisms.

In the event a seal excretes affected urine or feces on a beach, there is the possibility that flies would potentially be exposed to the drugs/metabolites. Numerous studies have been conducted to determine non-target effects in the pasture environment from antiparasitic drugs used on cows, and it is well documented that certain drugs (e.g., ivermectin) are lethal to dung beetles and therefore, inhibit dung degradation. Floate et al. 2005 conducted a review of the known literature on this topic and determined that benzimidazoles appear to be innocuous to dung insects, with the exception of oxfendazole, which may cause mortality of fly larvae. There are limited data on the degradation of benzimidazoles, and persistence in soil or dung is unknown (Floate et al 2005). Cross-trophic effects could occur if flies that ingested the drugs while feeding on seal fecal matter were subsequently eaten by an insectivorous species, but it is unknown if this would occur, and likely accumulated concentrations in flies would be low. Also, MMRP researchers would collect feces excreted by treated seals whenever possible, thus removing any potential impacts to organisms on the beach. Cross-trophic effects could also occur if a treated seal were consumed by a predator (e.g., Galapagos shark). It is unlikely that there would be significant effects to a non-target individual predator or species of shark, since these drugs are routinely used in the aquarium industry on fresh and marine water fish.

It is expected that the active and inactivated metabolites of these two drugs would be greatly diluted in the marine environment; and therefore, would not be expected to have significant effects on non-target species in the water, such as fish, invertebrates, or reptiles. While a wide range of human and veterinary medicines are increasingly being released into the environment (Boxall 2004), this is not the case in the NWHI where the majority of treatments would occur. Treatments to seals would not be performed concurrently on large numbers of seals where high concentrations of urine and feces would enter the environment at one time. Instead, treatments would occur over weeks at different locations (albeit within the same island or atoll) as candidate seals are encountered. Therefore, based on the safe, wide-use of these drugs on a variety of species, the fact that treatments to monk seals would be separated in time and space, and that the excreted materials would be well diluted in the marine environment, NMFS determines that administration of these drugs to Hawaiian monk seals in the wild would not have a significant impact to non-target species in the environment.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

4.3.1 Endangered Species Act

This section summarizes conclusions resulting from consultations as required under section 7 of the ESA. For all activities described in this EA except for the inter-island/atoll translocation of up to 20 pup or juvenile monk seals annually (including the translocations of six pups proposed for August 2009 as presented in Appendix 3), NMFS concluded that issuance of Permit No. 10137 is likely to adversely affect, but not likely to jeopardize the continued existence of Hawaiian monk seals.

NMFS requested consultation by the USFWS under section 7 of the ESA for incidental takes of species that would be affected by the proposed action, Laysan finch (disturbance and incidental mortality of up to 2 finch per year) and green sea turtle (disturbance on land). The biological opinion for this consultation is expected to be completed no later than July 2009, and the USFWS indicated to NMFS that the action is not anticipated to result in a jeopardy determination for Laysan finch. The USFWS provided guidelines for researchers to follow to minimize takes of Laysan finch. These guidelines will be incorporated into the Monument permits for work in areas where Laysan finch occur. Conditions in the proposed Permit No. 10137 are in place to minimize disturbance to sea turtles.

4.3.2 Marine Mammal Protection Act

The research and enhancement proposed in the submitted application and additional information provided by the applicant is consistent with permit issuance criteria in the MMPA and NMFS' implementing regulations. The views and opinions of scientists and other organizations knowledgeable of Hawaiian monk seals and matters germane to the application were considered and support NMFS' determinations regarding the application.

The permit would contain standard terms and conditions required by the MMPA and NMFS regulations, including (1) the effective date of the permit; (2) the number and kinds of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate. Other terms and conditions deemed appropriate relate to minimizing potential adverse impacts of specific activities (e.g., capture, sampling), coordination among permit holders to reduce unnecessary duplication and harassment, monitoring of impacts of research, and reporting to ensure permit compliance.

4.3.3 Other Applicable Laws

National Historic Preservation Act

NMFS consulted with permitting biologists for the Monument regarding entering and use of historic sites in the NWHI. The Monument indicated that the MMRP researchers hold current permits for work in the NWHI. Specifically related to the preservation of historic resources, the Monument indicated that a section 106 consultation was completed in May 2008 for the duration of two years for the seal team to access Nihoa and Mokumanamana (Necker) Islands.

National Marine Sanctuaries Act

NMFS consulted with the Hawaii Humpback Whale National Marine Sanctuary (HIHWNMS) for activities that would occur in the MHI. The HIHWNMS had no issues with the activities proposed in the MHI, including aerial and vessel surveys, and did not recommend any action on the part of the MMRP. The Monument also read the application and determined that the application is consistent with Monument regulations and the Findings contained in Proclamation 8031. NMFS verified that the applicant has applied for and received a permit from the Monument for standard field research activities and the de-worming study, which expires May 2009, and would reapply for such a permit annually. The MMRP had a separate Monument permit for foraging research, which expired December 31, 2008. The MMRP is in the process of applying for a permit to continue this work. However, activities authorized by the MMPA/ESA permit would not be able to occur in the NWHI unless and until a Monument permit was issued for such activity.

Migratory Bird Treaty Act

NMFS consulted with the Monument regarding potential impacts to sea birds protected under the MBTA. The Monument contacted USFWS, who indicated that incidental take permits are not issued under the MBTA, and researchers should take all necessary precautions following guidelines administered by the USFWS when working near such sea birds. In the NWHI, sea birds are abundant and nest on beaches frequented by monk seals. The MMRP verified that all researchers working in the NWHI receive training from USFWS staff regarding appropriate mitigation to avoid take of sea birds.

Magnuson-Stevens Fishery Conservation and Management Act

NMFS determined that the permitted activities would not affect designated essential fish habitat (EFH) as all activities carried out by the MMRP would occur on land, by air, and or by boat. Activities carried out by boat would not alter substrate or impact the water column. Therefore, we did not initiate consultation with the NMFS Pacific Islands Office of Habitat Conservation.

Coastal Zone Management Act

Impacts to aquatic life, wildlife, and plants (endangered species), as required by Hawaii State law have been considered in Section 4.2.3 above. Hawaii State law also supplements the Federal National Historic Preservation Act regarding impacts to historic preservation. This EA has evaluated the potential impacts of the proposed action on these resources and finds that, with implementation of protective protocols required by the MMRP and mandated by the Monument, no significant adverse impact would occur to these historic resources. Hawaii State law also serves to manage and protect water quality for the state of Hawaii, consistent with the Federal Clean Water Act. The proposed action would not contribute to degrading water quality in the NWHI and MHI. As discussed in Section 4.2.1 above, in the NWHI, boat emissions are controlled by the Monument proclamation and management requirements; and MMRP is required to follows these requirements. If seals were maintained in temporary pens in the NWHI, any seal effluent would not be substantially higher than that which naturally occurs in near shore waters.

Convention on International Trade in Endangered Species of Wild Fauna

The applicant has a history of applying for and securing necessary permits under the Convention on International Trade in Endangered Species of Wild Fauna (CITES). All import, export, re-export and introduction from the sea of species covered by CITES has to be authorized through a licensing system. Obtaining CITES permits is the responsibility of individual researchers. The cover letter to the permit reminds MMRP of this, and Attachment 1 of the permit contains a condition requiring that all CITES requirements are met, as applicable.

Animal Welfare Act

Under the AWA, the MMRP is responsible for obtaining IACUC reviews and approvals for their research and adhering to other requirements of the AWA. The applicant has received IACUC approval from the University of Hawaii for research protocols involving standard capture and handling techniques such as tagging, sedation, biological sampling, and instrumentation. Approval is pending for the de-worming protocol.

In addition, the permit would require the MMRP to comply with the provisions of the AWA and AWA implementing regulations “Specifications for the Humane Handling,

Care, Treatment, and Transportation of Marine Mammals" (9 CFR Part 3, Subpart E) with respect to any captive care and transportation of Hawaiian monk seals.

Other Requirements

Permits from the National Park Service are required for work within the Kalaupapa National Historical Monument. Permits from the State of Hawaii are required for access to certain restricted offshore islets within the MHI. A special use permit from the USFWS is necessary if any activities are anticipated at Johnston Atoll. The applicant would secure such permits as necessary depending on where particular activities would occur in a given year.

4.5 MITIGATION MEASURES

4.5.1 Physical Environment

The 2003 EA discusses mitigation implemented to minimize impacts to the physical environment in the action area. Here we present updated information relevant to the requirements of the Monument and information not previously considered. Anchorages of small boats incidental to conducting the activity are selected with consultation with Monument co-trustees, and would not adversely affect substrate. Field camps established to conduct monitoring activity are transient and would not alter the substrate. All trash, camping gear, research equipment, and other materials would be removed from the NWHI upon completion of the field season so no traces of researcher presence would be visible. Latrines are filled in at the end of each season.

All small boat hulls are inspected for presence of invasive species prior to deployment into the Monument. Strict quarantine procedures are followed to prevent introduction of invasive species to the Monument. This includes packing and sealing all field gear, food, etc. into plastic buckets to the maximum extent feasible, freezing soft materials that cannot be placed in buckets for 48 hours, use of clothing which is new or has only been worn at the site to which the particular biologist is stationed, and fumigation of sensitive electronic equipment that cannot be frozen or packed into buckets.

Chemical fixatives and preservatives are taken to the field sites for specimen collection. Transport and storage of all such materials are conducted in accordance with OSHA regulations, and Material Safety Data Sheets are present at all field camps.

As discussed in Section 3.1.1 above, to minimize disturbance to archeological sites on Nihoa Island, total duration on Nihoa would be minimized, and all activities would be restricted to the camping site, path of transit (either along shore or over the island), and beach. All researchers would receive a cultural briefing to increase their sensitivity to these sites prior to entering the Monument, as required by the Monument.

4.5.2 Biological Environment

Hawaiian monk seals

In addition to mitigation methods that would be used by MMRP during the proposed take activities as described in the MMRP methods (Section 2.2 above), all permits issued by NMFS for research on marine mammals and threatened and endangered species contain standard terms and conditions stipulated in the MMPA, ESA, and NMFS regulations. As required by the MMPA, these permits specify: (1) the effective dates of the permit; (2) the number and kinds (species and stock) of marine mammals that may be taken; (3) the location and manner in which they may be taken; and (4) other terms and conditions deemed appropriate.

Other terms and conditions deemed appropriate relate to minimizing potential adverse impacts to the target species from specific activities (e.g., capture, sampling, etc.), coordination among permit holders to reduce unnecessary duplication and harassment, monitoring of impacts of research, and reporting to ensure permit compliance. Permit No. 10137, if issued, would contain such conditions for researchers to follow to minimize impacts to Hawaiian monk seals. This includes the following:

- avoiding disturbance to pregnant and lactating females and nursing pups, and humanely providing for a pup abandoned due to permitted activities;
- terminating activities that may be life threatening to seals;
- using trained and experienced personnel to minimize handling time and disturbance;
- using an experienced marine mammal veterinarian for activities involving the use of sedatives or anesthesia;
- monitoring seals during handling and post-release; and
- using sterile or appropriately sanitized equipment to sample seals.

The permit would specify the maximum number of seals, by age and sex, which may be translocated annually in the NWHI, as required by the MMPA. However, the MMRP would be required to provide inter-island/atoll translocation protocols three months in advance of initiating such activity for review and approval by the Permits Division, since the MMRP will determine specific locations and methods for translocating seals within the NWHI each year depending on numerous factors as discussed above (e.g., survival, environmental conditions). These protocols will be reviewed in coordination with the Marine Mammal Commission, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), and NMFS Office of Protected Resources Endangered Species Division. Approval would be granted at the discretion of the Chief, Permits Division. No amendments would be issued as long as the protocols submitted fall within the parameters described in the permit application and supplementary information.

The permit would be conditioned to require details of holding facilities are provided for NMFS approval prior to removing males from the wild for permanent captivity. Regarding de-worming, the permit would be conditioned to require cessation of

treatments if there is any indication that the welfare of the subjects has been compromised by handling, treatment or any other artifact of the study; and approval to continue treatments must be granted by NMFS.

The permit is also conditioned to require regular reports on the effectiveness of the research at achieving the applicant's stated objectives (and thus at achieving the purpose and need of the federal action) and on the effectiveness of the mitigation measures required by the permit. The permit would also be conditioned to require the MMRP to suspend permitted activities if a report is not submitted annually as required by the permit. This condition has been added due to the delinquency in submitting reports under the current permit.

Spinner Dolphins

The threat of boat strikes would be minimized by operating small boats at a moderate speed while watching for dolphins. Dolphins would not be approached intentionally and distances of 150 feet would be maintained whenever possible.

Sea Turtles on Land

Boats would avoid landing on beach areas where turtles are basking in the immediate vicinity. On land, biologists would remain out of sight of turtles to the extent possible while still accomplishing research objectives as listed in the application. All the MMRP activities are conducted during daylight hours, and the turtles nest at night. MMRP establishes no field camps in the immediate vicinity of turtle nesting areas, so no lights are present which might disorient emerging hatchlings.

Laysan Finch

MMRP personnel would adhere to procedures mandated by USFWS to avoid injury or death of Laysan finches (see Appendix 5).

Non-ESA Listed Sea Birds

All reasonable precautions would be implemented to avoid take of sea birds incidental to MMRP activities and nesting seabirds on the beach would be avoided. USFWS gives MMRP field researchers a briefing on appropriate mitigation to avoid take. If shoreline pens are constructed, MMRP would increase monitoring on windy days and would dismantle the pen after use, which would not exceed two weeks for holding seals.

4.6 UNAVOIDABLE ADVERSE EFFECTS

Because the research involves disturbance, capture, and intrusive sampling of wild animals, a certain amount of adverse effects on individual target animals exposed to the research is unavoidable. While the applicant has identified all measures that would be taken to avoid negative impacts and the permit would contain mitigation measures to

minimize the extent of the adverse effects, it is not possible to avoid some stress, injury, and limited mortality of Hawaiian monk seals.

A limited number of Hawaiian monk seals may be intentionally euthanized or otherwise removed from the population. However, adult males would be removed because they were known to kill young animals. The benefit of increasing survival of immature seals outweighs the risk of removing up to ten adult males, since it is known that the aberrant behavior of a subject male would continue unless mitigation were implemented. Intentional euthanasia of moribund animals may also occur under the proposed action; a veterinarian would first determine the animal's condition to be irreversibly in decline. The data gained from the necropsy of a moribund animal outweighs the option of not euthanizing it, since most seals in poor condition disappear and their carcass is not recovered. While intentional or unintentional deaths to individual animals are significant for the individuals concerned, they are not significant in the context of this analysis with respect to the species as a whole.

Under the proposed action, the special avoidance measures implemented by the MMRP would eliminate adverse effects on some non-target ESA-listed animals and marine mammal species, but disturbance of other non-target animals, including green sea turtles, spinner dolphins, and Laysan finch, would unavoidably result from the presence and actions of the researchers. Serious injury or mortality of no more than two Laysan finch is possible.

4.7 CUMULATIVE EFFECTS

Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

It is likely the effects of the disturbance to the physical environment would be short-term and that the affected areas would recover between disturbances and following conclusion of the permitted research. Requirements of the Monument would be in place to ensure preservation of the NWHI ecosystem and the resources it holds, and temporary field camps are established primarily during summer months only. Activities to be undertaken by researchers in the MHI are not likely to have a measurable impact to the environment relative to those activities that already exist (e.g., recreational boating and fishing, aerial tour operations, use of beaches by tourists), and no permanent damage to the physical environment (e.g., construction) is proposed.

Research would undoubtedly result in disturbance of the target species, and in some cases, intentional and unintentional mortality. The analysis presented in this document and the 2003 EA provides evidence that if conducted conservatively and with caution, capture activities (where most stress is incurred to the target animal) will not have significant long-term adverse effects for the species; and based on past-performance, if

these measures are implemented in the future, the probability that incidental mortalities would occur during handling events is low.

While intentionally euthanizing animals (or otherwise removing them from the population) may be counterintuitive to activities necessary to enhance survival of a species, the intentional mortalities proposed by the MMRP indeed would be done to either provide critical information for the species (through euthanasia of moribund animals) or would be carried out to prevent mortality of immature seals, especially females (through euthanasia of rogue adult males).

Limited other activities occur in the NWHI to add to the effects from MMRP, the only entity permitted to enter the NWHI to take Hawaiian monk seals for research purposes. Persons entering the Monument must possess a permit, and there are no other entities authorized to take monk seals (with the exception of the MMHSRP if necessary in the event of an emergency die off or other emergency response activity – and those would involve MMRP staff as Co-investigators).

In the MHI, many other factors (e.g., human disturbance, vessel traffic, fishing interactions, exposure to disease) are emerging as threats to this species. Ironically, in this environment with so little protection compared to the NWHI, seals are thriving and in excellent body condition; while in the NWHI, where they are protected, seals are failing to thrive. One of the goals of the MMRP is to find out why there are such stark differences between survival and condition seals in the NWHI and MHI. There is currently not enough data to provide an accurate estimate of the numbers in the MHI or to determine what the carrying capacity might be for the MHI. This information is critical for managers to plan activities to facilitate seals and humans coexisting while minimizing negative interactions.

The MMRP's assessment of the status of the MHI and NWHI subpopulations, research programs on health and foraging, and enhancement activities would provide critical data and actions necessary for the management and recovery of this species in the future. Overall, based on the analyses in this and the 2003 EA, it is highly unlikely that activities carried out by the MMRP would have significant cumulative impacts when considered with other factors affecting monk seals.

4.7.1 Other research permits and authorizations

One other permit issued to the NMFS Marine Mammal Health and Stranding Response Program (MMHSRP; Permit No. 932-1489) authorizes takes of Hawaiian monk seals. However, these take activities do not duplicate or overlap with those proposed by the MMRP. MMRP researchers are listed as Co-investigators on the MMHSRP permit and work closely with the Pacific Islands Regional Stranding Coordinator on any issues pertaining to monk seal strandings, entanglements, deaths, and moving seals in the MHI.

4.7.2 Other actions

Other future actions which may impact monk seals include the following:

- use of shark deterrents at French Frigate Shoals implemented to minimize shark predation on pups (currently permitted by the Monument); future lethal removal of sharks will be proposed by MMRP.

- increased enhancement activities to save young seals from the NWHI, including but not limited to future captive care and translocations of animals between subpopulations of the NWHI and MHI (a permit application is expected to be submitted by MMRP in the foreseeable future);

- initiation of increased enhancement activities in the MHI to respond to increased human interactions (a permit application is expected to be submitted by PIRO in the foreseeable future); and

- continuation of long-term population monitoring, research, and enhancement efforts (i.e., submission of future permit applications after the proposed five-year permit expires).

The Permits, Conservation and Education Division has no other current pending permit requests to conduct research or enhancement activities on the wild population of Hawaiian monk seals.

CHAPTER 5 LIST OF PREPARERS AND AGENCIES CONSULTED

Preparer: NMFS Permits, Conservation and Education Division, Office of Protected Resources, 1315 East-West Highway, Silver Spring, MD 20910.

Agencies Consulted: MMRP; Monument; USFWS.

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APPENDICES

APPENDIX 1: APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

National Environmental Policy Act

The National Environmental Policy Act (NEPA) is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. NMFS' issuance of permits represents approval and regulation of activities. NEPA requires consideration of environmental issues in federal agency planning and decision making. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the Council on Environmental Quality's (CEQ) implementing regulations (40 CFR Parts 1500-1508).

NOAA Administrative Order (NAO) 216-6 established agency procedures for complying with NEPA and the CEQ's implementing regulations. NAO 216-6 specifies that issuance of research and enhancement permits under the MMPA and ESA is generally exempted (categorically excluded) from further environmental review. However, when a proposed permit is the subject of public controversy based on environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon ESA-listed species or their habitats, preparation of an EA or EIS is required. Therefore, NMFS is preparing an EA for this action to provide a more detailed analysis of effects to ESA-listed species and their habitat. This EA is prepared in accordance with NEPA, its implementing regulations, and NAO 216-6.

Marine Mammal Protection Act

The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions, including permits for scientific research or to enhance the survival or recovery of a species or stock, issued pursuant to section 104 of the MMPA. These permits must specify the number and species of animals that can be taken, and designate the manner (method, dates, locations, etc.) in which the takes may occur. NMFS has sole jurisdiction for issuance of such permits and authorizations for all species of cetacean, and for all pinnipeds except walrus[7].

An applicant must demonstrate to NMFS that the taking would be consistent with the purposes of the MMPA and applicable regulations. For research permits, the applicant must demonstrate, among other things, that the taking is required to further a bona fide[8] scientific purpose. For enhancement permits involving threatened and endangered species, the applicant must demonstrate that the activities are likely to contribute

7 The U.S. Fish and Wildlife Service has jurisdiction for walrus, polar bears, sea otters, and manatees.
8 The MMPA defines bona fide research as "scientific research on marine mammals, the results of which – (A) likely would be accepted for publication in a refereed scientific journal; (B) are likely to contribute to the basic knowledge of marine mammal biology or ecology; or (C) are likely to identify, evaluate, or resolve conservation problems."

significantly to maintaining or increasing distribution or numbers necessary to ensure the survival or recovery of the species and the activities are consistent with the species' recovery plan.

NMFS has promulgated regulations to implement the permit provisions of the MMPA (50 CFR Part 216) and has produced OMB-approved application instructions that prescribe the procedures necessary to apply for scientific research and enhancement permits. All applicants must comply with these regulations and application instructions in addition to the provisions of the MMPA.

Section 109(h) of the MMPA authorizes Federal, State, or local government officials or employees, or persons designated under section 112(c) of the MMPA to take a marine mammal in a humane manner (including euthanasia) if such taking is for the protection or welfare of the individual animal, the protection of public health and welfare, or the nonlethal removal of nuisance animals. NMFS has promulgated regulations to implement provisions of section 109(h) (50 CFR Part 216). For threatened and endangered marine mammals, an ESA section 10 enhancement permit is also required to undertake such activities.

Endangered Species Act

Permits to take ESA-listed species for scientific purposes or for the purpose of enhancing the propagation or survival of the species may be granted pursuant to Section 10(a)(1)(A) of the ESA. Such permits are for activities that are likely to further the conservation of the affected species. NMFS has promulgated regulations to implement the permit provisions of the ESA (50 CFR Part 222) and has produced OMB-approved application instructions that prescribe the procedures necessary to apply for permits. According to 50 CFR 222.308(b), permits for threatened and endangered marine mammals must be issued in accordance with the provisions of part 216, subpart D. All applicants must comply with these regulations and application instructions in addition to the provisions of the ESA.

Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service (USFWS)) for federal actions that "may affect" a listed species or adversely modify critical habitat. NMFS' issuance of a permit affecting ESA-listed species is subject to these section 7 consultation requirements. Under section 7 of the ESA, NMFS is required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402).

National Historic Preservation Act

The goal of the National Historic Preservation Act (NHPA) is to have federal agencies act as responsible stewards of our nation's resources when their actions affect historic properties. The NHPA established the Advisory Council on Historic Preservation (ACHP), an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy. The ACHP is the only entity with the legal responsibility to encourage federal agencies to factor historic preservation into federal project requirements. Under section 106 of the NHPA, a consultation is required to take into account the effect of federal activities on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA; 16 U.S.C. 703-712) prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, of any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit. The U.S. Fish and Wildlife Service (USFWS) regulations authorize permits for takes of migratory birds for activities such as scientific research, education, and depredation control. There is no provision of the MBTA for issuing incidental take permits.

Magnuson-Stevens Fishery Conservation and Management Act

Under the MSFCMA Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for issuance and modification of research permits that authorize activities that may adversely affect EFH.

Coastal Zone Management Act

Congress enacted the Coastal Zone Management Act (CZMA) (16 U.S.C. 1451 et seq.) to protect the coastal environment from demands associated with residential, recreational, commercial, and industrial uses (e.g., State and Federal offshore oil and gas development). Those coastal states with an approved Coastal Zone Management Plan, which defines permissible land and water use within the state's coastal zone[9], can review Federal actions, licenses, or permits for "Federal consistency." "Federal consistency" is the requirement that those Federal permits and licenses likely to affect any land/water use or natural resources of the coastal zone be consistent with the Program's enforceable policies.

The CZMA requires evaluation of consistency of the proposed program action with the enforceable policies of the State of Hawaii. Enforceable policies are state policies which are legally binding through state laws, regulations, land use plans, ordinances and judicial or administration decisions, by which the State exerts control over private and public land

[9] A state's coastal zone extends 3 miles seaward, and inland as far as necessary to protect the coast.

and water uses and natural resources in the coastal zone and which are incorporated into an approved management plan (15 CFR 930.11(h)). The State of Hawaii law for implementing the federal CZMA is HRS 205A: Coastal Zone Management. The following state enforceable policies are potentially applicable to the MMRP proposed activities:

HRS 195D and HAR 13-124: Conservation of Aquatic Life, Wildlife, and Land Plants (endangered species)
HRS Chapter 6E: Historic Preservation
HRS 342D and HAR 11-54: Water Pollution and Water Quality Standards.

National Marine Sanctuaries Act

The NMSA (32 U.S.C. 1431 *et seq*.) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance. The National Marine Sanctuary Program, operating under the NMSA and administered by NOAA's National Ocean Service (NOS) has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. Obtaining special use permits is the responsibility of individual researchers. However, as a courtesy, the Office of Protected Resources consults with NOS when proposed research would occur in or near a National Marine Sanctuary.

Convention on International Trade in Endangered Species of Wild Fauna

The Convention on International Trade in Endangered Species of Wild Fauna (CITES) is an international agreement between governments with the goal of ensuring that international trade in specimens of wild animals and plants does not threaten their survival. All import, export, re-export and introduction from the sea of species covered by CITES has to be authorized through a licensing system. In the U.S., the Fish and Wildlife Service is the Management Authority for CITES. Obtaining CITES permits is the responsibility of individual researchers.

Animal Welfare Act

The Animal Welfare Act (AWA; 7 U.S.C. 2131 – 2156) sets forth standards and certification requirements for the humane handling, care, treatment, and transportation of mammals. Each research facility is required to establish an Institutional Animal Care and Use Committee (IACUC), which reviews study areas, animal facilities, and research protocols for compliance with the AWA requirements. For federal research facilities, the head of the federal agency is responsible for ensuring compliance with the AWA. The researcher is responsible for obtaining IACUC reviews and approvals for their research and adhering to other requirements of the AWA related to care and transport of marine mammals.

APPENDIX 2: TABLE SPECIFYING THE PROTECTED SPECIES, LOCATIONS, AND MANNER OF TAKING

Table 1. Authorized annual takes of Hawaiian monk seals. Locations: Hawaiian Archipelago=Main Hawaiian Islands (MHI) and adjacent islets, Kaula Rock, Necker Island (Is.), Nihoa Is., and the Northwestern Hawaiian Islands (NWHI). MHI=Hawaii, Maui, Molokai, Kahoolawe, Lanai, Oahu, Kauai, and Niihau. NWHI=French Frigate Shoals, Laysan Is., Lisianski Is., Pearl and Hermes Reef, Midway Atoll, and Kure Atoll.

Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
1. Monitoring	Any	Both	150	3	Disturbance from visual observation and photo-identification during ground monitoring and aerial and vessel surveys	MHI	Annually at any time of year.
			50	1		Nihoa Is.	
			50	1		Necker Is.	
			250	5		French Frigate Shoals	
			10	1		Gardner Pinnacles	
			250	3		Laysan Is.	
			225	3		Lisianski Is.	
			200	3		Pearl and Hermes Reef	
			100	2		Midway Atoll	
			150	2		Kure Atoll	
			5	1		Johnston Atoll	

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
2a. Tagging	Any except nursing pups, lactating or obviously pregnant females.	Both	30	3	Restraint, tagging (flipper and PIT), collect flipper plugs, morphometrics (length and girth)	MHI	Annually at any time of year (predominantly during summer field camps). All of the animals may also be taken by Tasks 1 and 3. [1]At French Frigate Shoals, 35 weaned pups of either sex may have a sonic tag deployed on a third flipper tag (annually over three years).
			25	1		Nihoa Is.	
			15	1		Necker Is.	
			150	3		French Frigate Shoals[1]	
			75	3		Laysan Is.	
			50	3		Lisianski Is.	
			50	3		Pearl and Hermes Reef	
			25	2		Midway Atoll	
			35	2		Kure Atoll	
			1	1		Johnston Atoll	
2b. Retagging	Same as	Both	100	1	Restraint, retagging	Hawaiian	Annually at any time of

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
	above.				(flipper), flipper plugs, morphometrics	Archipelago	year. Seals may have been taken by disturbance (Task 1) and may have been tagged previously.
3. Marking	Any	Both	75	2	Temporary bleach marking	MHI	Annually at any time of year. All of the animals may also be taken by disturbance (Task 1) and tagging (Task 2).
			30	2		Nihoa Is.	
			30	2		Necker Is.	
			250	2		French Frigate Shoals	
			250	2		Laysan Is.	
			225	2		Lisianski Is.	
			200	2		Pearl and Hermes Reef	
			100	2		Midway Atoll	
			150	2		Kure Atoll	

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
			5	1		Johnston Atoll	
4. Health Screening and Foraging Studies	Any healthy seal excluding lactating females with pups and nursing pups	Both	70	2	Restraint, sedation, tagging, blood sampling, swabs, blubber biopsy, weight, morphometrics (girth and length), instrumentation	Hawaiian Archipelago	Annually any time of year. Sixty (60) healthy seals may be instrumented. Recaptures for instrument removal and sampling. All animals may have been taken by Tasks 1-3.
	Any unhealthy seal excluding lactating females with pups and nursing pups	Both	30	2	Restraint, sedation, tagging, blood sampling, swabs, blubber biopsy, morphometrics, treatment (lance abscesses), humane euthanasia or incidental mortality of 10 moribund animals	Hawaiian Archipelago	Annually at any time of year. Includes humane euthanasia of up to 10 moribund or severely injured seals at discretion of veterinarian authorized over a five-year period. All animals may have been taken by Tasks 1-3.
5. Intestinal Parasite Treatment	Pups $\geq$ 120 days post-weaning and juveniles up	Both	200	8	Restraint, weigh and measure (morphometrics), fecal collection (voided feces	Hawaiian Archipelago	Annually, year-round. Initial study trials to include pups $\geq$ 120 days post weaning to juveniles $\leq$ 2

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
	to age 3				or fecal sample collected via fecal loop or digital extraction), treatment (oral praziquantel and fenbendazole); post-treatment monitoring at approximately 4 week intervals (visual assessments and recapture for weight, morphometrics, and fecal sampling)		years. Maximum number of seals that may be included in initial study are: French Frigate Shoals: 47 seals; Laysan Island: 41 seals; and Lisianski Island: 29 seals. Treatments may be combined with other activities requiring restraint and sedation
6. Translocation	Nursing pup	Both	20	6	Capture, restraint, and relocation by hand to natural mother or prospective foster mother	Hawaiian Archipelago, Johnston Atoll	Establishing/re-establishing maternal association. Annually at any time of year but predominantly during summer field camps. Most takes will occur in the NWHI (intra-island/atoll).
	Weaned Pup	Both	35	3	Capture, restraint, sampling, and relocation from high risk areas via boat,	Hawaiian Archipelago, Johnston Atoll	Risk alleviation. Annually at any time of year. Most takes will occur at

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
					ship, vehicle, or air craft		French Frigate Shoals (intra-atoll) or within the Main Hawaiian Islands.
7. Adult Male Removal	Adult	Male	10	2	Capture, restraint, sedation, sampling, instrumentation/trans-location, permanent captivity, or euthanasia	Hawaiian Archipelago; Johnston Atoll	Up to 10 males may be removed over a five year period.
8. Disentangle	Any	Both	As warranted (likely not to exceed 25/year)	>1	Disentanglement and dehooking (with or without capture, sedation, and release)	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year. All animals may have been taken by Tasks 1-3.
9. Conduct Necropsies	Any	Both	As warranted	1	Necropsy any seal found dead, that died during restraint, or that was euthanized.	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year.
10. Opportunistic Retrieval of samples	Any	Both	Unlimited samples	Unlimited samples	Collect parts (placentae, scats, spews, and molted fur/skin) from haul out areas	Hawaiian Archipelago; Johnston Atoll	Annually at any time of year but predominantly during summer field camps.

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Task	Size (Age)	Sex	No. Seals Taken /Year	No. Takes/ Seal /Year	Type of Takes	Locations	Dates/Time Period And Details
11. Import and Export Parts	Any	Both	Unlimited import/export	Unlimited samples	Export (and re-import) Hawaiian monk seal samples collected under the authority of this permit. Import (and re-export) Mediterranean monk seal specimens for research related to monk seal conservation.	World-wide (including but not limited to Canada, the Netherlands, Scotland, Greece, Australia)	Annually at any time of year.
12. Incidental harassment of monk seals	Any	Both	200	2	Incidental harassment during any research and enhancement activity	Hawaiian Archipelago; Johnston Atoll	Total incidental harassment over all activities.
13. Accidental Mortality	Any	Both	2[2]	1	During any research or enhancement activity	Hawaiian Archipelago; Johnston Atoll	[2]Four (4) accidental mortalities over a five-year period is authorized not to exceed 2 deaths in any one year.

APPENDIX 3: HAWAIIAN MONK SEAL INTER-ATOLL TRANSLOCATION PROTOCOL FOR 2009

Objective: Translocate 6 weaners from French Frigate Shoals, an area of low survival, to Nihoa, an area of higher survival. This is a pilot project with the main goals being to determine the safest and most efficient way to transport young seals between atolls and to see if survival rates or relocated weaners are higher than animals left at French Frigate Shoals.

Characteristics of Candidate Seals:
Recently weaned (within 2 months of relocation)
May maximize the seal imprinting on new location
Allow greatest amount blubber resources to adapt to new location.
Seals in medium condition
3 males and 3 females to maintain sex so as to not skew sex ratio at French Frigate Shoals by removing only females.
No outward signs of disease, injury or any other factors that may compromise survival.

Measure of Success: Survival of treated seals from weaning to age 1 relative to controls at French Frigate Shoals. The controls in this pilot study are weaners that are left behind. Due to funding constraints control seals can not be instrumented at this time. Due to time constraints we may not be able to sample other weaned seals, however, once we have completed the sampling and instrumentation of relocation candidates, we will sample other weaners as appropriate under out Health Assessment portion of the permit.

Steps for Relocation:
Selection and capture of seals for instrumentation and health and disease screening.
Capture of seals and transport to vessel for move to Nihoa
Transportation from French Frigate Shoals to Nihoa
Release of seals at Nihoa.
Post-release monitoring

Transport Vessels: NOAA RV Oscar Elton Sette (OES); SAFE Boat – 19' RHIB with twin 60HP 4-stroke Yamaha; Whaler – 17' with 70HP 4-stroke Honda; small boat operators will be NOAA BS&S/DOI MOCC and PIFSC Advanced Coxswain certified with surf rescue training.

Specific Protocols:
Selection and capture of seals for instrumentation and health and disease screening.
Seals will be selected based on the criteria listed above. We will try to find sufficient number of seals at Tern Island, which will be the closest point to the pickup point for the transport to Nihoa. Seals would undergo biomedical sampling and instrumentation 2-4 days prior to transport from the atoll. Seals that fulfill the above criteria will be captured using standard practices. They will be caught by hand or using a hoop net. Seals will be sedated using an IV injection of 0.15 – 0.20 mg/Kg diazepam in the extra-dural vein. Seals will undergo the standard health and disease screening including:

Blood Processing: Field analysis of WBC and RBC counts; WBC differentials, platelets; hematocrit; hemoglobin; total solids; serum chemistry; glucose; BUN; banked samples go in liquid nitrogen dewar.

Swab processing: In the field swabs are put in liquid nitrogen dewar after collection; analyses for Avian Influenza transport media (frozen); HMS herpes virus (or bank this sample); 3 fecal swabs in Cary Blair transport media sent to UCD Micro Lab; banked samples include 2 dry swabs from the eyes, mouth, genital orifice, rectum and any external wounds; 1 dry swab from the nares; 1 conjunctive swab in viral transport media (if deemed appropriate).

Blubber Biopsies: Put in LN dewar in the field; 1 for toxicology as part of another project (Teflon); 1 for fatty acid analysis for this project (cyrovial).

Other Sampling: Red top tube for PFC – spin down and pipette off plasma, freeze plasma; mercury samples (blue top tube – invert to mix, decant WB into mercury-clean container, and freeze; fur – put into mercury-clean bag and freeze).

Samples not analyzed in the field will be stored, shipped, and analyzed as described in the current monk seal permit.

External Exam: Physical Exam (no obvious injury; oscultation; examine eyes, nose, ears etc. for damage, disease, moisture); morphometrics (girth, length, weight). If seals, based on veterinarian's hands-on physical exam, do not show any outright physical signs of injury or illness they will be instrumented with a MK-10 Satellite linked GPS dive recorder. This device will provide post-release monitoring until the opportunity to visually survey the islands the following year. If upon exam seals do show physical signs of injury or illness, the veterinarian will make the decision regarding potential sedation for full biomedical sampling and/or appropriate treatment for injury or illness. These animals will be covered under the Health Assessment portion of the HMS research permit.

After this handling, candidate seals will be released and allowed to freely range until capture for transport (approximately 2-4 days). This will minimize any stress seals may experience being held in a captive shore pen. Prior to the second capture, the seal will be visually assessed for any outward signs of injury or illness. If the veterinarian determines the animal to be unhealthy, either after closer physical examination and/or evaluation of blood sample, then the animal will not translocated.

If an instrumented seal cannot be relocated at the previous capture point prior to capture for relocation we will use the satellite tag and small boats to try to relocate it. If it appears that animal has disappeared (e.g. death by shark or left the atoll), we may catch another seal for transport depending on a number of factors including: (1) If seals are already on the ship for relocation, we will not capture, process and move another seal to the ship; and (2) If there are no seals that fit the criteria listed above, we will not capture another seal.

Capture of seals and transport to vessel for move to Nihoa
The field team at French Frigate Shoals will monitor the location of seals visually and by satellite tracking. Recaptures will begin ~0700 and the OES will anchor approximately 1.5 miles from

Tern Island. This would result in an approximately 5-15 minute boat ride from Tern depending on conditions; however, weather is generally favorable in September.

Two small boat teams will begin transporting seals from the islets and most seals should be coming from Tern Island. If seals need to be taken from other islets, one or both teams will collect seals from the furthest location first. The longest boat ride would be approximately 40 minutes, duration of trip regularly undertaken in relocations of weaners from areas of high shark predation.

Seals will be captured using standard techniques for the transport of weaners. Animals will be restrained in a stretcher net by two trained seal biologists and placed on the deck inside the small boat. Seals will be transported directly to the OES. Water will be available onboard to cool seal off if transport if overheating becomes a concern. Up to 2 seals may be transported in the whaler at one time.

Seals will be taken onto the OES by lifting the entire small boat by crane up to the mid-ship low railing access on the port side of the vessel. One biologist will remain with the seal during lifting. Seals will be hand lifted from the small boat onto the OES and brought to their cages.

A total of 6 individual cages approximately 8' x 4' x 3' will be placed on the aft deck of the OES. The distances between cages will be wide enough to allow biologists to move between, prevent spread of urine and feces between cages, and free flow of air. The cages will be strapped to the deck to prevent sliding if rough seals develop. Seals will be placed on a blue tarp, removed from the stretcher net and lifted manually into the cages. Seals will be held separately. A saltwater hose is located near the cage and ice is available for cooling off seals in the heat of the day.

Transportation from French Frigate Shoals to Nihoa

The transit from FFS to Nihoa takes approximately 26 hours. Departure time from FFS is estimated at 1300 and a 1500 arrival at Nihoa the following day would allow for release that evening. However, if departure is later in the day, seals will be held for another night and released around 0800 the morning of the third day. So seals will be kept on the OES for 30 – 48 hrs.

During transport the aft deck will be off limits to anyone except seal biologist monitoring the animals and ships safety officers. No physical contact with seals will be made unless a problem arises in which a seal needs to be restrained for examination or treatment (see contingency plan below). If physical contact is made, protocols for handing seals in the wild will be followed as described in the permit application and as written in the Hawaiian monk seal Field Research Manual for safe handling of seals and minimizing risk of disease transmission (e.g., clean coveralls that have been soaked in bleach solution, wash hands, etc). During transport fishing from the aft deck will be prohibited. We will be looking for a variety of threats, indications of stress or disease, and ways to mitigate both while observing the animal: entrapment/entanglement in cage; abnormal discharge from body orifices; normal respiration; normal behavior; modifying ambient temperatures to prevent overheating; enforce security-preventing disturbance by people on ship; monitor for ship equipment/supplies posing risk to seals.

Seals will be monitored 24 hrs a day while on the ship by biologists working on 2-hour shifts. Observers will watch for changes in external behavioral/health parameters. Initially upon be loaded onto the boat the seals will be closely observed for signs of acute stress (e.g. continued high respiration and heart rate, agitated behavior, shaking). Descriptive and medical observations will be collected for each individual seal. The following types of data will be recorded: observation form - write observations every 30 minute; physical exam form - observer completes after their 2-hour shift as a summary; eye exam form - only if observe eye lesion. A veterinary exam sheet will also be filled out by the attending vet prior to release.

Release of seals at Nihoa.
The OES will approach within 0.5 miles of Nihoa for the launching of small boats. Seals will be removed from their cages and placed on a blue tarp. They will be captured using a stretcher net and brought to the SAFE boat, which will be held by the crane at the portside mid-ship low railing access. Groups of 3 seals will be transported at a time on the floor of the SAFE boat. The SAFE boat will be lowered into the water for a near-shore release of seals.

Landing on the beach is hazardous and likely to disturb a number of seals resting on shore. The small boat will attempt to get within at least 100 m of shore but closer if conditions allow. This will mean the boat will be in water approximately 20 feet deep with emergent land clearly visible for seals to navigate by. Two biologists will lift the seal over the rail of the safe boat, lowered to the surface of the water and one side of the stretcher net dropped allowing the seal to swim away. Safety lines will be tied to the boat side bar of the stretcher net and connected to the SAFE boat. This will keep the stretcher net from sinking and will cause the net to open releasing the seals if it should be dropped. An additional crewmember will be prepared with snorkel gear to help in the water if something needs to be done in the water.

Post Release Monitoring

Remote Monitoring: Seals will be instrumented with a MK-10 Satellite-linked GPS Dive Recorder, which will provide information on habitat use, dive behavior, and survival. These data will be compared to animals instrumented and biologically sampled (in an identical fashion to relocated seals) at Nihoa and previous tracking studies of yearling and juvenile seals.

The study that will be happening at Nihoa Island concurrent to the relocation will be sampling across multiple age sex structures and, as mentioned above, involve identical sampling techniques as those used on relocated seals. We will make attempts to instrument animals of the same cohort as part of this study, but due to logistics, time on the island, size of the beach, and small number of seals, most instrumentation will likely have to be opportunistic.

Resighting: Attempts to resight the seal will be made during subsequent cruises and research projects at Nihoa, both by NMFS staff and opportunistically by USFWS conducting other operations on the island. Cruise schedules have not been set due to normal budget uncertainties. At the minimum re-sights will be conducted during our field camp deployment and retrieval cruises in May and August, respectively.

Contingency Plans: If during transport a seal becomes sick or injured it will be kept on the ship. Veterinary and husbandry staff will be on board and will have a full kit of emergency drugs, antibiotics, intubation equipment, fluids for hydration, and IQF herring if tube feeding is necessary. The compromised seal(s) will be kept on board and taken to Honolulu. Transit time from Nihoa to Honolulu is approximately 24 hours. During transit the seal(s) will continue to be monitored 24 hours/day.

Upon arrival to Honolulu seal(s) will be transported via truck to a pre-approved facility for care. Care will be lead by staff from the Marine Mammal Center with support from PIFSC/PIRO, using protocols refined and developed with recent captive care activities. Releasability of the seal will be discussed with OPR on a case-by-case basis.

Due to the logistic constraints of getting to Nihoa it will be difficult for rapid response if for some reason instruments on relocated animals begin to fail. Failure could be due to a number of factors including seal mortality or electronics failure. If tag failure exceeds 50% (which has been documented in previous studies), NMFS personal will attempt to travel to Nihoa to survey on an available vessel (USFWS charter, USCG, NMFS research cruises), however, will not be able to charter a vessel for this purpose.

APPENDIX 4: PAPAHANAUMOKUAKEA MARINE NATIONAL MONUMENT SPECIAL CONDITIONS & RULES FOR MOVING BETWEEN ISLANDS & ATOLLS AND PACKING FOR FIELD CAMPS

The islands and atolls of the Papahanaumokuakea Marine National Monument (Monument) and the Hawaiian Islands National Wildlife Refuge are special places providing habitat for many rare, endemic plants and animals. Many of these species are formally listed as Endangered under the Endangered Species Act. Endemic plants and insects, and the predators they support, are especially vulnerable to the introduction of competing or consuming species. Such introductions may cause the extinction of island and reef endemics, or even the destruction of entire island or reef ecological communities. Notable local examples include: the introduction of rabbits to Laysan Island in 1902 which caused the extinction of numerous plant and insect species, and 3 endemic landbird species; the introduction of rats to many Pacific Islands causing the elimination of many burrowing seabird colonies; the introduction of the annual grass, sandbur, to Laysan Island where it has crowded out native bunch grass thus, eliminating nesting habitat for the Endangered Laysan finch; and, the introduction and proliferation of numerous ant species throughout the Pacific Islands to the widespread detriment of endemic plant and insect species.

Several of the islands within the Monument are especially pristine, and as a result are rich in rare and special plants and animals. Nihoa Island has at least 17 endemic and rare insect species, 5 Endangered plants and 2 Endangered birds. Necker Island has Endangered plants and 11 endemic insects. Laysan Island has Endangered plants, 9 endemic arthropods and the Endangered Laysan finch and Laysan duck. Other islands in the Monument such as Lisianski, and islets in Atolls such as Pearl and Hermes Reef and French Frigate Shoals provide homes for a variety of endemic and/or endangered species and require special protection from alien species.

Other Pacific Island such as Kure and the “high islands” (Oahu, Hawaii, Maui, Kauai, etc.) as well as, certain islands within Midway Atoll, Pearl and Hermes Reef and French Frigate Shoals have plants and/or animals that are of high risk for introduction to the relatively pristine islands discussed above. Of special concerns are snakes, rats, cats, dogs, ants and a variety of other insect and plant species. Harmful plant species of highest concern that we know of are *Verbesina encelioides, Cenchrus echinatus, and Setaria verticillata.*

The Co-trustees are responsible for the management and protection of the islands, reefs and wildlife of the Monument. No one is permitted to set foot within the Monument without the express permission of the Co-trustees through the permitting process. Because of the above concerns, the following restrictions on the movement of personnel and materials throughout the Monument exist.

The Following Conditions and Rules apply to the all islands within the Monument with the exception of those at French Frigate Shoals and Midway Atoll:

Definitions:
"**New**" means off the shelf and never used anywhere but the island in question.
"**Clothing**" is all apparel , shoes, socks, over and under garments.
"**Soft gear**" is all gear such as daypacks, fannypacks, packing foam or similar material, camera bags, camera/binocular straps, microphone covers, nets, holding or weighing bags, bedding, tents, luggage, or any fabric, fiber, paper or material capable of harboring seeds or insects.

1. Any personnel who will be landing boats, and staying within the boats, at any island should have clean clothes and shoes.

2. Any personnel going ashore at any island and moving inshore from the immediate area in which waves are breaking, or beyond the intertidal area, at the time of landing must have new footwear, new or island specific clothes and new or island specific soft gear. All must be frozen for at least 48 hours prior to landing.

3. Any personnel entering any vegetated area, regardless of how sparse the vegetation, must have new footwear, new clothes and new soft gear all frozen for at least 48 hours prior to landing.

4. To avoid transport of seeds from within small boats the following protocol should be followed. For islands with safe or sandy landing conditions, one should keep quarantine shoes/socks inside quarantine containers until the island is reached. One should go ashore bare foot, and then don the quarantine shoes. Non quarantine shoes should be removed in the small boat, put into a bucket or some kind of sealed container, and left enclosed in that container until the person departs the island. The sealed container, if clean on the outside, may go ashore, but should not be opened ashore. For landings which are rocky, rough, and relatively unsafe (such as Necker and Nihoa) for safety reasons, quarantine shoes should be donned when inside the small boats, but care should be taken to look for seeds and insects which may be in the small boat.

5. Soft gear may not be moved between islands. Hard gear must be thoroughly cleaned and frozen for at least 48 hours between islands.

6. During transit, clothing and gear coming off Kure, Midway, or any islet of French Frigate Shoals must be carefully sequestered to avoid contamination of gear bound for cleaner islands. Special care must be taken to avoid contaminating gear storage areas and quarters aboard transporting vessels with seeds or insects from these islands.

7. Regardless of origin or destination, inspect and clean all equipment, supplies, etc., just prior to any trip to the Monument. Carefully clean all clothing, footwear and softgear following use to minimize risk of cross contamination of materials between islands.

8. Pack supplies in plastic buckets with fitted lids or other sealable metal or plastic containers since they can be thoroughly cleaned inside and out. Cardboard is not permitted on islands. Cardboard boxes disintegrate in a short time and harbor seeds, animals, etc., which

cannot be easily found or removed. Wood is not permitted unless sealed (painted or varnished) on all surfaces and frozen for 48 hours.

Wooden boxes can also harbor insects and seeds and therefore are only allowed if well constructed (tight fitting seams are required). All wood must be treated, and inside and outside surfaces must be painted or varnished to provide a smooth, cleanable finish that seals all holes.

9. Freeze or tarp and fumigate then seal all equipment (clothes, books, tents, everything) just prior to departure. Food and cooking items need not be fumigated but should be cleaned and frozen, if freezable. Cameras, binoculars, radios, and other electronic equipment must be thoroughly cleaned, including internal inspection whenever possible, but do not need to be frozen or fumigated. Such equipment can only be packed in wooden crates if treated as in #2 above. Any containers must contain new, clean packing materials and be frozen or fumigated.

10. At present, Tern Island is the singular exception to the above rule, having less stringent rules due to the large number of previously established alien species. Careful inspection of all materials and containers is still required. However, it is acceptable to use wooden and cardboard containers for transporting supplies to Tem Island. Also, there is no requirement for freezing or fumigating items disembarked at Tem. Although requirements for Tem Island are more lax, the Refuge is still concerned about the possibilities of new introductions. Do not wear clothing to Tern Island that has been worn at Pearl and Hermes, Midway Atoll or Kure Atoll.

Additional Special Conditions for Travel to Nihoa and Necker (Mokumanamana) Islands: Nihoa and Necker are the most pristine locations in the Monument. Nihoa is home to the highest number of federally listed endangered species in the Monument. Many areas of these small rugged islands are inaccessible. Introduction of any alien species could have disastrous results in a very short time. It would be almost impossible to mount any kind of control or eradication program on these islands should an alien species become established. Because of these reasons, access to Nihoa and Necker are strictly limited, and rules governing entry are more stringent.

Access to Nihoa and Necker by permittees will only be allowed under the accompaniment and supervision of a U.S. Fish and Wildlife Service (USFWS) Representative. The representative, who shall be appointed by the U.S. Fish and Wildlife Service Monument Manager will work with permittees to assure careful compliance with all rules for inspection, handling and preparation of equipment. The USFWS Representative will have the authority to control and limit access to various parts of the island to protect animals, plants and archaeological sites, especially endangered species. The USFWS Representative will have the authority to disallow access to the island, or order an immediate departure from the island if conditions for working on the island are not met or are violated in some way.

All field equipment made out of fabric material or wood must be new, and never previously used in the Northwestern or main Hawaiian Islands. Equipment previously purchased or made for use on Nihoa and Necker that has been carefully sealed and stored while away from Nihoa and Necker, and not used elsewhere, may also be brought onto the island. Rules for freezing and/or fumigating are as described for other sites in the Monument (see above).

Clothing, footwear (shoes, slippers, socks, etc.), daypacks (soft gear) must be new, unused, or previously only used on Nihoa (or Necker) and carefully sealed and stored while off of the island. Hard gear such as camera, and equipment must be thoroughly cleaned and inspected.

Additional Special Conditions for Travel Within Pearl and Hermes Atoll: In recent years *Verbesina encelioides* has been introduced to Southeast Island within Pearl and Hermes Atoll. This noxious weed has taken over a large portion of the island. To prevent the further spread of this weed to the other islets within this atoll the following precaution must be taken:

1. Every person should have one set of quarantine gear and clothing for Southeast Island and one set of quarantine gear and clothing for all other islets in the atoll. For instance the same clothing, and if needed camping gear, may be used at north and seal kittery, but anything used at southeast needs to stay off all other islets in the atoll. Do not use the outer islet clothing and gear on Southeast Island.

2. Carefully inspect small boats and their associated equipment when traveling between islets at Pearl and Hermes Atoll. Since folks likely take one anchor ashore and put one anchor in the water there is potential for seed dispersal on anchor lines as well as from within the small boats. This needs to be watched very carefully.

Additional Special Conditions for Food: Fresh foods such as fruits, vegetables, leafy vegetables and tubers are not permitted on quarantine enforced islands (Necker, Nihoa, Laysan, Garner Pinnacles, Lisianski and Pearl and Hermes Reef). Concern is not only that certain species such as tomatoes could easily become established but that decomposing organic waste can also harbor microbes and insects and can act as an introduction vector. Soil can contain many seeds, eggs, larvae, etc., and cannot be transported to or between islands. All other food that can be safely frozen (this does not apply to food in cans or glass jars) must be packaged in air tight containers just as all other gear and frozen for 48 hours.

APPENDIX 5: PROCEDURES FOR MIMIMIZING IMPACTS TO ENDANGERED LAYSAN FINCH

The following avoidance and minimization measures will reduce the risk of harm to the Laysan finch:

To reduce the risk of inadvertent drowning of Laysan finch at the campsite:
Buckets will always be overturned so that they cannot collect rainwater.
Laundry buckets must have lids while laundry is soaking.
Water-filled buckets for dish washing (or for any other purpose) will always be attended.
Tarps *(e.g.,* those covering propane, etc.) will be tucked in tightly so that they cannot collect rainwater.
Garbage cans used for desalinization will have netting placed between the can and the lid. Care will be taken to make sure the lids close properly; faulty positioning of hoses can interfere with proper closure.
To minimize accidental entanglement of Laysan finches at the campsite:
Fabric with loose threads will be burned to minimize the risk of Laysan finch entanglement.
Laysan finch feet can become entangled when fabric is hung out to dry.
Loose threads will be cut off tents and tarps.
Anything with small mesh *(e.g.,* bird nets) will be put away to avoid Laysan finch entanglement.
To minimize impacts to Laysan finch from general camp activities and maintenance:
Camp supplies and water jugs will be aligned with ample space between rows so that finches will not get trapped. Storage jugs will always be capped.
Burn barrels must be attended at all times when burning trash. When not burning, any vents or rust-eaten holes in the barrel or lid will be covered *(e.g.,* with rocks).
For stability reasons, buckets will not be stacked more than two high. Personnel will watch for leaning buckets or water jugs and level the sand beneath leaning buckets if necessary.
Tents will be zipped at all times (day and night) so that finches cannot enter.
Laysan finches will not be fed or allowed access to human food. Laysan finch dependency on the camp could potentially result in adverse impacts to the finches when campsites are dismantled.
On the islands of Pearl and Hermes, Laysan finches appear to be limited by nest sites, therefore, they nest in debris (driftwood, plastic pipes, baskets, etc.). Thus, the beaches will not be cleaned or debris disturbed as this may destroy a nest. In an effort to prevent nesting in undesirable locations, camp gear must be checked daily during the nesting season (spring and summer) for signs that finches are building nests on or under gear. If it is determined nest building has begun, the nest site should be modified to prevent nest completion.