MARINE MAMMAL COMMISSION

17 April 2013

Mr. P. Michael Payne, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Re: Permit Application No. 16632
(Pacific Islands Fisheries Science Center,
Hawaiian Monk Seal Research Program)

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit application with regard to the goals, policies, and requirements of the Marine Mammal Protection Act. The Pacific Islands Fisheries Science Center is seeking to renew and amend permit no. 10137 to conduct research and enhancement activities on Hawaiian monk seals during a five-year period.

RECOMMENDATION

The Marine Mammal Commission recommends that the National Marine Fisheries Service issue the permit but—

- condition it to require the Center to (1) keep accurate records of disturbance rates and responses and (2) reduce the approach distance slowly to minimize the likelihood of causing unnecessary disturbance;
- condition it to require the Center to (1) refrain from tagging unweaned pups when the associated disturbance may increase substantially the exposure of the female or pup to unsafe conditions (e.g., the presence of sharks or aggressive males, rough surf conditions that pose a risk should the pup go into the water) or result in pup-switching between lactating females in close proximity, (2) monitor, document, analyze, and report the consequences of such tagging, (3) use such procedures only when cruise schedules limit the time researchers are on an island to a matter of days, and (4) assess the significance of applying such tags when they complete their survival analyses (i.e., determine how the outcome of the analysis would have changed if those seals had not been tagged);
- require the Center to develop a clear strategy for determining which animals to sample during health assessments so that its results are more likely to be representative of the health of the whole population;
- condition it to allow the Center the flexibility of including seals of any body condition in its de-worming study;

- encourage the Center to make every effort to identify and address those obstacles to translocations between the Northwestern Hawaiian Islands and the main Hawaiian Islands;
- consult with the Animal and Plant Health Inspection Service to ensure that it is satisfied that the plans and facilities for transporting and maintaining monk seals meet the requirements established under the Animal Welfare Act and are adequate to provide for the seals' health and well-being;
- condition it to (1) include language from the permit application that indicates lethal removal measures would be used only as a last resort and (2) require the Center to consult with the Office of Protected Resources and the Commission before taking such actions, whenever possible;
- condition it to require (1) clear guidelines for when hazing activities can be used and (2) the Center to document hazing events thoroughly to evaluate their effects;
- require that the Center (1) consider the feasibility of implementing taste aversion in the wild prior to implementing taste aversion trials in captivity and (2) specify how it plans to conduct taste aversion trials on any seals greater than 90 kg if its maximum dose limit is 4 g; and
- condition it to limit the number of procedures conducted on individual monk seals by avoiding simultaneous large studies (i.e., deworming, behavioral modification, and vaccination trials) from occurring concurrently on those seals.

RATIONALE

The Pacific Islands Fisheries Science Center proposes to conduct research on monk seals in the Hawaiian Archipelago (including the Northwestern Hawaiian Islands and the main Hawaiian Islands) and Johnston Atoll. The research could be conducted during all seasons of the year. The objectives are to identify impediments to monk seal recovery, design conservation interventions to minimize those impediments, and ultimately improve the population's survival and reproductive rates to the extent that the population is able to recover. To fulfill those objectives, researchers would investigate (1) abundance and distribution, (2) survival and reproductive success, (3) movement patterns and habitat use, (4) foraging ecology and fisheries interactions, (5) disease and health, (6) shark predation, (7) conspecific male aggression, and (8) seal and human interactions.

The Marine Mammal Commission has long monitored the activities of the Service's Hawaiian Monk Seal Recovery Program. The activities conducted by the program have resulted in an extraordinary database that provides much vital information for managing the species. As a general rule, the Commission strongly supports those research activities because it considers them essential to the Service's efforts to promote the recovery of this species. For that reason, the Marine Mammal Commission recommends that the National Marine Fisheries Service issue the permit, taking into account the following recommendations.

Ground-, aerial-, and vessel-based surveys

Each year researchers would observe, photograph, and videotape virtually all seals in the population during assessment surveys that occur primarily from March through September. The surveys could occur on a daily basis and could harass individuals of all age classes and either sex. During ground surveys, researchers would approach sleeping animals within 1 m, primarily to read

tag numbers, but they generally would remain as far away as possible, especially from molting seals and females with pups. The researchers are trained to be unobtrusive and to remain low to the ground whenever seals may alert to human presence. Researchers also could use unmanned terrestrial or amphibious vehicles to approach the seals at a minimum distance of 1 m. The vehicles would be equipped with video cameras to identify and photograph seals and assess injuries. Researchers would first test the suitability of various vehicles for collecting relevant data in the nearshore environment (including beaches) and monitor their potential for disturbance. If they prove successful and do not cause significant disturbance, researchers would then use the vehicles in other environments, as possible.

In addition, researchers would use remote-controlled video cameras in some locations (i.e., Nihoa Island) to monitor the resident monk seal population. During a two-day period, engineers would install up to three cameras on the cliff edges along the beach used by the majority of the local seal population. The cameras would be maintained one to two times per year. A researcher would accompany the engineers during installation and maintenance activities. They would skirt the edge of the beach and remain as unobtrusive as possible. In the event that a female-pup pair separates during the activities, the researcher would attempt to reunite them.

For aerial surveys, researchers would use helicopters, fixed-wing aircraft, and unmanned aerial vehicles to census monk seals. Helicopters and fixed-wing aircraft would generally remain at an altitude and horizontal distance of 152 m but could approach seals at a minimum altitude of 91 m and 76 m, respectively, to evaluate seal wounds, entanglement in debris, etc. To further enhance their population assessment and monitoring methods, researchers would use unmanned aerial vehicles (i.e., quadrocopters) to monitor several inaccessible sites such as at Necker, Nihoa, and Niihau Islands. Quadrocopters are small, quiet, and safe relative to other unmanned aerial vehicles because of their agility and the fact that their rotors are enclosed within a frame. Researchers can control the quadrocopter remotely and would use it to approach seals at a minimum altitude of 3 m. To minimize disturbance of seals from all aerial surveys, researchers would increase the altitude of the platform if an animal reacts to its presence. If seals react to the quadrocopter by vocalizing or fleeing into the water during the first few trials of that new technology, researchers would adjust the minimum approach distance accordingly.

Researchers also would use small boats (i.e., 5.5-m whaler) to assess seals on sand spits and on inaccessible beaches. They would circle the haul-out site at a minimum approach distance of 10 m to obtain the relevant data, good quality photographs, and body condition information. Researchers would avoid landing on beaches near seals.

The various forms of technology discussed in the application are intended to enhance data collection without increasing the level of disturbance. During and after initial testing, the researchers will have to make judgments regarding if and when such vehicles/technology should be used. Those judgments will have to be made on a case-by-case basis and the Commission does not expect that the researchers can describe a generally tolerable level of disturbance. At the same time, however, researchers should assess the level of disturbance whenever such devices are used so that they can make data-based decisions regarding their use. They might take several approaches to test the propensity for disturbance. First, they might set approach distances as indicated in the preceding paragraphs. Second, they might begin by limiting their approach to a relatively large distance and

then slowly decrease the distance. That is, there is no need to approach closer than required to collect the essential data. With this reasoning in mind, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to require the Center to (1) keep accurate records of disturbance rates and responses and (2) reduce the approach distance slowly to minimize the likelihood of causing unnecessary disturbance.

Tagging and marking activities

Researchers would harass, capture, handle, restrain, measure, weigh, sample, tag/mark, and conduct ultrasound measurements of blubber thickness on 620 monk seals per year. They would not capture nursing pups, lactating females, or obviously pregnant females. Individuals could be captured and handled up to three times during the course of the five-year permit. Researchers would collect skin and vibrissae from each monk seal. They would mark each seal with plastic flipper and passive integrated transponder tags. If a seal was recaptured, those tags would be reattached or implanted only if the original tags were lost, damaged (e.g., broken, worn), or had not been attached/implanted during previous captures. In addition, researchers would deploy a small sonic flipper tag on up to 35 weaned pups per year at French Frigate Shoals as part of a study to document pup and shark movements and interactions. All capture activities would last up to 15 minutes. Researchers also would mark with bleach nearly all the seals each year (including pregnant females, lactating females, and nursing pups) while they are sleeping. In some instances, researchers have to leave various sites before all of the pups are weaned and can be tagged. To ensure that those animals can be identified at a later time, researchers would tag up to 25 pre-weaned pups with a single flipper tag. They would sneak up only to a sleeping pup (that is relatively far from the sleeping female) and apply the flipper tag within 10 seconds. After tagging the pup, the researcher would move away from the seals immediately but also would confirm that the female-pup pair remained together. Seals would not be approached for any of the activities if they are near rock ledges or dangerous substrate. These activities are essential for maintaining the individual-based data collection on this species.

The Commission recognizes the importance of maintaining the database and also recognizes that doing so may become increasingly difficult if future budgets do not improve. The quality and utility of the database will decline if the program is not able to identify individuals in each population. The loss of identity for a few seals generally should not be a major problem, but the loss of individual identities for a cohort or a series of cohorts would be problematic, particularly since decisions about management interventions often are based on observed survival rates.

However, the Commission also believes that the program must balance the value of the information gained against the resulting disturbance and the consequences of such disturbance. Doing so will require cautious implementation of such procedures as tagging unweaned pups and careful monitoring, documentation, analysis, and review of the consequences. With those concerns in mind, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to require the Center to (1) refrain from tagging unweaned pups when the associated disturbance may increase substantially the exposure of the female or pup to unsafe conditions (e.g., the presence of sharks or aggressive males, rough surf conditions that pose a risk should the pup go into the water) or result in pup-switching between lactating females in close proximity, (2) monitor, document, analyze, and report the consequences of such tagging, (3) use

such procedures only when cruise schedules limit the time researchers are on an island to a matter of days, and (4) assess the significance of applying such tags when they complete their survival analyses (i.e., determine how the outcome of the analysis would have changed if those seals had not been tagged).

Health assessments

To determine the overall health of seals in the population, researchers would harass, capture, handle, restrain, sedate, measure, weigh, sample, tag/mark, and conduct ultrasound measurements of blubber thickness on up to 30 unhealthy and 100 healthy seals per year. They would not capture lactating females with pups or nursing pups. They would capture the seals using a hoop net or stretcher. The attending veterinarian would decide whether to sedate a seal, the types of samples to collect from injured, ill, or otherwise debilitated seals, and whether to recapture those seals for subsequent sampling. They would collect blood, vibrissae, blubber, and various swabs from each seal. Milk also could be collected from a female if it lost or abandoned its pup. If a seal was not tagged and/or marked, researchers would apply the flipper and passive integrated transponder tags described previously. If a seal has an abscess, they could lance, flush, and treat the abscess with antibiotics. Handling activities generally would require no more than 20 minutes. If the attending veterinarian determines that an individual has a high probability of death from an injury or underlying disease, the Center could euthanize up to 10 seals, of any age class including pups, during the five-year period.

Researchers could instrument up to 60 of the healthy seals captured during health assessments with various devices. They would use epoxy to attach the devices to a seal's pelage between the shoulders. The devices could include VHF transmitters, satellite transmitters, GPS transmitters, time-depth recorders, video cameras, accelerometers, and acoustic tags. Instruments intended to be attached for longer than two weeks would not exceed 1 percent of the seal's mass and those intended to be attached less than two weeks would not exceed 2 percent of the seal's mass. The seals would be recaptured to remove the instruments or the instruments would be allowed to fall off during the next molt. Researchers would not instrument nursing pups or lactating females with pups. Those activities, including instrumentation, would require holding seals for up to 60 minutes.

Diseases pose a serious threat to Hawaiian monk seals because the seals have been relatively isolated from other pinnipeds and have not been exposed to diseases known to occur in other species. One of the main concerns about this species is that it may be subject to an outbreak of disease. The Center coordinates its activities with the National **Marine Mammal Health and Stranding Response** Program and any activities involving a disease outbreak, strandings, or an unusual mortality event would be covered under the Program's permit, as it is beyond the scope of the Center's research permit.

In addition, the application is not clear regarding how seals will be pre-determined to be healthy or not for sampling purposes. Although the researchers may have specific reasons for selecting some seals (i.e., they are obviously debilitated), it may be useful to include at least some element of randomness in the sampling to improve the likelihood that the results are indicative of the general population rather than a selected portion of it. Given the need to minimize the impact of

disease on the population and to characterize its general health, the Marine Mammal Commission recommends that National Marine Fisheries Service require the Center to develop a clear strategy for determining which animals to sample during health assessments so that its results are more likely to be representative of the health of the whole population.

Intestinal parasite treatment

Parasitic infection may play an influential role in the condition of a young monk seal, especially when food is limited and the seal's immune system is developing. To determine the efficacy of various de-worming treatments, researchers would treat and monitor up to 100 seals per year of either sex that are greater than 4 months of age and less than 3 years of age. They would identify potential test and control seals (equal numbers of seals by age, sex, body condition, and location) during ground surveys and would exclude emaciated seals from the study. Researchers would handle each individual up to four times per year for treatment with oral or injectable de-worming treatments and up to four times per year for follow-up assessment. They would capture the seals with a net or by hand. They would restrain, collect feces, measure/weigh, tag (if not previously attached), conduct ultrasound on, and apply the treatment to each test seal. Researchers would assess post-treatment body condition and fecal egg counts by observing the seals, collecting scat from known individuals, recapturing and weighing, and conducting ultrasound on each test seal.

Researchers would test the efficacy of a topical de-worming treatment on up to 60 of the 100 seals per year, none of which would have been treated with oral or injectable drugs. Seals that receive topical treatments would be one- to three-years of age and of either sex. They would apply the topical treatment up to 12 times per year primarily to sleeping seals on the upper dorsum to ensure that the seal cannot touch with its fore flippers or bite the area treated. If capture and restraint are required, then researchers would apply the treatment only four times per year. Further, if a seal attempts to go in the water within 30 minutes of treatment application, researchers would herd them to higher ground or place passive objects (e.g., mesh net) between the seal and the water. However, if a seal is agitated or otherwise displays signs of undue stress and fails to become calmer after application, they would allow the seal to move into the water. Control seals would be handled in the same manner as test seals except they would not receive the treatment. If any of the treatments are determined to be effective (e.g., as evidenced by improved body condition or survival) and of low risk to the seals, then researchers could treat up to 300 seals per year in the least invasive manner. Seals appearing to be moribund would not be treated.

The description of this investigation indicates that emaciated or moribund seals will not be included, but it is not clear that such seals can be readily categorized. The condition of seals follows a continuum from good to thin to emaciated and finally to irreversibly moribund. Drawing the treatment/no treatment line in the wrong place could exclude seals that might benefit from deworming. In addition, focusing the study only on seals in better condition may inadvertently limit the scope of possible effect, making it more difficult to determine if a positive effect occurs. Also, the number of parasite eggs in seal scat may be a very imprecise measure, because it appears to vary markedly even in untreated seals. That being the case, the condition of animals and their survival should provide useful information regarding the benefits of treatment. Finally, including seals in poor condition may provide a better indication of how broadly a deworming treatment might be applied within a population. With these points in mind, the Marine Mammal Commission

recommends that the National Marine Fisheries Service condition the permit to allow the Center the flexibility of including seals of any body condition in its de-worming study.

Translocation

Some nursing pups are separated prematurely from their mothers. To reunite them with their mother or another parturient female that lost her pup, researchers would capture abandoned nursing pups or prematurely weaned pups by hand or with a hoop net or stretcher. They would transport the pups to sites on their natal islet or, in rare instances, within an atoll via small boat. Transport time would not exceed 30 minutes. In addition, researchers may seek to improve a female pup's chance of survival by (1) capturing a previously weaned male pup that has usurped the nursing position of a female pup and move him a sufficient distance from the female-pup pair and (2) reversing a pup exchange that has disadvantaged a female pup (i.e., the pups would be returned to their original nursing females). Researchers estimate that up to 20 pups per year of either sex would be translocated for those purposes, but they request authorization to conduct those activities on an unlimited number of pups. The Commission supports that request.

To alleviate various risks (e.g., shark predation, human interactions) to newly or nearly weaned pups, researchers would capture pups as previously stated and move them to other beaches or islets where they are less exposed to such risks. In the Northwestern Hawaiian Islands pups would be translocated only to other beaches within the same atoll but in the main Hawaiian Islands they could be translocated to any other beaches within the main Hawaiian Islands. For such translocations in the main Hawaiian Islands, researchers could transport the seals via truck, boat, plane, or helicopter within an 8-hour timeframe. Pups would be transported immediately after capture and would not be held in temporary captivity unless deemed necessary by the attending veterinarian. Researchers could assess the health of some of those seals, as described previously. They also could haze seals of any age class and either sex away from hazardous situations (e.g., boat ramps, roads). Researchers estimate that up to 60 seals per year of either sex would be translocated for those purposes, but they request authorization to conduct those activities on an unlimited number of seals. The Commission supports that request.

In addition, researchers would use a two-stage approach to translocate weaned pups deemed to have a small chance of survival from areas where pup survival is poor to areas where it is greater. During stage 1, they would capture and relocate up to 20 pups per year within the Northwestern Hawaiian Islands or from the main Hawaiian Islands to the Northwestern Hawaiian Islands. For the immediate future, pups would not be translocated from the Northwestern Hawaiian Islands to the main Hawaiian Islands. Translocation efforts would focus primarily on females, but males also could be translocated. Appendix A describes a structured decision framework for choosing when and where to capture and move seals and provides details regarding their care, transport (including by land, air, and sea), and health screening to prevent disease transmission.

During stage 2, researchers would recapture and relocate up to 30 seals (juveniles and subadults) per year within the Northwestern Hawaiian Islands, within the main Hawaiian Islands, or from the Northwestern Hawaiian Islands back to the main Hawaiian Islands (i.e., only those seals originally from the main Hawaiian Islands and translocated to the Northwestern Hawaiian Islands would be moved from the Northwestern Hawaiian Islands back to the main Hawaiian Islands).

Researchers would not relocate seals back to their original site until they are at least two years of age. Researchers could assess each seal's health, as described previously, during both stage 1 and 2.

Finally, researchers could translocate up to six seals per year of either sex and all age classes except pups to manage seals that have created problems by interacting with human activities or to test and evaluate translocation methods. Here, too, researchers would capture and relocate seals within the Northwestern Hawaiian Islands, within the main Hawaiian Islands, and from the main Hawaiian Islands to the Northwestern Hawaiian Islands, but not from the Northwestern Hawaiian Islands to the main Hawaiian Islands. Again, they also could assess the health of those seals.

Translocations are intended to increase juvenile survival and reduce the potential for human-seal interactions that put both at risk. The translocation of juveniles from the Northwestern Hawaiian Islands to the main Hawaiian Islands was proposed as a way of dealing with the extraordinarily low survival of juveniles in the Northwestern Hawaiian Islands beginning in the late 1980s and early 1990s. In contrast, young seals in the main Hawaiian Islands appear to be in better condition than their counterparts in the Northwestern Hawaiian Islands. Releasing translocated seals in the main Hawaiian Islands has been viewed as one way to avoid the potential for threats thought to be associated with captivity (e.g., the occurrence of blindness in 10 of 12 seals brought into captivity in the mid-1990s). To date, the idea of using the main Hawaiian Islands as a supportive environment for young seals is still one of the best options for dealing with poor juvenile survival. Although the Commission understands that the Service must address a number of social issues related to translocating seals to the main Hawaiian Islands and, indeed, encourages them to do so, it also is essential that the Service not lose the opportunity to develop and use this recovery measure in the near future. Therefore, the Marine Mammal Commission recommends that the National Fisheries Service encourage the Center to make every effort to identify and address those obstacles to translocations between the Northwestern Hawaiian Islands and the main Hawaiian Islands. The Commission will be pleased to assist the Service in any way that it can to continue the development and implementation of this potentially important management measure.

Adult male removals and hazing

Some adult males exhibit aggressive reproductive behavior that results in the injury or death of other seals—mostly females but also some males. To manage this aggressive behavior, researchers could capture up to 20 adult males per year that are known or strongly suspected of seriously injuring or killing conspecifics and (1) relocate them to beaches within the same islands or atolls where they were captured or (2) hold them permanently in captivity. As in other cases, researchers could assess the health of those seals before they are released. Seals may be relocated more than once if they return to the beach from which they were removed and resume aggressive behavior. Seals that are taken into permanent captivity may be held up to two weeks in holding pens at French Frigate Shoals or Midway Atoll before they are transferred to the main Hawaiian Islands where they would be transferred to temporary holding facilities (e.g., the Ford Island facility, Waikiki Aquarium, or The Marine Mammal Center's planned facility on the island of Hawaii). Strict quarantine measures would be followed at each facility. Seals would be brought to the main Hawaiian Islands only if a permanent facility has been identified and is willing to obtain the necessary permits. Such transport and holding must comply with certain federal statutes and regulations. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service consult with

the Animal and Plant Health Inspection Service to ensure that it is satisfied that the plans and facilities for transporting and maintaining monk seals meet the requirements established under the Animal Welfare Act and are adequate to provide for the seals' health and well-being.

Aggressive adult male seals that cannot be relocated in the wild or taken into captivity could be euthanized humanely using injectable drugs, gunshot, or penetrating captive bolt. A veterinarian experienced with Hawaiian monk seals would be consulted when selecting the method of euthanasia, in accordance with the American Veterinary Medical Association guidelines. Only staff with firearms training and who are either a veterinarian or have had veterinary instruction may conduct euthanasia by gunshot. The Marine Mammal Commission recognizes that such drastic measures may be required under certain circumstances. That being said, euthanizing an otherwise healthy adult male seal is a serious management measure and the Commission hopes that the Center is not faced with the need for such action. Based on the potential significance of such removals, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to (1) include language from the permit application that indicates lethal removal measures would be used only as a last resort and (2) require the Center to consult with the Office of Protected Resources and the Commission before taking such actions, whenever possible.

In addition, researchers would haze aggressive adult males away from another seal if the aggressive males appear to be harassing the seal in such a way that puts it in imminent danger of serious injury or death or if any of the males are known to have harmed or killed another seal previously. The Center believes that the benefits of protecting potentially vulnerable seals outweigh the potential adverse effects of hazing aggressive males and the Commission agrees. Hazing would include approaching an adult male, vocalizing, making loud sounds, prodding with a long pole, or throwing or projecting with a wrist-rocket sling shot small objects (e.g., rocks, sticks, coral rubble, debris up to 4 inches in length) at or near him to distract him and stop his aggressive behavior. Researchers estimate that up to 10 adult male seals per year would be hazed, but they request authorization to conduct those activities on an unlimited number of male seals.

The Commission supports that request, but also believes that at least two problems may develop from hazing seals. The first would occur if the researchers inadvertently haze a dominant seal that is otherwise protecting a female seal from other aggressive males. If the dominant male and female move into the water, then the dominant male loses its ability to control access to the female and she is more likely to be mobbed by the other males. With this concern in mind, it behooves the researchers to be cautious in such interventions. The second problem would occur if the researchers were to use those techniques in front of members of the public that thereafter would consider hazing methods appropriate behavior for any seal on the beach. Here, too, the researchers will need to be cautious in such interventions. For these reasons, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to require (1) clear guidelines for when hazing activities can be used and (2) the Center to document hazing events thoroughly to evaluate their effects.

Disentanglement and de-hooking

Monk seals of either sex and all age classes can become entangled in fishing nets, lines, and other marine debris. Researchers would disentangle seals using capture/restraint or using a cutting implement with no restraint. Seals that are captured would be released on the same beach or on a nearshore reef. Researchers would remove hooks by restraining the seal in a hoop net or stretcher and removing the hook by hand. Those seals may be sedated by an attending veterinarian, as necessary. Researchers would coordinate any efforts to disentangle a seal in the main Hawaiian Islands with the regional stranding coordinator and would report any entanglement in the Northwestern Hawaiian Islands to that stranding coordinator. Researchers estimate that up to 75 seals per year would be disentangled or de-hooked, but they request authorization to conduct those activities on an unlimited number of seals. The Commission supports that request.

Necropsies and opportunistic sampling

The Center would conduct a necropsy on any monk seal found dead. Those necropsies are coordinated and data shared with the regional stranding coordinator. Tissue samples and skeletal remains would be collected and could be retained. After the necropsy, seal tissue may be used as bait for permitted shark removals to enhance pup survival. Researchers also would collect opportunistically unlimited numbers of placentae, scats, spews, and molted skin/hair from monk seal haul-out sites. Retrieval of the samples would occur only after the seals have departed the haul-out site. All samples could be exported and re-imported for analysis. In addition, samples from Mediterranean monk seals could be imported and re-exported for analysis. The Center would obtain the necessary permits under the Convention on *International Trade in Endangered Species* of Wild Fauna and Flora.

Some seals that were rehabilitated and held temporarily under 109(h) or 112(c) stranding agreements could benefit from supplemental feeding after they are released. Researchers would feed up to 12 seals per year 5 percent of their body weight as frequently as once per day for one year. The released seals would be gradually weaned from human contact rather than transitioning abruptly to the wild. Supplemental feeding would occur only in the Northwestern Hawaiian Islands to minimize habituation to humans. The Commission supports this activity but also considers it experimental and therefore encourages the researchers to keep careful feeding records and to monitor the success. The Commission also agrees that such an approach should not be used in the main Hawaiian Islands.

Behavior modifications

To reduce interactions between humans and monk seals, the Center would test various aversive conditioning techniques on up to 20 wild and 20 captive monk seals per year. Those techniques could include visual, (e.g., waving large objects), aural (e.g., shouting, making loud sounds, seal crackers, projecting sounds underwater), and tactile stimuli (e.g., prodding with poles, using crowding boards, or throwing small objects at or near the animals). Those techniques would be developed in a careful, experimental fashion and, if proven safe and effective, applied as appropriate. Researchers would conduct the study trials on weaned, healthy, non-pregnant and non-molting wild seals in the main Hawaiian Islands. They would apply the selected stimulus up to three

times to each individual to evaluate consistency in the induced responses and habituation. Testing could occur on land or in the water. If the seal flees the area, the trial would be aborted.

In addition, researchers would conduct behavioral modification trials using chemical stimuli on captive monk seals. Up to 20 seals that habitually take food from people (i.e., stealing speared fish or bait or depredating nets) could be captured and temporarily held for up to 21 days. Also, up to 20 aggressive males that are brought into permanent captivity could be tested. The Center's goal, if used in the wild, would be to target specific seals known to approach humans for provisioning or to steal bait or catch from spear fishermen. The Commission is unsure how this type of behavior modification would be employed with wild seals but encourages the Center to consider feasible means for implementation in the wild prior to conducting captive trials. This is especially important if taste aversion measures cannot be implemented in the wild population.

Researchers would offer each seal a food type that is different from its typical diet (i.e., dead, restaurant-quality herring, capelin, and occasional squid) until it willfully ingests it. Thereafter, they would supplement the food with 50–100 mg/kg of lithium chloride, an emetic that induces vomiting. The lead veterinarian would complete a daily visual assessment of any seal receiving lithium chloride and would be stationed on site for the first 4 hours following lithium chloride administration. The seal would be monitored and its reactions recorded for at least 12 hours. If the seal avoids the food, it would be offered unaltered food for a few days and then altered food again to determine if avoidance persists. If the seal doesn't avoid the food, researchers will use a higher dose of lithium chloride not to exceed 4 g. However, even at the smallest dose of 50 mg/kg, the 4 g dose limit would be exceeded for newly weaned pups that can weigh 90 kg, let alone adult males than can weigh up to 200 kg. It is unclear how the Center plans to conduct the taste aversion trials with a limiting dose of 4 g. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service require that the Center (1) consider the feasibility of implementing taste aversion in the wild prior to implementing taste aversion trials in captivity and (2) specify how it plans to conduct taste aversion trials on any seals greater than 90 kg if its maximum dose limit is 4 g.

In addition, lithium chloride not only induces vomiting but also can cause inappetence, stomach convulsions, and ataxia and uncoordination due to muscle stiffness. Researchers would provide supportive care if a seal experiences muscle stiffness and difficulty with locomotion. Seals that experience severe side effects (protracted emesis, non-improving muscle stiffness or ataxia, or other severe unintended effects) for more than 48 hours following ingestion of lithium chloride would be removed from the study. Additional diagnostics would be pursued at veterinary discretion and supportive care would be provided. Seals that refuse to eat would be offered live fish to encourage feeding. Upon veterinary approval, researchers would release the seal to the wild as soon as possible. Researchers would conduct health-screening blood panels on all seals that are to be enrolled in the study and prior to their release. Quarantine protocols also would be followed for all seals in the taste aversion trials.

The behavior modification program would be a joint effort between the Service, the Center, their partners, and the public—who would report and describe seal behaviors and associated human interactions. The Center would establish a Behavior Modification Advisory Committee consisting of researchers and managers to aid in the development and implementation of the program. None of the stimuli are intended to physically harm the seals.

In addition to the stimuli study trials, the Center would administer a testosterone reduction agent to up to 10 adult male monk seals in permanent captivity. Those seals would be captured, restrained, sedated, sampled (blood, swabs, blubber, and vibrissae), and administered the testosterone reducing agent up to three times per year. Researchers would measure testosterone an additional seven times per year and monitor behaviors. Control seals would be handled in the same manner as test seals except they would not receive the testosterone reducing agent. If the method proves safe, effective, feasible, and reversible, it could be used as an enhancement alternative to translocation, captivity, or euthanasia of aggressive adult males in the wild.

Vaccinations

The Center proposes to vaccinate up to 1,100 monk seals of either sex and all age classes if the need arises and safe, effective vaccines were available. Currently, cooperating researchers have vaccinated other pinniped species and permanently captive monk seals at several facilities using a recombinant canary pox and inactivated West Nile virus to determine whether they could protect monk seals from canine distemper and West Nile virus, both of which are considered potential threats to wild Hawaiian monk seals. The vaccines have not caused adverse consequences but their efficacy has not been determined. Under the requested permit, researchers would continue to vaccinate up to 20 captive monk seals at various facilities for both viruses twice per year, if needed. The effectiveness of the vaccines would be determined by collecting blood and nasal swabs from the seals four times during the year following inoculation and using those samples to verify antibody formation.

After at least five additional captive seals have been vaccinated with both vaccines, the seals have exhibited no adverse side effects, and the vaccine has been proven effective, a prophylactic vaccine trial may be developed for seals in the main Hawaiian Islands. In the interim, the Center has formulated a response plan with various triggers that would delineate which subpopulations should be vaccinated and when, if the need arose. The Commission supports the response plan and encourages preparation for managing the risks of disease.

Validation studies

Captive monk seals are a valuable resource because they provide opportunities for testing recovery measures that might be useful for the wild population. For example, under the requested permit, Center researchers could conduct validation studies of those methods described previously (i.e., capture, restraint, marking, biomedical sampling, deworming, and instrumentation) on up to 20 captive monk seals per year an unlimited number of times. Some other studies (i.e., behavioral modification and vaccination trials) also could be conducted on the captive monk seals.

However, using the seals for too many studies at one time may present a problem because the effects observed in multiple studies may confound the interpretation of results. The Center did not stipulate if multiple large studies would be conducted concurrently on the captive seals. To minimize confounding results from various studies and minimize the number of procedures conducted on individual captive seals, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to limit the number of procedures conducted

on individual monk seals by avoiding simultaneous large studies (i.e., deworming, behavioral modification, and vaccination trials) from occurring concurrently on those seals.

Incidental harassment and unintentional mortalities

The Center is requesting authorization to harass incidentally up to 400 monk seals, 500 spinner dolphins, and 20 bottlenose dolphins during the proposed research and enhancement activities. The Center also is requesting to kill unintentionally up to two monk seals per year (not to exceed four seals during the five-year period) during research activities. In addition, the Center is requesting to kill unintentionally up to two weaned pups, four juveniles/subadults, and two adult males per year (not to exceed four weaned pups, eight juveniles/subadults, and four adult males during the five-year period) during enhancement activities.

The Center's Institutional Animal Care and Use Committee (IACUC) has reviewed and approved the proposed procedures and the University of Hawaii's IACUC plans to review the procedures in May 2013. For those activities that would occur at captive facilities, each facility would be licensed by the Animal Plant Health Inspection Service under the Animal Welfare Act.

The Commission believes that the activities for which it has recommended approval are consistent with the purposes and policies of the Marine Mammal Protection Act.

Please contact me if you have any questions concerning the Commission's recommendations.

Sincerely,

Timothy J. Ragen, Ph.D.
Executive Director