



MARINE MAMMAL COMMISSION

30 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. 17952
(Daniel Costa Ph.D.,
University of California Santa Cruz)

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit request with regard to the goals, policies, and requirements of the Marine Mammal Protection Act. Dr. Costa is requesting authorization to conduct research on California sea lions from California to Washington during a five-year period.

RECOMMENDATIONS

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

- limit the amount of time that Dr. Costa may hold pups to no more than one working day and prohibit holding pups overnight during metabolic chamber studies; and
- require assessment of changes in body condition and survival as a function of the research activities authorized under the permit.

In addition, the Marine Mammal Commission recommends that the National Marine Fisheries Service adjust its allowed limit for unintentional research-related mortalities for all relevant pinniped permits in accordance with its determination as to whether to count the loss of a fetus against the mortality limit.

RATIONALE

Dr. Costa and his co-investigators propose to conduct research year-round on California sea lions along the U.S. West Coast, primarily on the Channel Islands and Año Nuevo Island, California. They would continue what has been a productive and illuminating, long-term study investigating (1) foraging ecology and diving physiology, (2) movements and habitat use patterns, and (3) health and disease of California sea lions.

Proposed activities

Dr. Costa and co-investigators are requesting authorization to harass, capture, handle, sedate, measure, weigh, sample, mark/tag, and attach instruments to 50 pups and 50 subadults of either sex, 50 adult females, and 50 adult males per year. Generally, researchers working under this permit would capture up to five sea lions (pups, juveniles, and adult females) at a time using individual hoop nets. They would place the sea lions in individual dog crates if they are to be held for more than 30 minutes prior to processing. The researchers would capture adult male sea lions using a floating platform with a fenced-in enclosure. Sea lions would voluntarily haul out on the platform, enter the enclosure through an open door and, in doing so, trigger a mechanism that closes the door. Dr. Costa has been using this method to capture large male sea lions for nearly 10 years. He or his co-investigators would then mark each sea lion with a flipper tag and with hair dye or bleach. They would collect blood, hair, vibrissae, swabs, muscle, blubber, skin, urine, and milk (females) from each sea lion. They also could administer doubly-labeled water and Evan's blue dye to, and collect serial blood samples from, all captured sea lions and perform stomach lavage and/or enemas on each of those sea lions. An individual could be recaptured and resampled up to eight times during the five-year period. In addition, researchers would use a metabolic chamber to conduct metabolic rate measurements on up to 10 pups greater than two weeks of age and 10 juveniles per year.

Researchers could attach to individual sea lions instruments that comprise up to 2 percent of their body mass. Those instruments could include VHF transmitters, satellite transmitters, accelerometers, GPS transmitters, CTD tags, time-depth recorders, and stomach temperature recorders. The stomach temperature recorder would be paired with a stomach temperature telemeter that researchers would place in the stomach of sedated seals using a stomach tube. To increase retention time in the stomach, the telemeter may be attached to biodegradable ethafoam. Dr. Costa has used those methods previously with California sea lions and the telemeters had a mean passage time of 12 days. To investigate foraging ecology, he also requests to attach accelerometer tags to the bottom jaw of juveniles and adult sea lions using epoxy. Tags would either be allowed to fall off during the sea lion's annual molt or would be removed by the researchers at a later time. Researchers could instrument an individual sea lion up to four times during the course of the permit.

Research subjects

The application indicated that Dr. Costa and his co-investigators would include research subjects as young as two weeks. Although it is generally possible to guess the approximate age of pups, determining whether they are or are not at least two weeks old does not seem possible unless the researchers know the birth date for a particular pup or have seen evidence of the perinatal period (i.e., a still attached placenta or a protruding and still evident umbilicus).

Dr. Costa's supporting documents indicated that the proposed activities would have the same effect on any individual, no matter if it is a few weeks or a few months old. Although many pinniped pups as young as, or younger than, two weeks old have been involved in research activities. The tolerance of pups to handling, including long-term effects, has not been studied formally and one reasonable hypothesis would be that their tolerance increases steadily, and perhaps gradually, with age from more vulnerable at birth to less vulnerable as it ages. At the individual animal level, the question of pup tolerance for handling raises concerns about potential effects on each pup.

From a population perspective, the question of concern is whether a group of pups can tolerate those activities without unacceptable changes in their survival rates.

Those concerns do not automatically rule out the possibility of doing research on such young animals, but they argue for a scientific approach to determine their tolerance coupled with a suitable level of caution. The Commission has recommended a similar cautious, scientific approach when researchers study cetacean calves and females with calves.

Age versus size

The tolerance of pups may vary not only as a function of age, but also as a function of size. Indeed, age and size themselves are correlated, but it generally is not clear if one of those factors is more important than the other in judging a pup's tolerance to handling. Size appears to offer an advantage inasmuch as a researcher can determine accurately a pup's size simply by weighing or measuring it when it is captured. In contrast, researchers generally do not have sufficient information to know an animal's age. Size also may be a preferred indicator if it reflects the resources (e.g., energy reserves) that an animal has for coping with stressful situations.

Instrument weight, drag, and encumbrance

The attachment of instruments to young (i.e., small) animals also raises concern. Dr. Costa and his co-investigators request authorization to attach to pups small instruments totaling less than 2 percent of each pup's body mass. They do not anticipate needing to attach more than three tags to a pup of any age but could reinstrument an individual up to four times during the five-year period. Although the researchers' objective is to study the normal behavior of individuals and Dr. Costa indicated that they would not deploy more tags than are necessary, it is not clear from the application and supporting documents how they would determine that the tags are having no more than a negligible, unintended effect. Two percent of a pup's body weight (i.e., 200 g for a 10 kg pup) could be excessive in some situations, especially if the pup is in poor condition.

The configuration of the tags also could be important if that configuration causes excessive drag and thereby requires the pup to expend more energy when swimming. Although it may be unreasonable in this case to require that the researchers conduct studies to characterize the drag resulting from the attachment of one or more instruments to a pup, it is reasonable to require that they collect information on the status of the pups involved (e.g., body condition), as such information might provide insights into the potential effects of handling and instrumentation.

The potential for instruments to interfere with normal movement and function is a third consideration. Such an effect would be contrary to the intent of the study and is not in the researchers' best interests. However, the effects of attaching instruments to marine mammals, especially small marine mammals (including pinniped pups), may be difficult to assess, particularly when the pups are in the water. In this case, Dr. Costa and co-investigators request authorization to attach accelerometer tags to the bottom jaw of juveniles and adult sea lions using epoxy. The accelerometer tags (approximately 20 mm by 73 mm and 48 g) to be used are not novel instruments, but likely have been attached to a subject animal's back rather than jaw. Jaw attachment would allow the researchers to assess foraging success, as has been done in only a few studies of otariids. In that

instance, the researchers will need to ensure that the placement of the accelerometer tag on the lower jaw does not interfere with normal movement and function, particularly foraging. As discussed previously, one indirect way to measure potential effects would be through periodic assessments of the animal's body condition (i.e., weighing it each time it is captured) and any evidence of wounding at the attachment site (i.e., damaged skin around the jaw from scraping it on substrate or from drag in the water).

Metabolic chamber studies

Similar uncertainties are associated with the researchers' request to conduct metabolic chamber studies. They request authorization to conduct metabolic rate measurements using a metabolic chamber on up to 10 pups greater than two weeks of age and 10 juveniles per year. They would conduct measurements on those sea lions under various air and water temperature conditions (multiple test runs lasting at least one hour each). Between test runs, the sea lions would be held in portable mesh containers or wooden boxes for at least 30 minutes to ensure that they are metabolically stable.

To run those tests, Dr. Costa could hold animals for up to two days, including one overnight stay. Although the Commission supports this type of research, it questions whether holding pups for two days, including overnight, poses unnecessary risks to them. It may not be in the best interest of the pups, especially for those that are only a few weeks old. Small pups are highly dependent upon their mothers. Their mothers forage at sea for a few days, return to the rookery for a period of time to nurse their young, and then repeat that cycle. If a female returns to the rookery just after a pup has been captured, it may return to sea before the pup is released, which means that the pup will have lost a nursing opportunity. Although the loss of a nursing opportunity may not be significant for some pups, it could be important for others, especially those that are small and in marginal condition. It also is feasible that the female will abandon her pup if she does find it on a return trip to the rookery. Until some of these concerns are better understood, the Marine Mammal Commission recommends that the National Marine Fisheries Service issue the permit but condition it to limit the amount of time that Dr. Costa may hold pups to no more than one working day and prohibit holding pups overnight during metabolic chamber studies.

Monitoring and measuring unintended, adverse effects

The proposed activities discussed previously and the concerns related to them are not new. In general, the Commission supports the proposed research activities but it also believes that more information is needed on those age classes of marine mammals that may be especially vulnerable to capture and handling. To facilitate the necessary research on such age classes without causing unnecessary adverse effects, the Marine Mammal Commission has long supported permit conditions that require researchers to assess the impacts of their studies.

A scientific approach aimed directly at addressing this concern might involve a multifactorial study using a range of pups of different sizes and collecting the data necessary to assess potential effects on pups as a function of their size (e.g., changes in condition, growth, or survival). However, requiring the researcher to conduct such a study may not be reasonable as that requirement would

fundamentally change the nature of the proposed research. In addition, the researcher may not have the resources to accommodate that requirement, which would necessitate a considerable sample size.

Instead, the Commission believes that by tracking the condition and survival of the animals used in the study, the researchers should be able to provide a reasonable assessment of the effects of their various activities on young California sea lions. To detect such effects and—at the same time—provide a stronger foundation for moving forward with the proposed research activities, the Marine Mammal Commission recommends that the National Marine Fisheries Service condition the permit to require assessment of changes in body condition and survival as a function of the research activities authorized under the permit.

Opportunistic sampling and incidental disturbance

Dr. Costa and co-investigators would collect scat weekly at various sites within California. They also could import tissue samples from up to 14 species of otariids to compare to California sea lion foraging ecology, physiology, and diving behavior. Samples could be exported to Canada for analysis as well. Their proposed activities could harass 8,450 California sea lions, 500 harbor seals, and 300 northern elephant seals per year.

Unintentional and intentional mortalities

Dr. Costa and his co-investigators also request to take up to 7 California sea lions per year (not to exceed 20 sea lions during the five-year period) by either unintentional mortality or intentional mortality (i.e., euthanasia). They have requested authorization for more mortalities than in previous applications because of the prevalence of domoic acid toxicity in the California sea lion population, which may increase the likelihood of death for captured animals. If a lactating female dies as a result of research activities and her dependent pup can be identified or a female-pup pair is separated, the researchers would either transport the orphaned pup to a rehabilitation facility or euthanize it if rehabilitation is not an option. They would carry a crash kit during all capture activities and would have a veterinarian or veterinary technician along on most of the captures to administer the drugs used to euthanize an animal, if necessary. If a veterinarian or veterinarian technician is not present, other qualified personnel trained by the veterinarian or veterinarian technician would be responsible for conducting euthanasia.

In addition, Dr. Costa and his co-investigators requested allowance for added mortalities to account for the possibility that the Service would count the death of a pregnant lactating female as three unintentional mortalities. To the Commission's knowledge, the Service has not developed a consistent policy or approach for this matter. It neither consistently requires researchers to assess pregnancy during the course of necropsies nor does it appear to consistently account for the developmental stage of the fetus. It is unfortunate when any research animal dies, whether incidentally or intentionally from euthanasia. But for the purpose of authorizing research permits, a consistent policy is needed to set forth the manner in which the Service will address this question and a correspondingly suitable allowance for such deaths. The allowed number of mortalities should account for such things as the population's tolerance for such losses and the importance of the research and should promote careful research without placing unnecessary constraints that otherwise would stifle important research.

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The question of how to account for fetuses that are lost when a female dies could easily turn into a debate about the extent to which they should be recognized as individuals. As is the case with humans, that question could turn into what appears to be an important but perhaps irresolvable philosophical debate. The Commission does not consider it essential to have that debate in the context of permitting marine mammal research. Instead, the issue raised by this permit application is how to facilitate valuable research when it entails some risk of adult female mortality and the associated loss of their fetuses. If the Service is convinced that it must account for the loss of an individual fetus in its mortality limit, then it also must recognize that it (1) should follow that approach consistently and (2) must increase the mortality limit to a point that will allow the conduct of valuable research without unreasonable penalty for the loss of a fetus. Otherwise, the Service's approach will only serve to discourage potentially important research. Therefore, the Marine Mammal Commission recommends that the National Marine Fisheries Service adjust its allowed limit for unintentional research-related mortalities for all relevant pinniped permits in accordance with its determination as to whether to count the loss of a fetus against the mortality limit. Whether the fetus is or is not counted, the limit should not be so stringent that it poses a risk of halting, unnecessarily, that research deemed valuable. The Commission would welcome a meeting to discuss this matter.

The University of California's Institutional Animal Care and Use Committee (IACUC) will review the research protocols once the Service issues the research permit. However, Dr. Costa indicated that the IACUC has approved similar protocols in the past.

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 regarding the Commission's recommendations.

Sincerely,

A handwritten signature in blue ink that reads "Timothy J. Ragen". The signature is written in a cursive, flowing style.

Timothy J. Ragen, Ph.D.
Executive Director