



MARINE MAMMAL COMMISSION

1 July 2019

Ms. Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3225

Re: Permit Amendment Application No. 21006
(Linnea Pearson, Ph.D.,
California Polytechnic State University)

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the above-referenced permit amendment request with regard to the goals, policies, and requirements of the Marine Mammal Protection Act (the MMPA). Dr. Pearson proposes to amend her permit to conduct research on Weddell seals in Antarctica—permit 21006 expires on 1 October 2020. Researchers are authorized to harass, capture, handle, restrain, measure/weigh, sedate, mark, sample, conduct procedures on, and/or attach instruments to up to 10 Weddell seal pups per year¹. Researchers also are authorized to conduct ground-based surveys and collect samples from dead seals. The purpose of the research is to (1) determine the thermoregulatory strategies by which Weddell seal pups maintain eutheria in air and in water and (2) examine the development of diving capability as the animals prepare for independent foraging.

The Commission provided extensive comments and recommendations in its [13 September 2018 letter](#) and [13 July 2018 letter](#) on Dr. Pearson's previous amendment requests under the MMPA² and the Antarctic Conservation Act (ACA)—neither of which was issued at that time by NMFS or the National Science Foundation (NSF). Dr. Pearson has again requested³ to revise the types of drugs and ages of pups to which the drugs would be administered, to add blood sampling for Cohort B animals, to revise the ages at which various tag types would be attached and retrieved,

¹ Researchers also are authorized for up to two pup mortalities per year, not to exceed three mortalities during the permit duration.

² The Commission also provided extensive comments on Dr. Pearson's original permit application in its [21 July 2017 letter](#) and extensive informal comments on permit application 18879 submitted by Dr. Heather Liwanag, who originally proposed to conduct the activities. Although Dr. Liwanag's application was published for public comment in August 2016, it was subsequently withdrawn. Thereafter, Dr. Pearson became the principal investigator on the related permits and Dr. Liwanag became a co-investigator.

³ The only modification that differs from those reviewed in 2018 is the request to collect swabs from all ages of pups in Cohorts A and B.

to increase the number of takes, to administer antibiotics as necessary, etc. (see the amendment application for specifics). For clarity, the Commission summarized in Table 1 all the procedures that would be authorized for the various ages and cohorts under the proposed amendment.

Table 1. Proposed procedure specifics.

	Sample size	1-week-old pups (1 st capture)	3-week-old pups (2 nd capture)	5-week-old pups (3 rd capture)	7- to 8-week-old pups (4 th capture)
Cohort A	N=6 pups	Full physiology workup with sedation including morphometrics ¹ , tritiated water and Evans blue dye, blood samples, muscle and blubber biopsies, swabs, attach dorsal-mounted accelerometer and flipper-mounted TDR.	Full physiology workup with sedation including morphometrics ¹ , tritiated water and Evans blue dye, blood samples, muscle and blubber biopsies, swabs, retrieve dorsal-mounted accelerometer, and attach flipper-mounted VHF tag.	Full physiology workup with sedation including morphometrics ¹ , tritiated water and Evans blue dye, blood samples, muscle and blubber biopsies, and swabs.	Full physiology workup with sedation including morphometrics ¹ , tritiated water and Evans blue dye, blood samples, muscle and blubber biopsies, swabs, vibrissa sample, and retrieve flipper-mounted TDR and VHF tag.
Cohort B	N=6 pups	In-air metabolic measurements (no sedation), sedation, morphometrics ¹ , blood sample, swabs, attach dorsal-mounted accelerometer and flipper-mounted TDR.	In-air and in-water metabolic measurements (no sedation), sedation, morphometrics ¹ , blood sample, swabs, retrieve dorsal-mounted accelerometer, and attach flipper-mounted VHF tag.	In-air and in-water metabolic measurements (no sedation), sedation, morphometrics ¹ , blood sample, and swabs.	In-air and in-water metabolic measurements (no sedation), sedation, morphometrics ¹ , blood sample, swabs, vibrissa sample, and retrieve flipper-mounted TDR and VHF tag.

¹ Also includes thermal imaging and ultrasound of blubber depth. Core body temperature would be monitored as well.

The California Polytechnic State University’s Institutional Animal Care and Use Committee (IACUC) is in the process of reviewing the revised research protocols. NMFS will provide the IACUC approval to the Commission once received.

Inconsistencies in the sedation protocols

Inconsistencies have been an ongoing issue with various portions of Dr. Liwanag’s original MMPA permit application, Dr. Pearson’s original MMPA and ACA permit applications, Dr. Pearson’s previous MMPA and ACA amendment applications, and the various IACUC protocols⁴. The sedation protocols in the current MMPA amendment application are inconsistent with the protocols stipulated in the sedation table referenced in the application. As such, it again is unclear

⁴ The Commission also notes that inconsistent numbers of animals were reported to have been taken during the various activities within and between the MMPA and ACA annual reports.

exactly what the researchers are proposing. The Commission is dismayed that this issue has still not been addressed in the current amendment application.

Specifically, the amendment application indicated that sedation of Cohort A pups at 1 week and Cohort B at all four time points *will follow* the plan outlined in the sedation table, *and* sedation *will be determined* on an individual basis at the discretion of the veterinarian. It is unclear if the veterinarians will follow the plan stipulated in the sedation table that specifies certain drugs are to be used at various ages *or* instead the veterinarian will determine the appropriate sedation drugs based on each individual. The veterinarian can do one or the other, but not both as implied by the amendment application.

In addition, the amendment application indicated that the veterinarian *may start* with midazolam alone for 1-week-old pups to provide sedation and muscle relaxation *or* with the combination of midazolam and butorphanol, depending on the animal's activity level and at the discretion of the veterinarian. However, the sedation table noted both that the veterinarian *may begin* with the most appropriate protocol *and will begin* with Protocol 1 (midazolam alone) for 1-week-old pups, but have the option to move to Protocol 2 (midazolam and butorphanol) during handling. If Protocol 1 does not provide sufficient sedation for the *first three 1-week-old pups handled*, the veterinarian *may begin* with Protocol 2 for the remaining procedures. The sedation table could be interpreted as allowing for either drug combination while still restricting the drugs to midazolam alone for the first three pups, which is inherently contradictory. Those protocols are incongruous and unclear for the youngest and most sensitive age class—the Commission commented extensively on this issue in its 13 September 2018 letter⁵.

For 3-week-old and older pups, either drug combination could be used, depending on the animal's activity level and its reaction to previous sedation event(s), at the discretion of the veterinarian. For 7- or 8-week-old pups, the amendment application indicated that the veterinarian *will only use* midazolam and ketamine if the pups *are refractory* to sedation with midazolam and butorphanol *or were refractory* to sedation with that combination at a previous handling. The sedation table is inconsistent with that statement. It specifies that Protocol 3 (midazolam and ketamine) *will only be used* in older animals that are very active or agitated, *after one* of the other sedation protocols *has been attempted*. The Commission informally inquired whether Dr. Liwanag was aware of the various inconsistencies in the amendment application and sedation table and NMFS indicated that she was. It is baffling why NMFS processed the amendment application yet again with these known inconsistencies remaining and why neither Dr. Liwanag nor Dr. Pearson can specify their sedation protocols in a consistent manner. More importantly, during the first year of activities that have already been completed, the researchers, including the veterinarian, did not abide by the underlying NMFS and ACA applications and IACUC protocols regarding what drugs were authorized to be used on various ages of pups or whether sedation was even authorized to be used on some ages of pups. Thus, it is paramount that the sedation protocols be clear in this proposed amendment.

Inconsistencies aside, the Commission again notes that each animal reacts to sedatives differently⁶ and the procedures to be conducted on pups in Cohorts A and B are not the same. That

⁵ Please review that letter and the Commission's concerns in concert with this letter.

⁶ This also is referenced in Dr. Pearson's sedation summary submitted as part of the annual report under the NMFS permit. One of the pups was more sensitive to sedatives than the other pups and exhibited cyanosis in addition to apnea.

is, use of sedatives on one animal should not be based on another animal's insufficient reaction to them. Prior handling also may influence an animal's reaction to sedatives. Pups in Cohort B are handled and subjected to the metabolic chamber for an hour or two before the researchers attempt to sedate them. Thus, those animals may already be agitated and may not react to the sedatives in the same manner as pups in Cohort A that are sedated immediately after being weighed. Furthermore, the Commission maintains that ketamine is not necessary for collecting morphometric measurements, removing instruments, and collecting blood samples for Cohort B pups. As noted during the Commission's informal comments on Dr. Liwanag's withdrawn permit application, ketamine can be taken into the field to have on hand in case of emergencies or medical necessity (i.e., wound debridement) but should not be needed to perform the various activities—activities that at that time were more extensive than those currently authorized for Cohort A pups, let alone Cohort B pups. Furthermore, use of a riskier drug combination should not be based on behavior of the animal a few weeks earlier, but rather on whether the animal is sufficiently sedated at the time of handling. The Commission maintains that escalation in the types of drugs used should be based on the behavior of the individual animal at the time of handling, not on the behavior of other animals or the same animal during previous captures.

Given that the proposed documentation again is inconsistent regarding many aspects of the sedation protocols, inclusion of a sedation table in the final permit amendment is necessary to eliminate any questions the researchers have in the field regarding what drugs can be used on which pups and to clarify exactly what the permit amendment is authorizing. As such, the Commission recommends that NMFS specify in the final permit amendment an accurate and complete sedation table that stipulates the specific drugs to be used for each age of pups in both cohorts and the appropriate conditions, including that (1) either midazolam or midazolam and butorphanol can be used for any age class of pup in either cohort, based on the animal's activity level *and* the discretion of the veterinarian and (2) midazolam and ketamine can only be used for a 7- or 8-week-old pup if it is refractory to sedation with midazolam and butorphanol *at that time*. That is, a pup's response to midazolam alone or midazolam and butorphanol at another sampling point has no bearing on whether midazolam and ketamine should be used when the pup is 7 or 8 weeks of age.

Activities to be authorized

As stated herein, the researchers, including the veterinarian, did not abide by the underlying NMFS and ACA applications and IACUC protocols regarding the sedation protocols that were to be implemented in the first year of activities, which is why those protocols must be clearly stipulated in the final permit amendment. Dr. Pearson's MMPA and ACA annual reports also indicated that VHF tags were attached to two pups in Cohort A and two pups in Cohort B at 3 weeks of age during those activities. Neither the NMFS nor the ACA permit or the IACUC protocols authorized pups in either cohort to be instrumented with VHF tags at 3 weeks of age. Accelerometers were authorized to be attached at 3 weeks of age and VHF tags at 5 weeks of age. Thus, three of the 3-week-old pups were instrumented with both accelerometers and VHF tags attached to the dorsal pelage with epoxy. In addition, the annual reports indicated that rectal temperatures were taken on pups of all ages in Cohort B. However, the permit applications indicated that rectal temperatures were to be taken only on pups that participated in in-water metabolic trials in Cohort B and were 3 weeks of age and older. Given that the researchers and veterinarians have failed to comply fully with the requirements of the existing MMPA and ACA permits and IACUC protocols and the take

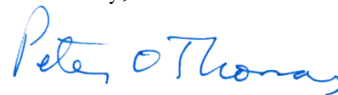
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tables⁷ do not specifically stipulate which of the procedures are authorized to be conducted on which pups, the Commission recommends that NMFS include in the final permit amendment a table similar to Table 1 provided herein that specifies exactly which procedures are authorized to be conducted on each age class of pups for both cohorts. Those specifications should minimize *any* further confusion on exactly what each permit authorizes.

The Commission reminds the researchers that violations of the MMPA and ACA and any permits issued under those statutes have subjected permit holders to various penalties, including fines, permit revocation, and suspension of the opportunity to obtain new permits. Whether these violations were carried out knowingly by either the researchers or the veterinarian or were unintentional due to a lack of proper attention on their part to understanding what the permits do and do not authorize, they were violations nonetheless. Thus, Dr. Pearson, Dr. Liwanag, any associated veterinarian, and all other personnel should be advised again that they *must* abide by the procedures and protocols specified in the permit application or any amendment thereto and all permit conditions. Failure to do so will constitute violations of permit 21006 issued under section 104(c) of the MMPA and permit 2018-013 issued under the ACA and may result in permit suspension or revocation and/or other penalties.

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

Sincerely,



Peter O. Thomas, Ph.D.,
Executive Director

cc: Dr. Nature McGinn, National Science Foundation
Dr. Barbara Kohn, Animal and Plant Health Inspection Service

⁷ Including the take table in permit amendment application, in NMFS's Authorizations and Permits for Protected Species (APPS) system, and in the final permit issued in 2017.