21 July 2017

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 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 conduct research on Weddell seals in Antarctica during a three-year period. Permit application 18879 submitted by Dr. Heather Liwanag proposed similar activities. Although that application was published for public comment in August 2016, it was subsequently withdrawn.

Dr. Pearson proposes to conduct research on Weddell seal pups in Antarctica during two field seasons. The purpose of the research is to (1) determine the thermoregulatory strategies by which Weddell seal pups maintain euthermia in air and in water and (2) examine the development of diving capability as the animals prepare for independent foraging. Researchers would harass, capture, handle, restrain, measure/weigh, sedate, mark[1], sample[2], conduct procedures[3] on, and/or attach instruments[4] to up to 10 Weddell seal pups per year[5] (see Table 1 and the application for specifics). Only pups from females[6] who are of prime age (7 to 16 years old) and multiparous would be targeted. Females would be corralled or herded to ensure they do not enter the water when 1-week old pups are handled[7]. For all other age classes, pups would be handled when the female is foraging at sea. Various other measures were proposed to minimize adverse impacts on the pups (see the

[1] With flipper tags.
[2] Including blood, vibrissae, blubber, and/or muscle. All samples could be imported/exported for analysis.
[3] Including administering Evan's blue dye and tritiated water and collecting serial blood samples, conducting in-air and in-water metabolic measurements in a metabolic chamber, and conducting ultrasound and thermal imaging.
[4] Up to three instruments would be attached to each pup. Those instruments include a flipper-mounted tag and two dorsal-mounted tags. All instruments would be retrieved when the pups are approximately 8 weeks old.
[5] Seven additional pups could be captured but subsequently deemed too underweight to be a subject of the study or exhibited distress during the metabolic measurements such that they would be removed from the study. Those pups would be released and reunited with the female with no further procedures or captures conducted.
[6] Based on demographic data provided by Drs. Garrott and Rotella.
[7] Pups would be reunited with the female after the research activities conclude.

application for specifics). In addition, researchers would conduct ground-based surveys[8] and would collect samples[9] from dead seals. Non-target Weddell seals could be harassed incidental to the proposed activities. California Polytechnic State University's Institutional Animal Care and Use Committee is in the process of reviewing the revised research protocols.

Table 1. Longitudinal sampling specifics.

	Sample size per year	**1-week old pups** (1st capture)	**3-week old pups** (2nd capture)	**5-week old pups** (3rd capture)	**7- to 8-week old pups** (4th capture)
Cohort A	N=5 pups	Full physiology workup with sedation including morphometrics[1], tritiated water and Evan's blue dye, blood samples, muscle and blubber biopsies, and TDR attachment.	Full physiology workup with sedation including morphometrics, tritiated water and Evan's blue dye, blood samples, muscle and blubber biopsies, and accelerometer attachment.	Full physiology workup with sedation including morphometrics, tritiated water and Evan's blue dye, blood samples, muscle and blubber biopsies, and VHF attachment.	Full physiology workup with sedation including morphometrics, tritiated water and Evan's blue dye, blood samples, muscle and blubber biopsies, tag retrieval, and vibrissa sample.
Cohort B	N=5 pups	Morphology[1] and metabolic measurements[2] (no sedation) and TDR attachment.	Morphology and metabolic measurements (sedation, only if necessary to instrument) and accelerometer attachment.	Morphology and metabolic measurements (no sedation) and VHF attachment.	Morphology and metabolic measurements (no sedation), tag retrieval, and vibrissa sample.

[1] Includes thermal imaging.
[2] Only in-air metabolic measurements would occur on 1-week old animals. Both in-air and in-water measurements would occur on all other age classes.

Mortalities

Dr. Pearson requests up to two pup mortalities[10] per year, not to exceed three mortalities during the permit duration. Euthanasia may be considered in, but not limited to, the following situations: (1) if a pup fails to respond to emergency therapy and remains unresponsive/unconscious or in significant respiratory distress with declining vitals; (2) if a pup's condition declines during or following handling, irrespective of whether the pup has been reunited with the mother, and it appears medically evident that survival is unlikely; or (3) in the unlikely case that a pup is unable to be reunited with the female, such that the female and pup remain out of contact for 48 hours, the pup would be euthanized if it is <30 days old or <50 kg—euthanasia may be considered before 48 hours if the pup's condition is in rapid decline and survival is unlikely. If a pup dies, a necropsy would be conducted. In the case of a mortality, all field work would cease until the cause of death is determined and all handling and procedure protocols are reviewed with the National Marine

[8] Including conducting thermal imaging and observations associated with shivering behavior and molt status of pups and reading flipper tags.
[9] Including but not limited to muscle, blubber, skin, hair, vibrissae, and brain. All samples could be imported/exported for analysis.
[10] Either unintentional or intentional mortality (i.e., euthanasia for humaneness purposes).

Fisheries Service (NMFS) and the Commission. The Commission believes those measures are prudent and should be explicitly stated as conditions in the permit, if issued. Therefore, the Commission recommends that NMFS condition the permit to require Dr. Pearson to cease all field activities if a mortality occurs, including from euthanasia due to female abandonment, until all handling and procedure protocols are reviewed by NMFS and the Commission.

Experience and veterinary discretion

Dr. Pearson has sufficient experience conducting the majority of the proposed activities, including in Antarctic conditions. Dr. Sophie Whoriskey, the veterinarian likely to accompany the researchers, also has sufficient experience sedating and collecting various samples from pinnipeds, including phocid pups. However, the co-investigator and three research assistants do not have as extensive experience with the proposed procedures or field procedures in general, including working in conditions as extreme as those in Antarctica. Thus, it will be critical, that if Dr. Whoriskey is unable to serve as the veterinarian during the proposed research activities, she be replaced with an experienced veterinarian who has multi-year, full-time marine mammal veterinary experience, including extensive experience with phocids. The Commission therefore recommends that NMFS condition the permit to require that a veterinarian be present during the proposed procedures and that the veterinarian (1) possess multi-year, full-time marine mammal veterinary experience, including extensive experience with phocids and (2) consult with other veterinarians and/or researchers that have Weddell seal experience, preferably pup experience. These recommendations are consistent with informal comments the Commission provided to NMFS on the Liwanag #18879 permit before it was withdrawn. Further, if Dr. Whoriskey is unable to accompany the researchers, NMFS should review the credentials of and approve any alternate veterinarian prior to that veterinarian deploying to Antarctica.

Although Dr. Pearson has included various measures to minimize adverse impacts on the pups, the proposed activities are quite invasive and extensive for pups that are only 1-week old. The last permit[11] that was issued to conduct work on such young pups did not include procedures that were as invasive or extensive. Those less invasive activities were conducted on pups that were only 2- to 3-days old, and unfortunately three pups died from various causes. Therefore, the Commission believes it is incumbent on the researchers to recognize and respond to any sign of an adverse impact, including female abandonment.

For example, the application indicated that if hypothermia[12] occurs during in-water metabolic measurements, the protocols would be adjusted by reducing exposure to water or by terminating procedures as directed by the veterinarian. The Commission believes that the researchers should not wait until a pup is hypothermic to cease activities. If a pup's body temperature is decreasing or a pup is showing signs of distress, the activities should cease. In addition, if a pup of any age shows any signs of undue stress during any of the proposed activities, the activities should cease. Furthermore, activities should cease if there are any signs of a female potentially abandoning her pup. Either Dr. Pearson or Dr. Whoriskey are the personnel responsible for making these determinations. Therefore, the Commission recommends that NMFS condition the permit to allow activities to occur only after careful assessment of the female and the pup and to

[11] Permit 763-1845 issued to the Smithsonian National Zoological Park in 2006.
[12] Via thermocouple measurements and/or observed behavioral distress.

allow activities to continue based on how the pup is tolerating the various handling and research procedures and on how the female is tolerating being separated from her pup—all of these determinations should be made at the discretion of Dr. Pearson or the attending veterinarian, either of which must be present during all proposed procedures.

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

Sincerely,

Rebecca J. Lent

Rebecca J. Lent, Ph.D.
Executive Director