



# MARINE MAMMAL COMMISSION

4 February 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 Application No. 22187  
(Heather Liwanag, 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. Liwanag proposes to conduct research on northern elephant seals in California during a five-year period—she previously had conducted some of the proposed activities under permit 19108 issued to Dr. Daniel Costa, University of California, Santa Cruz (UCSC).

Dr. Liwanag would conduct research on elephant seals at two rookeries, Piedras Blancas and Vandenberg Air Force Base (VAFB). The purpose of the research is to establish a long-term elephant seal monitoring program to investigate life history parameters and demography, physiological parameters, behavior, and acoustic parameters. Researchers would harass, observe, capture, handle, restrain, measure/weigh, mark<sup>1</sup>, sample<sup>2</sup>, photograph/videotape, passively record, and/or conduct other procedures<sup>3</sup> on numerous elephant seals of any age and either sex per year (see the take table and application for specifics). Dr. Liwanag also requested up to two unintentional mortalities per year, not to exceed five during the five-year period. Non-target elephant seals, harbor seals, and California sea lions could be harassed incidental to the proposed activities. Dr. Liwanag proposed multiple measures to minimize adverse impacts on the various pinniped species (see the application for specifics). California Polytechnic State University's Institutional Animal Care and Use Committee has reviewed and approved the revised research protocols.

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<sup>1</sup> With flipper tags and/or bleach or hair dye.

<sup>2</sup> Including hair, swabs, and ectoparasites from live animals and various samples from dead animals. All samples could be exported for analysis.

<sup>3</sup> Including ultrasound, infrared thermography, and acoustic playback activities.

## General concerns

NMFS provided Dr. Liwanag's application to the Commission for informal review in October 2018. At that time, the Commission noted numerous deficiencies in the application<sup>4</sup> and contended that neither the Commission nor the public could comment meaningfully on the application as it was. The Commission's original concerns fell under numerous broad topics including—

- relevance of the stated purpose of the research and lack of hypotheses;
- duplication of studies conducted at other rookeries<sup>5</sup>;
- appropriateness of the number of proposed directed takes and lack of methods (i.e., ground surveys) for fulfilling the main objective of establishing a long-term monitoring program;
- lack of objectives, appropriate methods, and necessary information for collecting passive acoustic data and conducting playback activities;
- appropriateness of the number of proposed incidental takes for non-target elephant seals and other pinniped species;
- lack of measures to minimize impacts on seals during ground surveys and playback activities, to minimize impacts on female-pup pairs during all research activities, and to minimize disturbance to harbor seals during the pupping season;
- lack of justification for the proposed number of annual mortalities resulting from seemingly benign activities;
- lack of information regarding salvaging parts and importing/exporting samples;
- lack of principal investigator and co-investigator (PI and CI, respectively) experience conducting passive acoustic monitoring and playback activities;
- lack of research protocols (and underlying IACUC approval) that are consistent with the proposed activities, types of taking<sup>6</sup>, and numbers of takes stipulated in the application; and
- general errors, inconsistencies, and insufficient information within the application.

The Commission noted some of the same types of deficiencies and issues in its informal and formal comments on other permits with which Dr. Liwanag and her co-investigators have been associated<sup>7</sup>. Based on these deficiencies, the Commission indicated that NMFS should return the application to Dr. Liwanag as incomplete and withdraw the draft notice from the *Federal Register* publication process and NMFS did so.

In December, NMFS provided a revised application, a biosketch for an additional CI, a revised PI/CI duties table, and revised research protocols and an IACUC approval. Although Dr. Liwanag attempted to address the Commission's concerns, the revised documentation still includes some of the original shortcomings and additional issues arising from some of the revised information. These include—

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<sup>4</sup> Many of which are required based on NMFS's 2016 application instructions.

<sup>5</sup> Which included duplicating sections of other researchers' applications and omitting updated or current data and relevant citations.

<sup>6</sup> Including the proposed mortalities.

<sup>7</sup> See as examples, the Commission's [13 September 2018](#), [13 July 2018](#), and [21 July 2017](#) letters.

- lack of appropriate marking and ground survey methods and/or timing to meet the intended objectives<sup>8</sup>;
- lack of relevant objectives, appropriate methods, and necessary information to collect passive acoustic data and conducting playback activities<sup>8</sup>;
- appropriateness of the number of proposed incidental harassment takes for non-target elephant seals<sup>9</sup> and other pinniped species<sup>10</sup>;
- sufficiency of mitigation measures for minimizing impacts to seals, including female-pup pairs, during playback activities<sup>8</sup>;
- lack of consistent and necessary information regarding salvaging and exporting samples<sup>11</sup>;
- lack of principal investigator and co-investigator (PI and CI, respectively) experience conducting passive acoustic monitoring and playback activities<sup>8</sup>;
- lack of an IACUC approval and research protocols that are consistent with the types of taking stipulated in the application<sup>12</sup>; and
- inconsistencies in the application<sup>13</sup>.

The shortcomings of the application and the absence of critical information present difficulties to the Commission and any other reviewer in ascertaining how and why the various

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<sup>8</sup> This is discussed in a subsequent section herein.

<sup>9</sup> In its informal comments, the Commission noted that Dr. Liwanag did not request in the application any incidental harassment takes for non-target elephant seals during collection of passive acoustic measurements. Dr. Liwanag has yet to address this comment or explain why incidental taking would not occur for that activity but would for the other proposed activities. The Commission also inquired whether incidental harassment of non-target elephant seals during playback activities would be reported based on those seals that exhibited Level 2 and 3 responses, that occurred within the Level B harassment zone, or both. NMFS did not have an answer. For consistency with other directed acoustic studies, it would be prudent to enumerate takes based on those animals that occur within the Level B harassment zone, as well as those that exhibit Level 2 and 3 responses beyond the Level B harassment zone. The number of proposed, and then authorized, takes is dependent on how NMFS plans to require Dr. Liwanag to enumerate such takes. Until such time that NMFS specifies how incidental takes of non-target elephant seals are to be enumerated during playback activities, it is unclear whether the requested number of takes is insufficient, or excessive. Further, it is unclear how many incidental harassment takes Dr. Liwanag is requesting given that the application indicated that 11,250 non-target seals could be harassed but row 12 of the take table stipulated 16,250.

<sup>10</sup> Both harbor seals and California sea lions haul out with and in close proximity to elephant seals at VAFB and the Commission is not convinced that 100 takes of both species each year would be sufficient. This would depend on whether ground surveys of elephant seals at VAFB would occur on the rookeries themselves, which is discussed in a subsequent section herein.

<sup>11</sup> The purpose of salvaging samples was not provided, rather Dr. Liwanag provided reference to her permit 18523 for details. The purpose of the collection and subsequent analysis of the samples should be provided in the application that would authorize the collection of such samples. In addition, the application stated that samples would be exported under permit 18523, but the take table included export of samples in row 14. Inconsistencies aside, Dr. Liwanag's permit 18523 expires in 2019, thus it would be prudent to include export of the salvaged samples under permit 22187.

<sup>12</sup> Serious injuries and unintentional mortalities were included in the permit application but were not included in the revised IACUC protocols. Thus, the IACUC was not aware that serious injuries and mortalities could occur and did not evaluate them. The Commission notes that unintentional mortalities were included in research protocols approved by the same IACUC for Dr. Liwanag's activities involving Weddell seals.

<sup>13</sup> There are multiple inconsistencies noted herein in regard to the information contained in the application and the take table. For example, while the take table indicates each of the 50 adult seals and 25 pups could be targeted up to 10 times per year for playback activities, repeat exposures of individuals on subsequent days were not mentioned in the application. Also, in the methods section, Dr. Liwanag indicated she would take thermography measurements at 1–5 m from the animals, but she indicated that she would remain 5–50 m from the animals during thermography measurements in the mitigation measures section of the application.

activities would be conducted and whether some of Dr. Liwanag's proposed activities would meet the MMPA's *bona fide* requirement. Therefore, the Commission recommends that NMFS return the application to Dr. Liwanag with instructions to address the deficiencies stipulated herein and to submit a revised application. Upon submission of a revised application, NMFS should provide it to the Commission and any member of the public who requested or commented on the original application with an additional opportunity for comment and review.

The Commission additionally recommends that NMFS advise Dr. Liwanag that all research protocols reviewed and approved by her IACUC must match those procedures authorized under her research permit prior to conducting any procedures. Thus, the IACUC should be apprised that serious injuries and unintentional mortalities could occur and the protocols should be amended to include those possibilities. Dr. Liwanag also must ensure that the research protocols are revised for consistency with any additional permit application revisions based on comments herein, submit those revisions to her IACUC for review, and obtain approval before the upcoming field season.

### **Marking and ground surveys**

Dr. Liwanag requested to mark seals with flipper tags and either dye or bleach<sup>14</sup>, which she indicated would last one year. Based on the application, most marking activities would occur during the breeding season. An adult female marked during the breeding season<sup>15</sup> would lose her mark a few months later when females molt from April through June. Similarly, males would lose their marks when they molt from July through September. Neither timeframe is close to one year. In addition, Dr. Liwanag could mark pups that are at least one week of age. However, those animals would lose their lanugo within a month, shortly after weaning, and would remain unmarked for more than one year until the following molting season.

Dr. Liwanag did not request to re-mark animals in a given year<sup>16</sup> or retag animals that lost a tag—the latter was likely an oversight. Moreover, Dr. Liwanag did not request to conduct ground surveys in the rookeries, rather she indicated that those surveys would occur from bluffs using spotting scopes and binoculars<sup>17</sup>. That method would only be effective if the animals had dye/bleach marks that are retained. Flipper tags are difficult to read from a distance, particularly in a crowded rookery where the tags are obstructed by seals, sand, or other impediments (e.g., rocks, driftwood, etc.). Furthermore, Dr. Liwanag indicated that ground surveys would occur at least weekly during the breeding season and monthly during the molting season. Since Dr. Liwanag's intention is to document ages, birth rates, death rates, life histories of individual animals, reproductive histories,

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<sup>14</sup> Presumably, it would be non-toxic but this was not stipulated in the application.

<sup>15</sup> Generally, December through March. An individual female usually only remains at the rookery for one month from the time she gives birth until she weans her pup. Males remain for a few months competing for mates before heading to sea to forage.

<sup>16</sup> This information would need to be included in the application and the takes per animal column of the take table would need to be increased from 1 to 2.

<sup>17</sup> Resights also would be documented when researchers are conducting other activities in the rookeries, but Dr. Liwanag indicated that they would not be conducting concerted resight surveys in the rookeries. Take table rows 1–3 do not match those suppositions, takes are specified for conducting resights and general monitoring. The Commission cautions that the take table rows are not consistent with other similar elephant seal or Weddell seal permits. There should be one row for marking and tagging pups, one row for marking and tagging adults, and one row for incidental harassment during marking, tagging, and conducting ground surveys for resights. Row 1 (and Rows 6 and 10) should specify that dependent pups must be greater than 1 week of age as well.

weaning success, and weaning times, dedicated ground surveys would need to be conducted more frequently to obtain all intended data. Generally, ground surveys are conducted daily during the breeding season and weekly during the molting season<sup>18</sup> to meet those objectives. The Commission recommends that NMFS provide Dr. Liwanag the opportunity to (1) re-evaluate her objectives and proposed methods, (2) adjust the timeframe for when marks would be applied and re-evaluate whether marks would be re-applied, (3) re-evaluate how often and where ground surveys would occur, and (4) update the application, proposed numbers of takes, and take table accordingly. Absent these changes, it is unclear whether the proposed activities would meet the *bona fide* requirement under the MMPA.

### **Personnel experience and acoustic studies in general**

The Commission firmly believes that PIs and CIs should be authorized to conduct only those activities for which they have sufficient experience. In this case, neither Dr. Liwanag nor any of her CIs, including Dr. Francis<sup>19</sup>, has experience collecting in-air acoustic measurements from<sup>20</sup> or conducting playback activities on pinnipeds in general—let alone at a rookery during the breeding season<sup>21</sup>. Dr. Francis has conducted playback studies on humans, insects, birds, and a small mammal. However, none of those are relevant surrogates for elephant seals. The Commission therefore recommends that NMFS deny Dr. Liwanag's request to collect in-air passive acoustic data from and conduct playback activities on elephant seals until either she or one of her CIs has acquired the necessary experience to conduct those activities. Such experience can include accompanying her UCSC colleagues on their field studies that involve collecting in-air measurements and conducting playback activities.

The lack of experience conducting acoustic studies was apparent in Dr. Liwanag's application from October and unfortunately continues to be apparent in the revised application from December. The terminology used<sup>22</sup>, the methods proposed to be used<sup>23</sup>, the background

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<sup>18</sup> Since animals may not spend a month molting and may leave the beach before they are observed.

<sup>19</sup> Who recently was added as a CI to the permit request.

<sup>20</sup> Which would be collected at 1 m from a vocalizing seal, including adult males.

<sup>21</sup> Playback activities could be conducted on seals of all age classes, except pups less than 1 week of age and females with those pups. Playback activities could occur in close proximity to young pups, even if they are not the target animal.

<sup>22</sup> Sound pressure levels instead of source levels are used in certain instances.

<sup>23</sup> The orientation of the microphone (e.g., 0° on axis, 90°, an oblique angle between the two, 180°, etc.) to be held at 1 m during acoustic measurements was not stipulated, which affects how accurate the source level measurements will be. Playbacks of 'novel sounds' are included in the take table but not discussed in the text. A citation is lacking regarding the proposed source levels of 120 dB re 20 µPa at 1 m (Leq) and 130 dB re 20 µPa at 1 m (peak). Further the application indicated that, whenever possible, playback source levels will be matched to the actual source level of the recorded caller or sound—for example, male calls average  $116 \pm 1.5$  dB re 20 µPa peak (Mathevon et al. 2017) and the calls of subadult males, females, and pups tend to be much quieter (80 to 110 dB re 20 µPa). Those statements and proposed methods do not comport, as the differences between the proposed source levels and the actual source levels range from 12 to 40 dB. In addition, the application indicated that, "assuming the closest playback distance of 5 m, received levels from 120 dB playbacks should be < 108 dB (Leq) and [received levels from 130 dB playbacks should be <] 118 dB (peak). Although adult male calls are considered to contain impulsive components (Casey et al. 2015), these levels are well below the permanent threshold shift [PTS] levels for non-impulsive and impulse sounds for phocids, as defined by the U.S. Navy." In fact, these levels are not well below the PTS threshold. Assuming a source level of 120 dB re 20 µPa at 1 m and 20 minutes (maximum of four 5-min trials per day) of adult male vocalizations are broadcast, the range to PTS is 5 m. Moreover, Dr. Liwanag did not indicate what the range to Level B harassment would be—it is 10 m. Nor did she justify why a playback would be conducted on the same animal up to 10 times per year or what the minimum timeframe between conducting playback activities on the same individual would be. Further, a precision sound level meter set to a

information provided<sup>24</sup>, and the hypotheses proposed<sup>25</sup> underscore the need for personnel who have experience conducting acoustic studies on pinnipeds to be involved in the project. In addition, Dr. Liwanag did not stipulate any mitigation measures to cease playback activities if an animal responds adversely or to ensure playback activities conducted on adult males would not result in harm to nearby pups. The Commission further recommends that, until such time that the various deficiencies and inconsistencies in the proposed acoustic studies are corrected *and* personnel with appropriate experience are involved, NMFS suspend consideration of these activities. Although Dr. Liwanag may be well-intentioned, if her objectives and methods are not appropriate, the resulting data may not meet the *bona fide* requirement under the MMPA and potentially thousands of elephant seals could be harassed for no good reason.

### **Application completeness**

As noted in this and previous letters, some applicants are not following NMFS's 2016 application instructions. Although NMFS did return the application to Dr. Liwanag for revisions, those revisions did not address all of the Commission's concerns. More importantly, it is NMFS's responsibility to ensure that any application it sends to the Commission for informal comment and to the *Federal Register* for public notice and comment has followed the application instructions, is complete and consistent, and makes logical sense. Neither the Commission nor the public should be commenting on incomplete applications.

The Commission and its Committee of Scientific Advisors spend considerable time and effort reviewing permit applications and take their review responsibilities under sections 101(a)(1), 202(a)(2), and 203(c) of the MMPA seriously. The Commission poses questions or seeks additional information during its reviews because either (1) the applicant has not provided all of the information required under NMFS's application instructions or (2) the information provided is not sufficiently complete or clear to support the findings required under the MMPA and NMFS's implementing regulations or to recommend appropriate permit conditions for inclusion in furtherance of MMPA section 104(b)(2). Many of the problems associated with this and other recent applications, and the need for the Commission to seek additional information, could be avoided if NMFS did a more thorough job of vetting applications to ensure that they contain all of the required information before sending them to the Commission or making them available for public review. Therefore, the Commission recommends that NMFS, prior to providing an application to the

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fast-response setting (125 msec) would not accurately record impulsive calls produced by adult males. An impulse-weighted setting (35 msec) is necessary, as well as peak. Finally, the methods section did not specify what portions of the signals (i.e., frequency, amplitude, time domain, waveform including various call parameters, etc.) would be compared between the two rookeries to determine whether differences are present, which is an important element of such a study.  
<sup>24</sup> The background information regarding baseline source level measurements of elephant seal vocalizations is outdated and incorrect. Numerous researchers—many of whom were or are associated with UCSC including C. Reichmuth, M. Holt, N. Mathevon, C. Casey, etc.—have documented source levels of elephant seal vocalizations.

<sup>25</sup> Although the objectives of the playback activities were to better understand the importance of vocalizations in a social context, to better understand how natural acoustic disturbances influences elephant seal social ecology, and to provide a deeper understanding of ecological dynamics, it is unclear what those objectives mean from a scientific perspective. Further, 'natural acoustic disturbance' was not defined and could include vocalizations from conspecifics and/or ambient sound, which based on the application would be reflective apparently of 'ocean surf' rather than the nearby highway noise at Piedras Blancas. The hypothesis that bioacoustic signals or dialects differ between rookeries was disavowed by Shipley et al. (1981), as noted in Dr. Liwanag's application, and recently by Casey et al. (2018). Thus, it is unclear why the same hypothesis is being investigated again.

Commission for informal review and submitting it to the *Federal Register* for publication, ensure that (1) the 2016 application instructions have been followed and all required information is present, (2) all information in the application is consistent with NMFS's policies, and (3) all information in the application makes logical sense. If these conditions are not met, NMFS should return the application to the applicant for revision. If NMFS decides to process further applications in a state similar to the current application, the Commission will recommend that they be denied as not meeting the applicable requirements.

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

Sincerely,



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

## References

- Casey, C., I. Charrier, N. Mathevon, and C. Reichmuth. 2015 Rival assessment among northern elephant seals: evidence of associative learning during male–male contests. *Royal Society Open Science* 2:150228. <http://dx.doi.org/10.1098/rsos.150228>
- Casey, C., C. Reichmuth, D.P. Costa, and B. Le Boeuf. 2018 The rise and fall of dialects in northern elephant seals. *Proceedings of the Royal Society B* 285: 20182176. <http://dx.doi.org/10.1098/rspb.2018.2176>
- Mathevon, N., C. Casey, C. Reichmuth, and I. Charrier. 2017. Northern elephant seals memorize the rhythm and timbre of their rivals' voices. *Current Biology* 27:2352–2356.
- Shipley, C., M. Hines, and J.S. Bushwalk. 1981. Individual differences in threat calls of northern elephant seal bulls. *Animal Behaviour* 29:12–19.