



# MARINE MAMMAL COMMISSION

22 May 2018

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. 21719  
(Northeast Fisheries Science Center)

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). Northeast Fisheries Science Center (NEFSC) proposes to conduct research on pinnipeds in the Atlantic Ocean during a five-year period—permit 1770 authorized similar activities.

NEFSC proposes to conduct research on harbor, gray, harp and hooded seals from North Carolina to Canada. The purpose of the research is to investigate (1) abundance and stock structure, (2) distribution and movement patterns, (3) foraging ecology, (4) disease and health, and (5) effects of natural and anthropogenic factors on pinnipeds. Researchers would harass, observe, photograph/videotape, capture, handle, restrain, measure/weigh, sedate, mark, sample, conduct ultrasound on, and/or attach instruments on numerous individual seals of either sex and various age classes per year (see the take tables for specifics). NEFSC requests up to five mortalities<sup>1</sup> each of harbor and gray seals per year and one mortality each of harp and hooded seals per year. Researchers would implement various measures to minimize impacts on pinnipeds and also would be required to abide by the National Marine Fisheries Service's (NMFS) standard permit conditions.

## Acoustic tags

NEFSC has requested to attach VEMCO acoustic tags<sup>2</sup> to pinnipeds via flipper tags. VEMCO tags primarily are used to track movements and survival of fish and elasmobranchs by transmitting acoustic signals to a network of spatially-distributed receivers. Although NEFSC was authorized under its current permit<sup>3</sup> to use VEMCO tags, more information has come to light in recent years regarding pinnipeds' ability to hear such tags. A number of years ago, California sea

<sup>1</sup> Either unintentional or intentional mortality (i.e., euthanasia for humaneness purposes).

<sup>2</sup> That transmit a 69-kHz signal at a source level of 147 dB re 1  $\mu$ Pa at 1 m with a 30- to 120-sec delay. The transmission rate varies randomly  $\pm$  50 percent around the nominal delay value. For example, a 120-second delay indicates that the tag transmits randomly every 60 to 180 seconds.

<sup>3</sup> The Commission is unaware of any other permits that currently authorize their use.

lions and harbor seals were consuming large quantities of adult salmon implanted with VEMCO tags. That led researchers to question whether pinnipeds were able to hear the tags and selectively target the tagged fish, similar to a ‘dinner bell’ effect.

Cunningham et al. (2014) determined that both harbor seals and California sea lions could hear the 69-kHz VEMCO tags quite readily. Harbor seals and California sea lions<sup>4</sup> had detection thresholds of 106 and 112 dB re 1  $\mu$ Pa, respectively, at 69 kHz—they also were able to detect actual 69-kHz VEMCO tags at 113 and 124 dB re 1  $\mu$ Pa, respectively (Cunningham et al. 2014). Those detection thresholds are essentially measures of audibility. Thus, the VEMCO tags proposed for use by NEFSC would be at least 34 dB above audibility for harbor seals<sup>5</sup>. Cunningham et al. (2014) further indicated that both species would be able to detect the tags at hundreds of meters (Table III). Given that NEFSC plans to attach VEMCO tags to flipper tags to be retained for many years, impacts on the seals would be protracted.

The Commission is unaware of any studies that investigate effects on foraging ecology/efficiency or stress levels for pinnipeds that have been instrumented with VEMCO tags. However, Cunningham et al. (2014) asserted that VEMCO transmitters attached to pinnipeds would be perceptually loud and, as such, could alter the normal behavior of the tagged animal<sup>6</sup>, as well as other animals in the vicinity. The Commission agrees and contends that any such tag should not be attached to a pinniped in general, let alone for many years.

In addition to potentially causing undue stress on the animals, the Commission is not convinced that the tags have practical utility for NEFSC’s intended purpose of documenting movements and distribution of seals. Baker et al. (2014) investigated the detection efficacy of VEMCO<sup>7</sup> and GPS tags, including determining whether animals instrumented with VEMCO tags were truly absent or were merely undetected by the receivers. GPS tags were found to be more precise than VEMCO tags, which had transmission issues and were only detected within a few hundred meters of the receiver (Baker et al. 2014). The detectability depended on the seal’s location in the water column relative to the receiver and on environmental conditions. Specifically, wind stress increased ambient sound levels, which reduced detection of the tags by the receivers. While NEFSC plans to use the lower source level setting on the tags to minimize impacts on the seals, the animals will still be able to hear the tags at the reduced source level but the receivers likely will be less able to detect the tags. Since detection would likely be only within 50 to 100 m of the receivers, assuming adequate position of the seals relative to the receivers and calm seas, the data provided by the VEMCO tags would be questionable at best.

NEFSC indicated in an earlier version of its application that the VEMCO tags are cheaper than satellite or GPS tags. That may be true, but cost has no bearing on whether use of the tags

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<sup>4</sup> California sea lions were much more sensitive than previously predicted at those high frequencies. The high-frequency roll off observed for pinnipeds is much less dramatic above 50 kHz for sea lions. Therefore, the decreased slope at those ultra-high frequencies allows for audibility of sufficiently high-level sounds. Harbor seals, on the other hand, were known to hear sounds at those frequencies. Those data were further corroborated by Cunningham and Reichmuth (2016), who also included audiograms for spotted seals (see Table 1 and Figure 2).

<sup>5</sup> And 23 dB above audibility in California sea lions based on the 147-dB re 1  $\mu$ Pa at 1 m source level. Other pinniped species are expected to exhibit similar hearing abilities, with gray seals being more similar to harbor seals.

<sup>6</sup> NEFSC did attempt to allay some of these concerns by including comparisons to in-air sounds, which are not analogous to in-water sounds, and by suggesting that VEMCO tags were similar to a wristwatch chime. The Commission remains unconvinced.

<sup>7</sup> At the higher source level output of 169 dB re 1  $\mu$ Pa at 1 m.

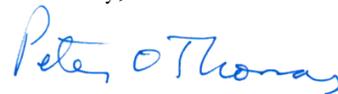
should be authorized under a research permit. The Commission is baffled why NMFS would put budgetary considerations above the welfare of the animals, especially for tags that would not provide the intended data. For all these reasons, the Commission contends that VEMCO tags should not be authorized for use under this or future permits involving pinnipeds<sup>8</sup>. Therefore, the Commission recommends that NMFS prohibit the NEFSC and any other applicant from deploying VEMCO tags on pinnipeds. VEMCO tags should not be deployed on cetaceans that are able to hear them as well.

### **Institutional Animal Care and Use Committee (IACUC)**

NEFSC has yet to provide the research protocols to its IACUC for review and approval. NMFS's current policy<sup>9</sup> requires that the Science Centers provide the IACUC assurance statement with all applications. Based on that policy, any applications for permits or permit amendments that do not include the assurance statement are to be returned to the applicant. It has been the Office of Protected Resources' practice to not require the assurance statement at the time an application is submitted—the Science Center must provide the statement before the permit is issued. If the Office of Protected Resources believes that its IACUC policy is too onerous, then it should consider amending the policy. However, the Commission recommends that, until such time that the policy is amended, NMFS return all permit and permit amendment applications that do not include the IACUC assurance statement to the respective Science Center and refrain from publishing those applications for public comment until the IACUC assurance statement has been provided.

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

Sincerely,



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

### **References**

- Baker, L.L., I.D. Johnsen, J.E. Mills Flemming, D.C. Lidgard, W.D Bowen, S.J. Iverson, and D.M. Webber. 2014. Probability of detecting marine predator-prey and species interactions using novel hybrid acoustic transmitter-receiver tags. PLoS ONE 9(6):e98117. doi:10.1371/journal.pone.0098117
- Cunningham, K.A., S.A. Hayes, A.M. Wargo Rub, and C. Reichmuth. 2014 Auditory detection of ultrasonic coded transmitters by seals and sea lions. Journal of the Acoustical Society of America 135(4):1978–1985.
- Cunningham, K.A., and C. Reichmuth. 2016. High-frequency hearing in seals and sea lions. Hearing Research 331:83–91.

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<sup>8</sup> And cetaceans as well, depending on the species.

<sup>9</sup> Which has been in effect since 2009.