



MARINE MAMMAL COMMISSION

15 January 2020

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. 22156
(Douglas Nowacek, Ph.D.,
Duke 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 application with regard to the goals, policies, and requirements of the Marine Mammal Protection Act (the MMPA). Dr. Nowacek is requesting authorization to conduct research on cetaceans during a five-year period.

Dr. Nowacek proposed to conduct research on 31 species of cetaceans year-round in the Atlantic Ocean. Researchers would harass, observe, photograph/videotape¹, record acoustically, conduct playback studies and photogrammetry on, biopsy sample, collect sloughed skin from, and instrument² numerous cetacean species of either sex and various age classes (see the take table for specifics). The purpose of the research is to (1) document baseline body condition, health status, and foraging and social behavior of various cetaceans under different ecological conditions, (2) investigate population-level context of those behaviors, and (3) determine how those species respond to various natural and anthropogenic sounds. Dr. Nowacek would implement various measures to minimize impacts on cetaceans and also would be required to abide by the National Marine Fisheries Service's (NMFS) standard permit conditions. He is currently updating his research protocols for review by his Institutional Animal Care and Use Committee (IACUC).

Acoustic playback studies in general

As noted herein, the Commission provided extensive informal comments on the acoustic playback portion of Dr. Nowacek's original application, which was subsequently revised. Although some of comments have been addressed in the revised application³, some have not and additional

¹ Including using unmanned aircraft systems.

² Including suction-cup and dart tags.

³ NMFS requested that the Commission not provide informal comments on Dr. Nowacek's revised application that was provided to the public for comment.

comments have come to light. In comments on the original application, the Commission noted that, while Dr. Nowacek discussed at length parameters (source levels, duty cycle, source type, etc.) associated with his currently-authorized playback studies, those parameters have no bearing on how Dr. Nowacek plans to conduct future playback studies. The revised application still noted that the exposure periods, including the duty cycle, for future studies would be similar to his current studies. That is not supported by the information contained in the revised application. In one portion of the application, Dr. Nowacek indicated that the duty cycle for his current studies is approximately 4 percent and in another portion that it is 6 percent. For his future proposed studies, Dr. Nowacek estimated that the sound sources could be active up to 10 and 20 percent of the time⁴.

The Commission also informally noted that boat noise, vibratory pile driving⁵, and some social or communication vocalizations⁶ are considered continuous sound sources and should be analyzed as such when estimating the extents of the Level A and B harassment zones. In his revised application, Dr. Nowacek only estimated Level A harassment zones based on intermittent sound sources. Boat noise, vibratory pile driving, some vocalizations, and rain are not intermittent but rather continuous sounds. Thus, it would not be realistic to broadcast them as 1-sec signals intermittently at a 10- or 20-percent duty cycle. In addition, the Level B harassment threshold is 120 not 160 dB re 1 μ Pa for continuous sources. As such, the associated Level B harassment zones would exceed the maximum Level B harassment zone of 398 m that was included in the revised application. In addition, the Commission informally noted that the worst-case scenario should be provided for each sound type. Dr. Nowacek provided the worst-case scenario for non-impulsive, intermittent sources but did not do so for either non-impulsive, continuous or impulsive sources. For impulsive sources, Dr. Nowacek indicated that all sound sources would be non-impulsive and sounds of seismic signals and pile driving would be recordings only. Although Dr. Nowacek intends to use only recordings rather than the sources themselves, recordings of impulsive sources can still retain impulsive characteristics, depending on how far from the source the recordings were made, and given that the Level A harassment thresholds are much lower for impulsive sounds⁷, it is imperative that the shut-down zones⁸ be sufficient.

Dr. Nowacek indicated that playback studies could be conducted on coastal bottlenose dolphins in water depths of 10 m or less. However, Dr. Nowacek used 20logR as the presumed propagation loss for estimation of the worst-case scenarios for Level A and B harassment. A propagation loss factor of 20logR is not appropriate in waters of 10 m or less, for which 15logR⁹ is used. Finally, as the Commission informally noted, Dr. Nowacek's take table does not include "acoustic, active playback/broadcast" in the incidental take rows of the various species, as included in previous permits¹⁰.

⁴ The revised application also noted that sounds transmitted by simulated sonar sources are typically transmitted every 25 seconds. However, a repetition rate of every 10 and 15 sec was used to estimate the various Level A harassment zones.

⁵ The application noted pile driving but did not distinguish between impact and vibratory.

⁶ As is rain, which was added to the revised application.

⁷ By 13 to 18 dB depending on the functional hearing group.

⁸ Dr. Nowacek proposed to implement shut-down zones of 1.5 times the Level A harassment zones for the various functional hearing groups in his revised application. However, the revised application still included the original shut-down zone of 200 m, which has been superseded.

⁹ Or even 10logR. 15logR would result in Level A harassment zones two to more than six times greater those estimated using 20logR, depending on the functional hearing group. The Level B harassment zones would range from 22 m to nearly 3 km rather than 10 to nearly 400 m as estimated using 20logR.

¹⁰ Including permits to Marine Ecology and Telemetry Research #21163 and Dr. Brandon Southall #19116.

Based on all of these issues, it is unclear if the proposed numbers of Level B harassment takes for the proposed playback studies are sufficient, specifically for incidental harassment of conspecifics and other species in the area. The Commission recommends that, prior to authorizing Dr. Nowacek to conduct playback studies using the various proposed sound sources, NMFS require him to (1) provide the Level A and B harassment zones based on the worst-case scenarios for non-impulsive, continuous and impulsive sound sources if he intends to use them, (2) re-estimate the Level A and B harassment zones for those sources that could be used in shallow water using 15logR rather than 20logR, and (3) adjust the numbers of Level B harassment takes for the various species, as needed, based on revisions to the harassment zones to ensure that the researchers do not have to cease their research activities prematurely, if the authorized numbers of proposed Level B harassment takes are met.

The Commission understands that some of the issues detailed herein may have been rectified in correspondence between NMFS and Dr. Nowacek, but those modifications may not have been incorporated into the revised permit application. The Commission notes that this has occurred before with other permit applications involving acoustics, which added unnecessary confusion and compromised reviewers' ability to provide informed comments. To maximize efficiencies and ensure accuracy of applications involving acoustic studies, the Commission recommends that NMFS ensure that its acoustic expert has reviewed the final version of any application, including any revised application, involving acoustic studies before providing it to the Commission for comment or publishing it in the *Federal Register* notice for public comment.

Level B harassment thresholds for sonar

Dr. Nowacek proposed to conduct two types of acoustic studies on cetaceans. For the first, researchers would coordinate with the Navy to use its operational sources, while for the second the researchers would deploy their own sound sources that mimic mid-frequency (MF) active sonar. The Level B harassment takes associated with the Navy-deployed assets are accounted for under the Navy's final rule (83 Fed. Reg. 57076), as has been done for previous permits. Thus, Dr. Nowacek included in his permit application Level B harassment takes associated with only those sonar sources that he would deploy. The Commission agrees with that approach but is concerned that the Level B harassment thresholds used to estimate marine mammal takes under the Navy's final rule and the research permit differ considerably for the same sources.

Under its final rule, the Navy used multiple¹¹ Bayesian biphasic dose response functions¹² (Bayesian BRFs) as its Level B harassment thresholds for behavior for non-impulsive sources¹³. The Bayesian BRFs were a generalization of the monophasic functions previously developed¹⁴ and applied to behavioral response data¹⁵ (see Department of the Navy

¹¹ For odontocetes, mysticetes, beaked whales, and pinnipeds. The Navy used the unweighted 120-dB re 1 μ Pa threshold for harbor porpoises as it had done for Phase II activities.

¹² Comprising two truncated cumulative normal distribution functions with separate mean and standard deviation values, as well as upper and lower bounds. The model was fitted to data using the Markov Chain Monte Carlo algorithm.

¹³ Acoustic sources (i.e., sonars and other transducers) similar to Dr. Nowacek's MF sonar source.

¹⁴ By Antunes et al. (2014) and Miller et al. (2014).

¹⁵ From both wild and captive animals.

2017 for specifics). At odds with this, the Commission understands that NMFS is still directing applicants to use its generic unweighted 160-dB re 1 μ Pa threshold to estimate takes associated with playback studies involving MF sonar sources. Although that threshold has been used historically by NMFS for estimating Level B harassment takes from MF sonar for research permits¹⁶, it has *never* been used by the Navy to estimate takes from any of its non-impulsive, acoustic sources¹⁷. It does not make sense that NMFS used two different thresholds to estimate Level B harassment takes for the same type of sources, and this also runs counter to the agency's approach for the Level A harassment thresholds. The same Level A harassment thresholds were used in both the Navy's final rule and Dr. Nowacek's permit application for MF sonar sources. NMFS directs applicants to use the same Level A and B harassment thresholds for *all* other sound sources (seismic airguns, vibratory and impact pile driving, underwater detonations, echosounders, subbottom profilers, etc.)—regardless of whether the applicant is requesting authorization to take marine mammals under 101(a)(5) or 104(c) of the MMPA. That is, the thresholds are based on the type of sound source, not the type of authorization issued.

In response to the Commission's recent recommendation for NMFS to use the Navy's Level B harassment thresholds rather than NMFS's generic 160-dB re 1 μ Pa threshold, NMFS indicated that it was not practical for researchers to use the Navy's Bayesian BRFs for mitigation purposes during playback trials and it was not appropriate to apply Navy thresholds to mitigate active acoustic sources used in a research study. The Commission has not suggested that researchers use the Navy's Level B harassment thresholds to *implement a mitigative action*. Rather, the Commission recommended that the Bayesian BRFs should be used for assessing Level B harassment and *for estimating Level B harassment takes*¹⁸. Specifically, the Commission noted that, since the Navy is funding and directly coordinating with the applicants, the Navy could easily provide estimated numbers of Level B harassment takes based on the appropriate behavior thresholds to inform the various permit applications. Using the Bayesian BRFs is practical, as the Navy routinely uses them and researchers only report on the animals that they can actually observe in close proximity to their vessel, irrespective of whether the Level B harassment zone is 2 km or 20 km.

NMFS also responded that it employed a conservative approach by requiring the applicant *to count takes* and shut down playback trials based on the functional hearing group with the most sensitive hearing, high-frequency cetaceans. The reason that NMFS must require permittees *to enumerate takes* based on the Level A and not the Level B harassment threshold is because the 160-dB re 1 μ Pa threshold yields smaller zones than the Level A harassment thresholds in certain circumstances. This anomaly is referenced in Dr. Nowacek's application as well and is counterintuitive to many applicants, including Dr. Nowacek. The generic 160-dB re 1 μ Pa threshold underestimates the ranges to Level B harassment and the numbers of takes.

¹⁶ The last of which was finalized in 2016.

¹⁷ For TAP I and Phase II activities, the Navy used two monophasic dose response functions, one for odontocetes and pinnipeds and one for mysticetes. The unweighted 120- and 140-dB re 1 μ Pa thresholds also were used for harbor porpoises and beaked whales, respectively, for Phase II activities.

¹⁸ The Commission notes that NMFS does apply the Navy's thresholds for mitigation measures—those are NMFS's Level A harassment thresholds (NMFS 2018). NMFS has deemed those thresholds as appropriate and instructs all permittees and action proponents to implement the Navy's Level A harassment thresholds for directed taking under 104(c) and incidental taking under 101(a)(5).

In the application that underpins the final rule, the Navy noted that the probability of a behavioral response and the potential for taking occur at received levels lower than and ranges greater than specified in Dr. Nowacek's application. For example, the probability for a beaked whale to respond behaviorally to MF1¹⁹ at 160 dB re 1 μ Pa is 93 percent, and the 50-percent probability of response occurs at approximately 146 dB re 1 μ Pa and out to ranges of 33 km or more (Table 6.4-9 in Department of the Navy 2018). The Navy also employs various cut-off distances²⁰ beyond which it does not believe impacts occur. For beaked whales, that distance is 50 km. Thus, impacts can occur at ranges greater than Dr. Nowacek's estimated Level B harassment zone of 398 m and at received levels much lower than 160 dB re 1 μ Pa.

In its final argument against using the Navy's behavior thresholds, NMFS pointed to its response to the Commission's recommendation to use the Navy's behavior thresholds²¹ for active sound sources for *scientific research* (84 Fed. Reg. 46788). Those activities actually involve echosounders and subbottom profilers, not MF sonar sources. However, the Commission points out that NMFS regularly uses the Navy's behavior thresholds for the Office of Naval Research's active acoustic sources, including MF sonar sources, when it conducts *scientific research activities* (83 Fed. Reg. 48802, 84 Fed. Reg. 50011). Thus, NMFS's argument is not applicable to the MF sonar sources proposed for use by Dr. Nowacek nor does it reflect NMFS's record in authorizing taking of marine mammals during research activities that involve MF sonar sources. Thresholds are based on the type of sound source, not the type of authorization issued *or* the purpose of the activity.

Given that very few applications and subsequent permits include such activities²² and the Navy is funding and directly coordinating with those researchers that conduct such activities, the Commission continues to believe that the Navy can easily provide estimated numbers of Level B harassment takes based on the appropriate behavior thresholds to inform the relevant permit applications. To ensure that NMFS is basing its thresholds on the best available science, the Commission recommends that NMFS require Dr. Nowacek and all other applicants and permit holders to use the Navy's Level B harassment thresholds for behavior²³ rather than the generic 160-dB re 1 μ Pa threshold to estimate the numbers of takes during acoustic studies involving *MF sonar and other military sources*.

Instrumenting protocols

In his application, Dr. Nowacek proposed to instrument some individuals of "a limited number of species" with both suction-cup and dart tags. However, Dr. Nowacek did not specify which species would be instrumented with two tags or justify why those species would need to be instrumented with two tags. Additionally, it is not clear whether individuals could be instrumented

¹⁹ Which is the sonar bin that includes both tactical MF sonar that the Navy would use and the MF sonar source that Dr. Nowacek would use to expose the various cetaceans.

²⁰ For Table 6.4-9, those distances are 10 m for pinnipeds and 20 m for odontocetes and mysticetes.

²¹ NMFS noted "the Navy's acoustic thresholds", but the Commission assumes NMFS intended to state "the Navy's behavior thresholds".

²² Currently, the Commission is only aware of three or four.

²³ Including the Bayesian BRFs for all species except harbor porpoises for which the unweighted 120-dB re 1 μ Pa threshold is used.

with two tags on separate days as the “takes per animal” column indicated one take per animal²⁴. The “details” portions of the take table stated “10 animals tagged with both dart/barb and suction-cup tags” for humpback, fin, short-finned pilot and Cuvier’s beaked whales,” but it is not clear if this is a full list of the “limited number of species” that would be instrumented with two tags.

In addition, the application stated that researchers would target any individual instrumented with a dart tag on days subsequent to the tagging for photographic purposes, resulting in additional takes of that individual. It is unclear whether a similar protocol would be followed for animals instrumented with suction-cup tags. For Cuvier’s beaked whales and short-finned pilot whales, acoustic playback studies could be conducted on any dart-tagged individual on days subsequent to tagging as well. However, for all such species, only one take per animal was included in the “takes per animal” column of the take table²⁵. Since researchers would be intentionally pursuing or conducting procedures on tagged, and thus identifiable, animals over multiple days, at least two takes per individual should have been included for all species that could be instrumented with dart tags. If animals instrumented with suction-cup tags could be approached on separate days, takes per individual should be increased for those as well. The Commission therefore recommends that NMFS ensure that Dr. Nowacek (1) indicate in the application the species that would be instrumented with both a suction-cup and dart tag, (2) clarify whether any species could be instrumented with one or more tags on separate days, and if so, amend the “takes per animal” column in the take table accordingly, and (3) include at least two takes per individual for every species that is instrumented with a suction-cup and/or dart tag that could be approached for photographic purposes and/or acoustic playback studies on subsequent days.

Principal investigator (PI) and co-investigator (CI) designations, responsibilities, and qualifications

A few of the curricula vitae (CVs), qualification tables, and biosketches lack detail regarding the experience of the PI or CI to conduct some of the procedures²⁶. Details regarding the procedures that a PI or CI would be authorized to conduct must be explicitly provided in a CV, qualification table, or biosketch to ensure that the researcher has qualifications commensurate with the duties to be conducted under the permit—this is consistent with NMFS’s implementing regulations (50 C.F.R. § 216.35(g)), its 2016 application instructions, and its qualification form instructions. Therefore, the Commission recommends that NMFS only authorize a PI or CI to conduct a procedure for which adequate experience has been described in his or her CV, qualification table, or biosketch.

The Commission has also repeatedly asserted, including in its [14 November 2019 letter](#) regarding NMFS’s revised application instructions, that a PI or CI who does not have adequate experience conducting procedures should not be authorized to conduct them, thus reducing the risk

²⁴ That is, a dart tag could be deployed on one day and a suction-cup tag could be deployed a few days later when playback studies would occur.

²⁵ Three takes per individual were included for Sowerby’s beaked whales and sperm whales. However, this appears to be an error, as no explanation was provided in the text for the multiple takes per individual of these two species.

²⁶ For example, Dr. Rosenbaum would be authorized to instrument large whales using suction-cup tags but his biosketch indicated that he only has “some experience for suction tagging whales.” It also indicated that his experience includes only one year of assisting with suction-cup tagging studies—further details were not provided.

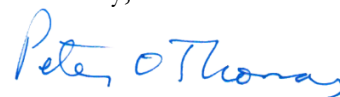
of harm or injury to both the animals and researchers²⁷. That is, if a PI or CI has only received training (Level 1)²⁸, he or she should not be authorized to conduct that procedure under the permit until having conducted it successfully under supervision, and, for invasive procedures, on live animals. The Commission thus recommends that NMFS ensure that PI and CIs are only authorized to conduct procedures for which they have at least performed under supervision (Level 2 or greater).

IACUC protocols

Dr. Nowacek stated that he is currently in the process of revising his IACUC research protocols consistent with the numbers of takes included in his permit application. However, the Commission notes several other inconsistencies between the research protocols that were previously approved by Dr. Nowacek's IACUC and those included in this application. First, Dr. Nowacek requested in his permit application to instrument, biopsy sample, and conduct acoustic playback studies on numerous cetacean species, but only a subset of those species was included and approved in his IACUC protocols. In addition, the IACUC protocols that were provided lack any description of the proposed playback studies. Dr. Nowacek stated in his permit application that his IACUC is generally not concerned with "anything that causes any discomfort less than a needle stick" and thus the playback studies were omitted, yet he planned on verifying this with his committee. Finally, as previously mentioned, Dr. Nowacek proposed to instrument some individuals of certain species with both a suction-cup and dart tag at the same time. However, neither of the IACUC protocols for suction-cup or dart tagging indicated that any animals could be instrumented with two tags at a given time. As such, the Commission recommends that NMFS advise Dr. Nowacek that, prior to conducting any procedures in the field, all research protocols reviewed and approved by his IACUC must include all relevant species and must match those activities authorized under the permit, including all active acoustic studies, if deemed necessary by his IACUC.

The Commission believes that the proposed activities are consistent with the purposes and policies of the MMPA. Kindly contact me if you have any questions concerning the Commission's recommendations.

Sincerely,



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

²⁷ For example, Ms. Wisse would be authorized to conduct biopsy sampling, even though in her qualification table she indicated that she had only received training in the procedure and listed her level of experience as a 1.

²⁸ Level 1 experience denotes having assisted or received education/training in performing the procedure, but have **not successfully performed** the procedure. Level 2 experience denotes having performed the procedure while **under supervision or training** of an expert (e.g., PI, CI, or veterinarian). Level 3 experience denotes having performed the procedure **without supervision** by a PI/CI. Level 4 experience denotes being considered an **expert** in performing this procedure, and having **supervised or trained** others in performing this procedure.

References

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