



MARINE MAMMAL COMMISSION

2 December 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. 22629
(Mystic Aquarium)

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). Mystic Aquarium (Mystic) is requesting authorization to import five captive-born beluga whales¹ from Marineland in Ontario, Canada, and conduct research activities on them during a five-year period. The beluga whales would be housed at either the aquarium in Mystic, Connecticut, or Georgia Aquarium in Atlanta, Georgia², and would be on public display incidental to conducting research activities. In addition, Mystic would abide by standards set forth by the International Air Transport Association for transporting the whales from Canada.

The purpose of the research is to investigate (1) diving physiology, (2) behavior, (3) reproduction, (4) morphometrics, and (5) microbiome of beluga whales, as well as to test non-invasive prototype tags. Researchers also would assess hearing and the neuroimmunological and physiological responses of beluga whales to environmental and anthropogenic sounds and stressors. Mystic would harass, observe, photograph/videotape³, measure/weigh, sample⁴, instrument⁵, collect auditory evoked potentials (AEP), and/or conduct acoustic playbacks and ultrasound on the five beluga whales⁶ (see the take tables for specifics). Researchers would implement various measures to minimize impacts on the whales.

¹ Two adult females, two immature females, and one immature male.

² The whales could be transferred temporarily or permanently to Georgia Aquarium, if deemed in the best interest of the whales based on health, social, or welfare considerations. Georgia Aquarium would conduct the proposed research activities at its facility.

³ Including photogrammetry.

⁴ Including blood, exhaled air, feces, saliva, skin, and vaginal, blowhole, and oral swabs.

⁵ Including suction-cup tags.

⁶ If any of those whales becomes pregnant and the calf survives, some of the proposed activities could be conducted on up to two of the calves during the five-year period as well.

Sampling schedule and take table format

Mystic has proposed to collect blood, skin, breath, saliva, fecal, and swab samples from the five beluga whales to be imported to pursue its research objectives. Multiple types of samples may be collected multiple times per day for various research objectives. However, the application did not clearly specify the general sampling schedule across all research objectives or the maximum number of procedures that could be conducted on a whale in a given day. For example, to study the neuroimmunological response of beluga whales to various stressors, Mystic proposed to conduct routine blood draws twice a month each month of the year; and four times a year, it would collect four blood samples in a day. It also proposed to collect blood opportunistically before, during, and/or after other activities, such whale transport, out-of-water events, veterinary examinations, novel social interactions, and training exercises. To investigate the relationship between diving physiology and immune response, Mystic would collect an additional 16 blood samples from each whale in a given year, with samples taken before and after dive activities. In addition to omitting the maximum number (and volume) of blood samples that could be taken on a given day, Mystic did not specify the time interval between blood sampling events, or between sampling events for any other sample type. Mystic's research protocols that were submitted to its Institutional Animal Care and Use Committee (IACUC)⁷ in previous years included detailed sampling schedules and other specifications. The permit application should have included those details for all activities. Therefore, the Commission recommends that NMFS require Mystic to provide (1) a detailed sampling schedule for all samples to be collected and (2) the maximum number of samples, as well as volume of blood, that could be collected per day from an individual beluga whale, before any permit is issued.

In addition to the lack of clarity regarding the sampling schedule across all sample types, Mystic's take table is inconsistent, in terms of structure and information provided, with other research permits issued since 2015 involving captive marine mammals⁸. The rows in the take tables of those other permits were designated based on the studies to be conducted rather than each sample type to be collected or procedure to be conducted. If the research activities involved multiple studies, as was the case for Waikiki Aquarium permit 21251 and PIFSC permit application 22677, each study was identified and the samples and procedures associated with that study were provided on a separate row. Also, the previous permits did not specify more than 365 takes per animal, since an animal can be taken only once in a given day even if samples are collected from or procedures are conducted on an animal multiple times in a day. Mystic enumerated the takes per animal by summing the number of samples to be collected from or procedures to be conducted on each animal in a given year, including those samples to be collected or procedures to be conducted multiple times per day. As such, 735 and 428 takes per animal were proposed for breath and saliva samples, respectively. In the PIFSC permit application 22677, when procedures would be conducted on an animal multiple times in a day, the sampling schedule was clearly described in the 'details' column of the take table. Thus, it was clear what samples would be taken and what procedures would be conducted on an animal on a daily and annual basis.

⁷ Which are discussed in another section herein.

⁸ Including the permits of Reichmuth (18902), Minnesota Zoological Gardens (17967), SeaWorld (22095), Waikiki Aquarium (21251), and Williams (19590), as well as the permit application of Pacific Islands Fisheries Science Center (PIFSC; 22677).

Based on these issues, the Commission recommends that NMFS (1) require Mystic to provide a take table that (a) specifies each of the research studies on separate rows and includes all relevant samples to be taken and procedures to be conducted for each study, (b) stipulates the numbers of days per year a study would be conducted in the ‘takes per animal’ column, and (c) describes in the ‘details’ column the number of times a sample could be taken or a procedure could be conducted on a whale in a given day, when applicable, and (2) include that take table in the permit, if issued.

Activities to be conducted on resident beluga whales

Mystic explicitly stated in its application that it would conduct any IACUC-approved research activity on the only beluga whale that it currently owns, which is held for public display. In addition, Mystic indicated that the two beluga whales currently on loan⁹ to the aquarium and held for public display would “also contribute to the non-intrusive research while they are under Mystic’s care.” It is unclear which activities would be conducted, but Mystic did not request takes of those three beluga whales for any of its proposed research activities in its permit application. The Commission disagrees with that approach.

Based on NMFS’s definition of “intrusive research” (50 C.F.R. § 216.3), certain activities that Mystic has conducted and would conduct on the three beluga whales should be authorized under a research permit. NMFS’s implementing regulations stipulate that intrusive research on captive animals does not include procedures that (1) are conducted by the professional staff of the holding facility or an attending veterinarian for purposes of animal husbandry, care, maintenance, or treatment, or a routine medical procedure that, in the reasonable judgment of the attending veterinarian, would not constitute a risk to the health or welfare of the captive animal or (2) involve either the introduction of a substance or object (i.e., as described in this definition) or a stimulus directed at animals that, in the reasonable judgment of the attending veterinarian, would not involve a risk to the health or welfare of the captive animal (50 C.F.R. § 216.3). Arguably, Mystic’s proposal to collect monthly blood samples during routine husbandry practices from the three beluga whales on public display would fit under the first criterion. However, conducting hearing-related tests does have the potential to injure or harm an animal, even when a trained animal participates on a voluntary basis. Furthermore, Mystic’s approach is inconsistent with other permits that authorize similar activities (e.g., Alaska SeaLife Center permit 18534, Minnesota Zoological Gardens permit 17967, and Williams permit 19590 for studies involving blood samples and Reichmuth permit 18902 and SeaWorld permit 22095 for hearing studies).

More concerning is the fact that Mystic already conducted AEPs and controlled sound exposure experiments in 2014 on two beluga whales held for public display¹⁰. Mystic has never been authorized to conduct those activities under a research permit, which is inconsistent with section 104(c)(3) of the MMPA. As such, the Commission recommends that NMFS include in the permit, if issued, takes of the three beluga whales currently held at Mystic for public display for the relevant studies in which the whales would participate.

⁹ One beluga whale is owned by Wildlife Conservation Society and the other is owned by SeaWorld.

¹⁰ Based on information provided in the application, which is discussed in more detail in a subsequent section herein, and in the research protocol for IACUC Project 14006.

Study 3—Hearing and physiological response to anthropogenic sound

Mystic proposed to conduct various hearing-related tests, including baseline and masked hearing threshold tests and directional hearing tests, on the five beluga whales to be imported from Canada. As stated previously herein, if it intends to conduct hearing-related tests on the three beluga whales currently housed at its facility, Mystic would need to be authorized under this permit¹¹ to conduct the activities on those whales as well¹². Beyond ensuring that activities to be conducted are authorized appropriately, the Commission has numerous concerns regarding Mystic's proposed hearing-related research activities.

First and foremost, Mystic did not make clear whether it plans to conduct masked hearing threshold tests, in which AEPs are conducted *during* sound exposure¹³, or actual threshold shift¹⁴ tests, in which the amount of threshold shift is measured *after* sound exposure. In the project description section of the application, Mystic indicated that it would compare baseline and masked hearing thresholds determined *while* the sound is projected. However, in the methods section, it stated that sound-related AEP hearing tests *would follow* each noise exposure session. The Commission initially assumed that Mystic was proposing to conduct masked hearing threshold tests and had inadvertently included incorrect methods throughout that section. But, Mystic noted in the project description section of the application that the controlled sound exposure experiments, mentioned previously herein, that were conducted on the single beluga whale indicated masking in beluga hearing sensitivity, exceeding 20 dB from baseline hearing. That assertion indicates that a 20-dB threshold shift occurred, which is more indicative of an actual threshold shift test. The Commission notes that onset TTS is defined as a shift of at least 6 dB (Southall et al. 2007, NMFS 2018, Southall et al. 2019) and therefore a 20-dB shift is much greater than onset TTS¹⁵. In short, Mystic's objectives do not comport with the proposed methods to fulfill those objectives.

Second, Mystic's objective to 'quantify the frequency range and dB magnitude resulting from the noise sources' is not standard terminology. The Commission assumes that Mystic intends to quantify the threshold shift in terms of both the amplitude and the frequency over which the shift occurs. However, the Commission is more concerned that Mystic's application does not discuss hearing recovery, whether researchers will ensure complete recovery from any threshold shift before an animal is exposed to another playback session, or whether other non-target beluga whales or other species held in the same pools as the whales could be exposed during the playback sessions¹⁶. Thus, Mystic could inadvertently induce high levels of TTS with repeated low-level sound exposures.

¹¹ Or another permit.

¹² Which would entail either amending its application and take tables or requesting an amendment to the permit, if issued, to include conducting the various activities on eight rather than five beluga whales per year.

¹³ Similar to methods used by Terhune and Ronald (1975).

¹⁴ i.e., temporary threshold shift (TTS).

¹⁵ Permanent threshold shift (PTS) is defined as 40 dB or more of TTS.

¹⁶ If not, Mystic must specify how it will ensure that other animals are not exposed to the playback sounds (e.g., moving the other animals to separate pools).

Third, the application does not specify how AEPs would be conducted in general¹⁷, let alone as part of masked hearing threshold tests. Information is missing regarding (1) the frequency range and specific frequencies that would be tested, whether clicks¹⁸ would be used in addition to pips, the total active sound transmission time¹⁹, and the timeframe over which Mystic would collect baseline AEP data and (2) whether a full audiogram or thresholds at only specific frequencies would be collected for the masked hearing threshold tests.

Fourth, Mystic noted that it would use tones as masking sounds but then specified that recordings from commercial ships, dredging rigs, aircraft, outboard motors, and impact hammers would be used—none of those recordings are considered tones. The frequency range and source levels of those recordings were omitted from the application as well.

Fifth, Mystic did not consider the sound emitted during the AEPs when it assessed its two scenarios (impact pile driving and ship noise) for the masked hearing threshold tests. Based on Mystic's scenario 1 for impact pile driving, it estimated that the weighted cumulative sound exposure level (SEL_{cum}) would be 158.3 dB re 1 $\mu\text{Pa}^2\text{-sec}$, which is less than the 160-dB re 1 $\mu\text{Pa}^2\text{-sec}$ threshold²⁰. However, Mystic did not specify whether it would conduct a baseline AEP before the first of two 3-minute playback sessions or whether it would ensure recovery prior to conducting the second playback session. If those two sessions were to occur, a total of four AEP sessions would be conducted for this scenario—one baseline AEP before the first session, the AEP associated with session 1, the AEP to ensure recovery before conducting the second session, and the AEP associated with session 2. Sound emitted during those AEP sessions could exceed the threshold for scenario 1²¹. Further, it is unclear how Mystic could possibly conduct up to three 15-minute sessions per day given that it proposed to emit sound at only 157.2 re 1 $\mu\text{Pa}^2\text{-sec}$ at 1 m and for only two 3-minute sessions for scenario 1.

Finally, Mystic indicated in the project description section of the application that it planned to quantify directional hearing abilities of beluga whales from three to five different angles. However, in the methods section of the application, Mystic indicated that anthropogenic noise would be projected at 0, 90, and 180 degrees from an animal's head. Directional hearing tests are conducted using AEP tones²², not anthropogenic sound recordings from ships, dredging rigs, and impact hammers. If Mystic intended to determine how masking affects a beluga's directional hearing, then that should have been specified. At present, Mystic's stated objectives likely would not be achieved with the methods proposed. The Commission notes that the directional hearing ability objective appears to be an afterthought. It was mentioned only as an objective in the project description section of the application and was not discussed further in the justification and summary of published findings portion of that same section. Numerous papers have been published on

¹⁷ More detailed information was included in Mystic's IACUC protocol (IACUC Project 14006) that was approved in May 2014 and expired in May 2019.

¹⁸ Which are considered impulsive, while pips are considered non-impulsive.

¹⁹ Specifying how many 20-sec sound bursts, that are comprised of alternating 20-msec modulated tones and 30-msec silent periods and defined as pips, or how many clicks (including the pulse duration) would be emitted during a single baseline AEP session.

²⁰ Which is based on maintaining Mystic's proposed buffer of 10-dB less than the weighted TTS threshold.

²¹ The Commission understands that, if both impulsive and non-impulsive sounds are emitted (e.g., impact pile driving sounds and AEP pips), the more conservative impulsive threshold is used to ensure that the threshold is not exceeded.

²² Similar to methods used by Popov and Supin (2009).

directional hearing in odontocetes (e.g., Au and Moore 1984, Supin and Popov 1993, Kastelein et al. 2005, Popov et al. 2006) and specifically on beluga whales (e.g., Klishin et al. 2000, Mooney et al. 2008, Popov and Supin 2009). In addition, Mystic included only a single sentence describing its directional hearing methods in the application, which is sorely insufficient.

Given that Mystic's proposed methods are both incomplete and do not demonstrate a likelihood of achieving the stated objectives, the Commission cannot conclude that the masked hearing threshold and directional hearing tests would be considered *bona fide* under section 104(c) of the MMPA. Further, the Commission is concerned that hearing recovery was not considered in Mystic's proposed methods and questions whether the humaneness criterion under section 104(c) of the MMPA would be met. For these reasons, the Commission recommends that NMFS refrain from authorizing Mystic to conduct either masked hearing threshold or directional hearing tests in the permit, if issued.

IACUC protocols

The Commission also notes that, while Mystic has provided research protocols that were previously approved by its IACUC, (1) some of the protocols have expired, (2) all of the proposed activities were not described in the protocols, and (3) the protocols described procedures to be conducted only on the beluga whales that were or currently are held at Mystic, not the five beluga whales proposed to be imported²³. For example, research protocols for quantifying hearing in captive beluga whales (IACUC Project 14006) were approved in 2014 but have since expired. Those protocols describe conducting AEPs on two beluga whales under ambient conditions and when exposed to anthropogenic sound, which may or may not be the same as the activities that would be conducted under the current permit application. Given the deficiencies in the current permit application, it is unclear whether the methods would be the same. Additionally, Mystic proposed in its application to collect breath samples for Studies 2 and 7, yet the numbers of samples proposed are either inconsistent with or missing from the approved research protocols provided in IACUC Projects 16006 and 12001, respectively. Finally, nearly all of the IACUC protocols identify and provide justification for the studies to be conducted only on the beluga whales previously or currently held at Mystic, which have numbered from one to four. Under the current permit application, Mystic could conduct the various activities on the five beluga whales to be imported and up to two calves born during the five-year period of the permit. One purpose of an IACUC review is to ensure that the sample size of animals is justified and all efforts have been made to reduce the number of animals to be used while ensuring the research objectives can be met. Thus, discrepancies in the number of beluga whales to be subjected to each research protocol is of concern.

It is not clear when or if Mystic will be submitting updated protocols to its IACUC for approval²⁴ and how those protocols might differ from the ones provided for review. The Commission recommends that NMFS advise Mystic that, prior to collecting any samples or conducting any procedures, all research protocols reviewed and approved by its IACUC must match those activities authorized under the permit, if issued.

²³ Or the two calves that could be born during the five years of the permit.

²⁴ Mystic did indicate that it expects to have approval for its updated hearing study protocols in place no later than December 2019 and that the research would not be carried out if a permit is not granted. However, those updated protocols were not provided to the public or to the Commission for comment.

Depleted stocks of marine mammals

The Commission recognizes that the five beluga whales would be imported for purposes of scientific research. Nevertheless, it notes that Mystic intends to place the animals on public display incidental to conducting the proposed research activities. Public display of marine mammals maintained under a scientific research permit can be authorized under applicable regulations (50 C.F.R. § 216.41(c)(1)(vi)) if NMFS determines that such activities—

- (A) are necessary to address scientific research objectives and have been specifically authorized by the Office Director under the scientific research permit;
- (B) are conducted incidental to and do not in any way interfere with the permitted scientific research; and
- (C) are conducted in a manner consistent with provisions applicable to public display, unless exceptions are specifically authorized by the Office Director.

Mystic has provided sufficient information in its application to enable the Office Director to make those determinations.

In this case, all of the whales that would be imported were born in captivity from wild-caught parents. At least one of the parents of each of the whales is from the depleted Sakhalin Bay-Nikolaya Bay-Amur River stock. Neither the MMPA nor NMFS's implementing regulations provide clear guidance on whether marine mammals that are partly, but not entirely, from a depleted lineage also are considered depleted. The Commission believes that the best interpretation of the MMPA is to treat any marine mammal as depleted if either of its parents is from a depleted stock. This would further the policies and rationale underlying the prohibition on importing depleted marine mammals for purposes of public display. Congress, in enacting that prohibition, believed that removing depleted marine mammals from the wild would be appropriate in very limited circumstances, and that public display was not one of them. Rather, those animals should remain in the wild, where they could contribute to rebuilding the depleted stock. It would undermine that policy if depleted marine mammals could be removed from the wild in other countries and be bred with animals from non-depleted stocks to supply public display animals to the United States. Thus, the Commission recommends that NMFS adopt a policy clarifying that a marine mammal with either parent from a depleted stock also be considered part of that depleted stock.

NMFS's regulations at 50 C.F.R. § 216.41(b)(5) set forth additional issuance criteria applicable to research permits involving marine mammals from depleted species and stocks. Consistent with its view that the beluga whales proposed to be imported should be considered as coming from a depleted stock, the Commission believes that the issuance criteria for depleted species and stocks should be applied to this application. The issuance criteria include—

- (i) The proposed research cannot be accomplished using a species or stock that is not designated or proposed to be designated as depleted, or listed or proposed to be listed as threatened or endangered;
- (ii) The proposed research, by itself or in combination with other activities will not likely have a long-term direct or indirect adverse impact on the species or stock;
- (iii) The proposed research will either:

- (A) contribute to fulfilling a research need or objective identified in a species recovery or conservation plan, or if there is no conservation or recovery plan in place, a research need or objective identified by the Office Director in stock assessments established under section 117 of the MMPA;
- (B) contribute significantly to understanding the basic biology or ecology of the species or stock, or to identifying, evaluating, or resolving conservation problems for the species or stock; or
- (C) contribute significantly to fulfilling a critically important research need.

With respect to the first criterion, Mystic has asserted that it would not be feasible for other facilities holding beluga whales in the United States to alter their institutional priorities to train whales for the proposed research activities and that information from animals with genetics in common with the Sakhalin Bay-Nikolaya Bay-Amur River stock may have more relevance to efforts to recover that stock as well as that of the Cook Inlet beluga whale. However, the Commission is unaware whether Mystic has done an exhaustive search of potentially available, non-depleted beluga whales that might be suitable subjects for the proposed research activities. This is something that NMFS should assess as part of its application of the requirements for using depleted marine mammals for research. The Commission, however, is not advocating that beluga whales from non-depleted stocks be taken from the wild in lieu of using the whales from Marineland. With respect to the second criterion, Mystic indicated that the animals were captive-born and are not candidates for return to the wild, therefore the research itself is not expected to result in additional removals or hindrance of recovery efforts for the source population. With respect to the third criterion, Mystic has provided a rationale for how the various studies contribute to understanding the basic biology and ecology of beluga whales and inform conservation issues concerning depleted beluga whale stocks in the wild. In addition, many of the proposed studies address the goals of the recovery plan for Cook Inlet beluga whales.

The Commission also is focusing on this issue because depleted marine mammals cannot be imported for purposes of public display. As such, the Commission believes that it, NMFS, and others need to be vigilant whenever reviewing applications seeking authority to import depleted marine mammals for purposes of scientific research and incidental public display, to ensure that the research has not been developed as a means to obtain display animals that could not otherwise be imported. This is particularly true if marine mammals from a depleted stock would be retained upon completion of the proposed research and maintained on public display indefinitely. In this case, the Commission believes that the proposed research activities²⁵ meet the 'bona fide' research requirement under section 104(c)(3)(A) of the MMPA and that the public display areas where the animals would be housed at the facility(ies) while research is being conducted provide the best option for the care and maintenance of the animals. Nevertheless, the Commission is concerned about the post-research fates of the animals and whether they will become 'de facto' public display animals.

As noted in the application, the requested permit would be valid for five years and, at the end of that time, the whales would continue to reside at Mystic, Georgia Aquarium, or some other suitable facility in the United States, presumably where they would be maintained on public display. Thus, heightened scrutiny seems warranted. Exactly how such evaluation should be conducted is not

²⁵ Except Study 3 as noted herein.

readily apparent. Perhaps NMFS needs to weigh the importance of the proposed research in addressing pressing conservation issues against the diminishment of the policy against allowing the importation of depleted marine mammals for purposes of public display by allowing the whales to be placed on display indefinitely. Alternatively, perhaps NMFS should go so far as to require that, if the whales are to be retained indefinitely after completion of the research, they be maintained in suitable facilities, but not on public display.

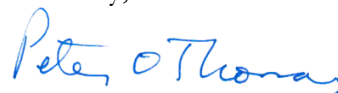
The most troubling aspect of the proposed research is the prospect that the whales would be allowed to breed. As stated in the application, Mystic would not use artificial insemination to promote breeding or contraception to deter breeding (unless contraception is judged to be medically necessary for the health and well-being of an individual beluga whale). This effectively extends indefinitely the issue of what to do with the animals once the proposed research is completed and adds to the impression that at least a secondary impetus for seeking the permit is to obtain depleted marine mammals for purposes of public display, something that cannot be authorized directly. The Commission therefore recommends that, if NMFS issues a permit to authorize the proposed importation and taking for research purposes, it conditions the permit to require Mystic or any other facility where the whales are housed to take steps to preclude breeding.

Additional comments

In addition to the issues raised in this letter, the Commission has identified some additional minor errors, misrepresentations of information, and inconsistencies in Mystic's application. The Commission has provided NMFS with these additional comments and recommends that NMFS incorporate them into the application, if a permit is issued.

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

Sincerely,



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

cc: Dr. Barbara Kohn, Animal and Plant Health Inspection Service

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