19 December 2011

Mr. P. Michael Payne, Chief
Permits, Conservation and Education Division
Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226

Dear Mr. Payne:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the application submitted by the U.S. Army Corps of Engineers seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act to take small numbers of Atlantic bottlenose dolphins by Level B harassment. The taking would be incidental to blasting operations in the Port of Miami, Florida. The Commission also has reviewed the National Marine Fisheries Service's 18 November 2011 *Federal Register* notice (76 Fed. Reg. 71517) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

RECOMMENDATION

The Marine Mammal Commission recommends that the National Marine Fisheries Service issue the incidental harassment authorization, provided it requires the Army Corps of Engineers to—

- conduct empirical sound propagation measurements during two detonation events per day using various delay weights and numbers of delays to verify that the danger and exclusion zones are sufficient to protect marine mammals from sound exposure levels, including the 182- and 177-dB re 1 μPa^2-second thresholds—the zones then should be adjusted accordingly; and
- suspend all activities if the authorized number of takes is reached.

RATIONALE

The Army Corps of Engineers is planning to conduct blasting and dredging operations in the Port of Miami beginning in the summer of 2012 and continuing for up to two years. The requested incidental harassment authorization would be valid for one year and the Corps would seek renewal for the second year. The Corps plans to (1) widen Cut 1 and deepen Cut 1 and 2 of the seaward approach to the Port, (2) add a turn widener and deepen the southern intersection of Cut 3 in Fisherman's Channel, (3) widen and deepen Fisher Island Turning Basin, and (4) expand the Federal Channel and the Port's berthing areas in Fisherman's Channel and the Lummus Island Turning Basin (Figure 1 in the application). The Corps would use a combination of confined blasting to loosen rock, mechanical dredging, and cutterhead dredging in water depths up to 18.3 m. The Corps plans a maximum of 313 detonation events in the first year of operation, with no more

than 2 detonation events per day. A given detonation event may involve up to 100 blast holes, and all the blasts in an event may be set off simultaneously or staggered in a series separated by a minimum delay of 8 milliseconds each. Each new blast in a series is referred to as a "delay." The Corps expects to use 4.5 to 204.1 kg of charge weight per delay. In 2005, the Corps used 6 to 54 blast holes and 4 to 30 delays for each detonation event. The Corps needs the option of setting off multiple shots per hole and multiple delays to prepare the substrate for dredging. After blasting, the substrate would be dredged and placed in the Miami Harbor Ocean Dredged Material Disposal site or used to construct seagrass and reef mitigation projects. Blasting operations would occur during daylight hours, although other related activities could occur during day or night. The Corps does not expect to take marine mammals incidental to drilling the blast holes or dredging the substrate because, in 2005, dolphins did not avoid the drilling and dredging operations and did not appear to be taken by those activities.

The Service preliminarily has determined that, at most, the proposed activities temporarily would modify the behavior of small numbers of bottlenose dolphins. It also anticipates that any impact on the affected species and stocks would be negligible. The Service does not anticipate any take of marine mammals by death or serious injury and believes that the potential for disturbance will be at the least practicable level because of the proposed mitigation and monitoring measures. The measures include—

- using stemming procedures (i.e., capping each blast hole with crushed rock) to reduce the pressure wave emitted from each detonation;
- suspending blasting operations if manatees are present between 1 November and 31 March;
- monitoring for marine mammals in four types of zones: the danger zone (i.e., Level B harassment based on a temporary threshold shift [TTS] at 23 psi), exclusion zone (i.e., the danger zone plus an additional 152.4 m), safety zone (two times the size of the danger zone), and watch zone (three times the size of the danger zone);
- adjusting the four zones based on the specific blast weight of each delay;
- using a minimum of six Service-approved observers (i.e., one aerial, two vessel-based, two stationed on the drill barge, and one stationed in the most optimal observation location for that detonation event) to monitor the respective zones for marine mammals;
- monitoring for one hour prior to, during, and for 30 minutes after each detonation event, including continuous aerial monitoring;
- using delay procedures;
- using a fish scare charge (e.g. 0.5 kg) to minimize blast impacts on fish;
- conducting in-situ pressure measurements to estimate impacts of confined underwater blasting on fish;
- providing protected species sightings data to the Service's Southeast Fisheries Science Center;
- providing the blasting plan to the Florida Wildlife Commission, U.S. Fish and Wildlife Service, and the National Marine Fisheries Service for their review 30 days prior to initiation of blasting operations;

- reporting injured and dead marine mammals to the Service and local stranding network using the Service's phased approach and suspending activities, if appropriate; and
- submitting a final report.

Level B harassment thresholds and associated zones of exposure

For underwater detonations, Level B harassment is based on auditory and behavioral impacts. The Service uses dual criteria for estimating distances at which TTS, a recoverable loss of hearing sensitivity, may occur. The criteria are based on (1) a sound exposure level threshold of 182 dB re 1 μPa^2-second and (2) a peak pressure threshold of 23 psi. The Service uses a threshold of 177 dB re 1 μPa^2-second to determine when repeated sound exposure based on multiple successive explosive events could result in behavioral changes constituting Level B harassment.

The Service and Corps believe that the 23-psi threshold provides a more conservative basis for determining the range at which TTS may occur when the explosive or the potentially affected animal is near the sea surface, where the sound exposure level would be reduced but the peak pressure would not. While that may be the case most of the time, it is not clear that it covers all situations that may arise during the proposed detonation events. The Corps estimated the distances for the four types of zones based on the peak pressure of individual delays rather than on the accumulated energy of the various delay weights and number of delays that would be detonated in a given period of time (e.g., during a detonation event). For example, a detonation event could include up to 30 delays, with up to 204 kg of explosives per delay, and with all delays detonating within a total of a few seconds. Because peak pressure thresholds are instantaneous and do not incorporate a time element, the safety zones based on peak pressure do not account for the total amount of energy exposure. In contrast, thresholds for sound exposure levels are intended to account for the total energy expended in a specific area during a specific period of time.

The Service and the Army Corp state that the Level B harassment threshold of 177 dB re 1 μPa^2-second for multiple successive detonations would not apply to the proposed activities because there would be no more than two blasting events per day and the multiple delay detonations are within a few milliseconds of each other and do not last more than a few seconds in total duration per detonation event. The Commission disagrees and believes that the sizes of the various safety zones should reflect the risks posed by the detonation events; that is, they should account for the possibility of multiple delays in the detonation event. That is, the Commission does not believe that the Service can legitimately ignore the fact that a detonation may be comprised of multiple blasts and that the total sound exposure level may therefore be more significant that the instantaneous peak pressure level. In fact, the proposed detonation events are very similar to gunnery exercises (i.e., live fire bursts lasting approximately 2–3 seconds with approximately 100 exploding rounds per burst) for which the Service has used and continues to use the 177-dB re 1 μPa^2-second threshold (e.g., 76 Fed. Reg. 43267). The Service also has used and continues to use that threshold for multiple underwater detonations that are delayed on the order of seconds as well (e.g., 75 Fed. Reg. 64276). For all these reasons, the Commission believes that the Service and Corps should estimate safety

zones based on peak pressure and overall sound exposure levels, including the 182- and 177-dB re 1 μPa^2-second thresholds.

In addition, modeling of the safety zones will need to account for a considerable amount of uncertainty arising from the fact that the detonations are set off within the bottom substrate. Underwater sound propagation models generally assume that such detonations occur in open-water, which is not the case here. Because the proposed detonations would occur up to 3 m underground, the peak pressure and sound exposure level should be reduced. For peak pressure, that appears to be the case. In 2005, the Corps measured in-situ peak pressure emitted from confined detonations of delays up to 204 kg in weight. The measurements yielded a distance of 213.3 m to the 23-psi threshold. However, if a simple open-water model is used, the estimated distance to the 23-psi threshold would be 607.1 m. Whether sound exposure levels would be diminished to the same degree is not clear.

The Commission recognizes that the Corps would have six observers ready to implement delay procedures if marine mammals enter the danger and exclusion zones and that the zones are very conservative, being more than three times greater than the Level B harassment zone for the 23-psi threshold. For that reason, the Corps reduced the number of takes for which it is requesting authorization based on implementation of those mitigation and monitoring measures. Nevertheless, the Commission still must question whether those measures provide adequate protection based on sound exposure levels. To address these issues, the Marine Mammal Commission recommends that the National Marine Fisheries Service require the Army Corps of Engineers to conduct empirical sound propagation measurements during two detonation events per day using various delay weights and numbers of delays to verify that the danger and exclusion zones are sufficient to protect marine mammals from sound exposure levels, including the 182- and 177-dB re 1 μPa^2-second thresholds. If the zones are found to be too small, then the Service and Corps should adjust them accordingly. In addition, the Service and Corps should use the distances to the relevant thresholds from those empirical measurements to estimate the number of takes for subsequent incidental harassment authorizations. Finally, because the Corps requested only a limited number of takes, the Commission further recommends that the Service require the Army Corps to suspend all activities if the authorized number of takes is reached.

Please contact me if you have questions about our recommendations or rationale.

Sincerely,

Timothy J. Ragen

Timothy J. Ragen, Ph.D.
Executive Director