10 July 2012

Naval Facilities Engineering Command, Pacific
Attn: HSTT EIS/OEIS Project Managers, EV 21 CS
1220 Pacific Highway, Building 1
San Diego, CA 92132-5190

Dear Sir or Madam:

The Marine Mammal Commission, in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Navy's Draft Environmental Impact Statement/Overseas Environmental Impact Statement (DEIS) for training and research, development, test, and evaluation activities conducted from January 2014–January 2019 within the Hawaii-Southern California Training and Testing study area (77 Fed. Reg. 27743). The DEIS discusses the impacts of those activities on marine mammals in the central North Pacific Ocean. Based on its review, the Commission provides the following recommendations and rationale.

RECOMMENDATIONS

The Marine Mammal Commission recommends that the Navy—

- revise the DEIS by expanding the range of alternatives under consideration to include at least one with lower levels of training and testing activities. Doing so is particularly important at this time when decision-makers may be faced with the choice of reducing the Navy's budget and, if they do so, they should be well informed about the environmental consequences of the various decisions that they might make;
- revise the discussion of North Pacific right whales by (1) moving it from the section on species unlikely to be found in the study area (i.e., 3.4.1.1) to the section discussing other marine mammals in the study area (i.e. section 3.4.2) and (2) expanding it to provide a more complete review of their status and threats;
- undertake research to determine if North Pacific right whales use or regularly migrate through Navy training and testing areas in the Pacific during fall and winter months—that research should include satellite telemetry studies to identify the migratory routes and overwintering areas of whales using summer feeding grounds in the Southeast Bering Sea and passive acoustic monitoring to detect right whale vocalizations in the Hawaii and southern California training and testing areas;
- adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB), if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012);
- explain why Kastak et al. (2005) data were used as the basis for explosive thresholds in pinnipeds and specify the extrapolation process and factors used as the basis for associated TTS thresholds;

- provide detailed information regarding how it determined marine mammal takes that occur when multiple types (i.e., acoustic, explosive, and non-explosive impulsive) of sound-producing sources of varying frequencies (i.e., low, mid, and high) are used simultaneously;
- use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and expended munitions, ordnance, and other devices) rather than using simple probability calculations;
- provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals;
- use passive and active acoustics, whenever practicable, to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound;
- cease the use of its sound sources (including explosive activities that do not use time-delay firing devices) and not reinitiate them for periods at least as long as the maximum dive times of the species observed (if identified to species) or likely to be encountered (if species identification is uncertain), after the sighting of one or more marine mammals within or about to enter a mitigation zone;
- adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate explosives; and
- revise its DEIS by (1) including in its cumulative impacts analysis all potential risk factors, whether they are deemed individually significant or negligible and (2) describing the specific details needed for the reader to evaluate the utility of the Navy's conceptual framework for its cumulative impacts analysis.

RATIONALE

The Navy proposes to conduct testing and training activities along the coast of southern California and Hawaii, the transit lanes between, and associated pierside locations from January 2014–January 2019. The activities would involve the use of low-, mid-, high- and very high-frequency sonar, weapons systems, explosive and non-explosive practice munitions and ordnance, high-explosive underwater detonations, expended materials, vibratory and impact hammers, airguns, electromagnetic devices, high-energy lasers, vessels, underwater vehicles, and aircraft.

The no action alternative

In this and several prior environmental impact statements for various range complexes, the Navy uses the term "no action" to mean continued use at the current level. The Navy cites guidance from the Council on Environmental Quality as the basis of its selection of this baseline as the no action alternative against which other alternatives are compared. The Council on Environmental Quality has published guidance (http://ceq.hss.doe.gov/nepa/regs/40/1-10.HTM) that posits two alternative interpretations of what constitutes no action. The first is that the action would not take place at all. Under this alternative, the impacts of the other alternatives would be assessed against not conducting any training or testing activities. As characterized by the Navy (page 2-62), the

second interpretation "allows the No Action Alternative to be thought of in terms of continuing with the present course of action until that action is changed."

The referenced guidance states that—

> The first situation might involve an action such as updating a land management plan where ongoing management programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. *In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development.* (Emphasis added)

The Navy has chosen to use a continuation of current activities as the no action alternative. The Commission understands that choice and considers it reasonable as long as the environmental impacts of all major current activities have been assessed appropriately. However, the Commission must question the selection of the other alternatives because, as a set, they do not satisfy the requirement under the applicable guidance that the DEIS consider management of both greater and lesser intensity. Therefore, the Marine Mammal Commission recommends that the Navy revise the DEIS by expanding the range of alternatives under consideration to include at least one with lower levels of training and testing activities. Doing so is particularly important at this time when decision-makers may be faced with the choice of reducing the Navy's budget and, if they do so, they should be well informed about the environmental consequences of the various decisions that they might make.

Marine mammal occurrence

Sections 3.4.1 and 3.4.2 in the DEIS are very well drafted generally. Those sections include relevant, up-to-date, and accurate information on most species of marine mammals. However, the Navy assumed that North Pacific right whales would be unlikely to occur in either the Hawaii or Southern California study areas. It stated that the presence of North Pacific right whales in the study area is extremely low, as they have been sighted only rarely in the Bering Sea and Gulf of Alaska in recent years. Although sightings of right whales in the study area are rare, this may be due to the small size the North Pacific right whale population rather than a lack of importance of the area as habitat for the species. In recent years, a few North Pacific whales have been seen in the southeast Bering Sea every summer since 1997 when regular efforts to look for them began (Wade et al. 2011). Those sightings indicate that the southeast Bering Sea is an important summer feeding area for the small number of remaining whales. The whales' winter habitat, however, remains unknown and requires further research to identify.

All other right whale populations whose winter habitats are known make annual migrations between summer high-latitude feeding grounds and lower-latitude calving grounds. That being the

case, right whales feeding in the summer in the southeastern Bering Sea and along the Kurile Islands are likely to migrate to lower latitudes in the winter. Rare as they may be, sightings of right whales in Hawaiian waters indicate that this area may be important for reproductive purposes or at least as part of a migratory corridor. Such habitat use patterns are supported by photographs matching an individual right whale in Hawaii and the southeast Bering Sea in 1996 (Kennedy et al. 2011). Therefore, the DEIS should be revised to note that although their occurrence around Hawaii is uncertain, waters off Hawaii could provide important migratory and winter habitats for North Pacific right whales. Accordingly, the Marine Mammal Commission recommends that the Navy revise the discussion of North Pacific right whales by (1) moving it from the section on species unlikely to be found in the study area (i.e., 3.4.1.1) to the section discussing other marine mammals in the study area (i.e. section 3.4.2) and (2) expanding it to provide a more complete review of their status and threats. Given the extremely endangered status of the North Pacific right whale and the possibility that the Pacific study area may include vital habitat for the species, the Marine Mammal Commission also recommends that the Navy undertake research to determine if North Pacific right whales use or regularly migrate through Navy training and testing areas in the Pacific during fall and winter months—that research should include satellite telemetry studies to identify the migratory routes and overwintering areas of whales using summer feeding grounds in the Southeast Bering Sea and passive acoustic monitoring to detect right whale vocalizations in the Hawaii and southern California training and testing areas.

Criteria and thresholds

The Navy proposes to estimate takes resulting from its activities by adjusting received sound levels at different frequencies based on the hearing sensitivity of various groups of marine mammals at those frequencies. The adjustments are based on "weighting" functions derived by Southall et al. (2007) and Finneran and Jenkins (2012; type I and type II weighting functions, respectively). Type I weighting functions (see Figure 1 in Southall et al. 2007) are flat over a wide range of frequencies and then decline at the extremes of the animal's hearing range. Type II weighting functions (Finneran and Jenkins 2012) are used only for cetaceans and combine the precautionary type I curves developed by Southall et al. (2007) with equal loudness weighting functions derived from empirical studies with bottlenose dolphins (Finneran and Schlundt 2011).

The Commission considers the theory behind those weighting functions to be sound. However, the amplitudes of the final type II weighting functions appear to have been shifted, lowering the sensitivity at all frequencies by roughly 16–20 dB (compare Figures 2 and 6 of Finneran and Jenkins (2012)). For sonar-related activities Finneran and Jenkins (2012) reduced the acoustic thresholds for low- and mid-frequency cetaceans by 16.5 dB (presumably to account for the amplitude decrease in the type II weighting functions), but it appears that they did not apply a similar adjustment of 19.4 dB for high-frequency cetaceans. Because data are lacking for TTS thresholds for high-frequency cetaceans exposed to acoustic (i.e., tonal) signals, they appear to add a 6-dB correction factor to the TTS threshold derived from non-explosive impulsive sources (i.e., airguns) based on the method outlined in Southall et al. (2007). However, the Commission's understanding is that Southall et al. (2007) did not use the 6-dB factor to extrapolate between impulsive and acoustic thresholds, but rather to estimate PTS thresholds from TTS thresholds based on peak pressure levels. In addition, it is unclear how the explosive thresholds (i.e., for underwater detonations) were adjusted downward to account for the amplitude decrease in the type II weighting

functions. If those thresholds were not adjusted by the appropriate amplitude factor, the Navy may have underestimated takes of marine mammals. To address these concerns, the Marine Mammal Commission recommends that the Navy adjust all acoustic and explosive thresholds for low-, mid-, and high-frequency cetaceans by the appropriate amplitude factor (e.g., 16.5 or 19.4 dB), if it intends to use the type II weighting functions as depicted in Figure 6 of Finneran and Jenkins (2012).

For determining TTS thresholds for pinnipeds for underwater detonations, the Navy used data from Kastak et al. (2005) and extrapolation factors from Southall et al. (2007). Kastak et al. (2005) estimated the average sound exposure level for onset-TTS for pinnipeds exposed to octave-band underwater sound centered at 2.5 kHz (i.e., mid-frequency sound). However, underwater detonations produce broadband sound in the low-frequency range. The Commission recognizes that Kastak et al. (2005) may be the only available data, but those data may not provide an appropriate basis for estimating those thresholds. Furthermore, the extrapolation factors from Southall et al. (2007) were not stated specifically in the Navy's analysis for underwater detonations, but it appears that they used 6 dB. As noted in the previous paragraph, Southall et al. (2007) seem to use 6 dB as the extrapolation factor for determining PTS thresholds from TTS thresholds based on peak sound pressure levels, not for extrapolating from acoustic to explosive thresholds. Thus, the Commission is unsure why thresholds based on octave-band mid-frequency sound were used for underwater detonations and what extrapolation factors were used and why. Therefore, the Marine Mammal Commission recommends that the Navy explain why Kastak et al. (2005) data were used as the basis for explosive thresholds in pinnipeds and specify the extrapolation process and factors used as the basis for associated TTS thresholds.

Modeling methods

Some of the Navy's activities involve the simultaneous use of multiple source types (i.e., acoustic, explosive, non-explosive impulsive) that generate sound within various frequency bands (i.e., low, mid, and high). To account for activities involving those sources, the Navy has proposed to sum all sound exposure levels received by an animal in each frequency band. However, the DEIS did not describe how the Navy would sum the sound exposure levels from multiple source types (e.g., acoustic vs. explosive). It also did not explain how the various thresholds for those different source types would be prioritized and applied. In such cases with multiple source types, a simple summation of sound exposure levels may not necessarily estimate takes accurately.

In addition, the Navy used three different types of propagation models: the Comprehensive Acoustic System Simulation/Gaussian Ray Bundle model for acoustic sources, Reflection and Refraction in Multilayered Ocean/Ocean Bottoms with Shear Wave Effects model for explosive sources, and the Range-Dependent Acoustic Model for non-explosive impulsive sources. The DEIS and supporting technical documents did not provide (1) information regarding how the Navy integrated propagation of sound from those three models into its effects model and (2) details regarding how sound exposure levels would be summed. Again, it is not clear whether a basic summation of those sound exposure levels is appropriate. If the Navy used some other algorithm for this summation, it should explain that algorithm. For all of these reasons, the Marine Mammal Commission recommends that the Navy provide detailed information regarding how it determined marine mammal takes that occur when multiple types (i.e., acoustic, explosive, and non-explosive

impulsive) of sound-producing sources of varying frequencies (i.e., low, mid, and high) are used simultaneously.

The Navy also estimated the probability of vessels, expended munitions, and non-explosive materials (e.g. sonobouys) striking a marine mammal. The Navy's method for determining those strike probabilities was based on simple probability calculations. For example, it used a Poisson model to estimate the probability of ship strikes based on the historical rate of ship strikes. Although the use of the Poisson model is not unreasonable for modeling the occurrence of rare events, such as a ship striking a marine mammal, the assumption that the encounter rate will remain the same is questionable if the Navy increases the number of training and testing activities or if the abundance and distribution of marine mammals change. Such an approach may be appropriate for the no action alternative but is clearly deficient for assessing impacts of alternatives 1 and 2.

To estimate the probability of spent munitions or non-explosive materials striking marine mammals, the Navy simply compared the aggregated footprint of some specific marine mammal species with the footprint of all objects that might strike them (DEIS Appendix G). Both of those were based only on densities of marine mammals in the action area and expected amount of materials to be expended within a year in those areas. By combining marine mammal densities and those activities over space and time into a single calculation sequence, the Navy provided only a crude estimate of strike probabilities for the "average" condition. Unfortunately, neither marine mammals nor Navy activities are distributed homogeneously in space or time. The Commission does not understand why the Navy did not incorporate spatial and temporal considerations to make its take estimation procedure more realistic biologically. The Navy's model for determining takes of marine mammals from sound-producing activities can account for moving sound sources and marine mammals. In that model, the Navy could adjust the data collected by the animat dosimeters from received sound level to a close approach distance and estimate strike probabilities more realistically. The Marine Mammal Commission recommends that the Navy use its spatially and temporally dynamic simulation models to estimate strike probabilities for specific activities (i.e., movements of vessels, torpedoes, unmanned underwater vehicles and expended munitions, ordnance, and other devices) rather than using simple probability calculations.

Mitigation and monitoring measures

Many of the proposed activities involve mitigation measures that currently are being implemented in accordance with previous environmental planning documents, regulations, or consultations. Most of the current mitigation zones for activities involving acoustic (e.g., mid- and high-frequency active sonar) or explosive sources (e.g., underwater detonations, explosive sonobuoys, surface detonations) were designed to reduce the potential for onset of TTS. For the proposed DEIS, the Navy revised its acoustic propagation models by updating hearing criteria and thresholds and marine mammal density and depth data. Based on the updated information, the models predict that certain activities may have adverse effects over greater distances than previously expected. Mitigating and monitoring measures generally are less effective at greater distances and the Navy considers the costs of improving those measures unacceptably high. That is, the Navy does not believe it is feasible to prevent or mitigate TTS for every activity. For that reason, it proposes to base its mitigation zones for each activity on avoiding or reducing PTS.

Table 5.3-2 in the DEIS lists the Navy's predicted distances or ranges over which PTS might occur and recommended mitigation zones. The table categorizes sound sources by type (e.g., MF1:SQS-53 mid-frequency active hull-mounted sonar) and does not include all sources, but rather includes for each category (or bin) the average and maximum distances from the sound source at which PTS could be expected to occur. Chapter 3 of the DEIS also includes tables listing such ranges. However, in Chapter 3, the tables include only a subset of the proposed activities (6 of the 13 explosive activities analyzed) and the average rather than maximum ranges (see Tables 3.4-15). In addition, the DEIS does not provide the ranges to PTS for acoustic sources for more than one ping (Table 3.4-9), as it does for TTS (i.e., 1, 5, and 10 pings; Tables 3.4-10). Instead, the DEIS simply assumes that marine mammals would not maintain a nominal speed of 10 knots parallel to a ship and thereby receive sound from more than a single ping. Absent this kind of information, the DEIS process is not fully transparent and the Commission and public cannot comment on the appropriateness of the proposed mitigation zones. To address those shortcomings in the DEIS, the Marine Mammal Commission recommends that the Navy provide the predicted average and maximum ranges for all criteria (i.e., behavioral response, TTS, PTS, onset slight lung injury, onset slight gastrointestinal injury, and onset mortality), for all activities (i.e., based on the activity category and representative source bins), and all functional hearing groups of marine mammals.

The DEIS notes that the use of observers (lookouts) would increase the likelihood of detecting marine mammals at the surface, but it also notes that the value of visual monitoring is limited and could not be relied on to avoid all impacts to all species. The Commission agrees and has made numerous recommendations to the Navy to characterize the effectiveness of visual observation. Importantly, the Navy is now working with collaborators at the University of St. Andrews to study observer effectiveness. The Commission believes those studies will be very useful once completed.

However, until the results are available, the Commission also believes that the Navy should supplement its visual monitoring efforts with other measures rather than simply reducing the size of the zones it plans to monitor. The DEIS does propose to supplement visual monitoring using passive acoustics during activities that generate impulsive sounds (i.e., primarily for explosives), but does not propose the same during the use of (non-impulsive) low-, mid-, and high-frequency active sonar. In contrast, the Navy uses visual, passive acoustic, and active acoustic monitoring during Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar activities to augment its mitigation efforts over large areas. It is not clear why the Navy is not proposing to use those same monitoring methods for the other activities described in the DEIS. To ensure effective monitoring, the Marine Mammal Commission recommends that, whenever practicable, the Navy use passive and active acoustics to supplement visual monitoring during the implementation of its mitigation measures for all activities that generate sound.

In addition, the Navy proposes that, if feasible, it will cease acoustic activities (i.e., active sonar transmissions) and explosive activities (i.e., detonations that do not use time-delay firing devices) when a marine mammal is detected within the mitigation zone. Those activities would resume when the animal is "thought to have exited" the mitigation zone. The meaning of "thought to have exited" is not clear, and a more definitive criterion is needed to clarify when activities might be resumed. The current mitigation measures allow the Navy to resume mid-frequency active sonar activities only when a sighted marine mammal has not been resighted for 30 minutes or the vessel

has transited more than 2,000 yards beyond the location of the last detection. Those measures also stipulate that explosives cannot be detonated unless a sighted marine mammal has not been resighted for 30 minutes, but those measures do not stipulate a distance because those detonations occur at a fixed location. In any case, the Commission must question all of those approaches if the position of the marine mammal is unknown. That is, the key considerations driving those measures are the relative positions of the marine mammal and the sound source. Their relative positions over time are best estimated as a function of their positions when the marine mammal was first sighted, the speed and heading of the vessel, and the speed and heading of the marine mammal. If the vessel and marine mammal are moving in opposite directions, then the marine mammal may leave the mitigation zone relatively quickly. However, if they are moving in the same direction, then the marine mammal may remain in the mitigation zone for a prolonged period. Unless a sighted marine mammal is resighted leaving or outside the safety zone, the Navy should not resume its activity until it has had a reasonable chance of verifying that it can do so safely. The delay should take into account that (1) a marine mammal may remain underwater where it is not visible, (2) it may change its heading and speed in response to the vessel, and (3) using visual observation alone it is not possible to determine a marine mammal's position relative to the vessel or sound source after the initial sighting, unless the marine mammal surfaces again and is observed.

The dive time of a sighted marine mammal is a central consideration whenever mitigation measures depend on visual observation. For small cetaceans, the Commission has recommended a delay of at least 15 minutes because their dive times are shorter and generally occur within that timeframe. For some mysticetes and large cetaceans, the proposed 30-minute pause may be inadequate, sometimes markedly so. Sperm whales and beaked whales, in particular, may remain submerged for periods far exceeding 30 minutes. Blainville's beaked whales dive to considerable depths (> 1,400 m) and can remain submerged for nearly an hour (Baird et al. 2006, Tyack et al. 2006). In addition, observers may not detect marine mammals each time they return to the surface. Even under ideal conditions detection can be a problem, particularly for cryptic species such as beaked whales. Barlow (1999) found that "[a]ccounting for both submerged animals and animals that are otherwise missed by the observers in excellent survey conditions, only 23 percent of Cuvier's beaked whales and 45 percent of *Mesoplodon* beaked whales are estimated to be seen on ship surveys if they are located directly on the survey trackline." Thus, depending on the species involved, short-term visual monitoring may not be adequate to confirm that a sighted marine mammal has left the mitigation zone. To address this problem, the Marine Mammal Commission again recommends that, after the sighting of one or more marine mammals within or about to enter a mitigation zone, the Navy cease the use of its sound sources (including explosive activities that do not use time-delay firing devices) and not reinitiate them for periods at least as long as the maximum dive times of the species observed (if identified to species) or likely to be encountered (if species identification is uncertain).

For explosive activities that do involve time-delay firing devices, the Navy proposes to use a 915-m mitigation zone, which is smaller than the 1,326-m zone currently used. The current zone was based on a 20-lb net explosive weight charge, a time delay to detonation of 10 minutes, an average swim speed for dolphins of 3 knots, and an added buffer to account for marine mammals that may be transiting at speeds faster than the average. The Commission has commented on this matter in numerous letters and continues to believe that the use of 3 knots as an average swim speed is inaccurate and inadequate, even with an added buffer to account for animals swimming faster than 3

knots. A simple calculation indicates that if a marine mammal swims at just 4 knots for the duration of the time-delay(10 minutes), the size of the mitigation zone would be inadequate, whether at 1,326 or 915 m. Importantly, many marine mammals are capable of swimming, and regularly do swim, much faster than 4 knots, especially for short periods. The average swim speed for bottlenose dolphins, for example, ranges from 2.6 to 8 knots (Lockyer and Morris 1987, Mate et al. 1995, Ridoux et al. 1997). In addition, pelagic dolphins swim faster than coastal species. The average swim speed for captive Pacific white-sided dolphins is 12.4 knots (Rohr and Fish 2004). Wild long-beaked common dolphins have been observed swimming at an average of 8.1 knots and captive individuals of that species have been observed swimming at an average of 13.0 knots (Rohr et al. 1998). In addition, the average swim speed for wild pantropical spotted dolphins is 6.9 knots (Au and Perryman 1982). Because many of the marine mammal species in the study area can and generally do swim faster than 3 knots, the mitigation zone proposed by the Navy is simply inadequate and poses a risk of additional injury and mortality, as was recently observed at the Silver Strand Training Complex. To address this concern, the Marine Mammal Commission recommends that the Navy adjust the size of the mitigation zone for mine neutralization events using the average swim speed of the fastest swimming marine mammal occurring in the area where time-delay firing devices would be used to detonate explosives.

Cumulative Impacts

The Navy's analysis of cumulative impacts on marine mammals extends the evaluations in Chapter 3 of individual and multiple sound-producing activities under the various alternatives. The Navy's analytical framework is commendable, but its description and use of the framework in the DEIS falls short in several important respects.

First, the DEIS does not include the detailed information needed to assess the reliability of the framework. Without that information, the framework is a conceptual model only and the reader does not have sufficient information to judge its utility and, therefore, the soundness of the Navy's decision-making based on that model.

Second, the DEIS indicates that the Navy omitted stressors or activities that it found to have a negligible impact on an individual species from its overall cumulative impact analysis. Doing so is completely counter to the idea behind a cumulative impact assessment. The Council for Environmental Quality's regulations for implementing the National Environmental Policy Act point out that "[c]Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). In essence, the approach used in the DEIS defeats the purpose of a cumulative impacts analysis.

To address these fundamental concerns, the Marine Mammal Commission recommends that the Navy revise its DEIS by (1) including in its cumulative impacts analysis all potential risk factors, whether they are deemed individually significant or negligible and (2) describing the specific details needed for the reader to evaluate the utility of the Navy's conceptual framework for its cumulative impacts analysis.

Please contact me if you have questions concerning the Commission's recommendations or rationale.

Sincerely,

Timothy J. Ragen, Ph.D.
Executive Director

cc: P. Michael Payne

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