

Open Water Peer Review Panel Monitoring Plan Recommendations Report February 2013

The Open Water Peer Review Panel reviewed British Petroleum's (BP's) marine mammal monitoring plan for its proposed three-dimensional (3D) ocean bottom cable (OBC) seismic survey in the Prudhoe Bay area, in the Beaufort Sea, during the open water season in 2013. The purpose of this survey is to collect "current, high resolution seismic data to image the reservoirs in the Prudhoe Bay Unit." BP's survey effort will involve as many as three seismic vessels, multiple support vessels (approx. 15, included those for cable deployment and recovery), geophysical equipment, on-shore equipment, camps, trucks, helicopter, and buses. Seismic survey sources will be arrays of eight airguns in two configurations, a single array with a total of 16 guns (320 in³; 212 dB re 1 μ Pa rms), or two arrays with a total of 16 guns (640 in³; 223 dB re 1 μ Pa rms). To acquire more data per unit time, two vessels will simultaneously operate arrays in flip-flop mode such that shot intervals will be 4-5 seconds. The actual seismic survey will occur in shallow and very shallow waters (1 – 14 m) on the shore side of Cross Island and Northstar Island. The 2013 activities will occur between 1 July and 30 September 2013, with data acquisition only occurring in July and August in order to mitigate potential impacts to migrating bowhead whales and the Nuiqsut subsistence hunters at Cross Island. However, a marine mammal survey vessel will conduct periodic observations offshore of the barrier islands after 25 August. BP's monitoring plan for the 2013 open water season is similar in many ways to BP's 2012 marine mammal monitoring and mitigation plan (4MP) in Simpson Lagoon. Given this similarity between the 2012 and 2013 plans and the results from the 2012 Simpson Lagoon monitoring effort, the panel's comments here often refer to the detailed comments provided in the 2012 panel reports for the Simpson Lagoon operation.

BP is requesting authorization for non-lethal, incidental "level B harassment" of marine mammals during its proposed OBC seismic survey in the Prudhoe Bay, in the Beaufort Sea, for the period July 1 – September 30, 2013¹. They acknowledge the potential for disturbance from a) pulsed sounds from their seismic airgun activities and b) the physical presence of vessels in the area (see p. 22 of the Incidental Harassment Authorization [IHA] application).

The panel notes that this document does not, but should be modified to explicitly acknowledge the potential for disturbance from each type of activity and from the cumulative combination of multiple types of sound sources that are part of the project.

The primary objectives of BP's 4MP (see page 51 of their IHA application) include:

- 1) Visual monitoring (two Protected Species Observers [PSOs] per seismic vessel) to:
 - a. Record the visual occurrence of marine mammals, within the 180-190 dB safety zone and anywhere around each operating seismic vessel, in order to estimate the number of animals potentially affected;
 - b. Compare the distance and distribution of marine mammals relative to a source vessel at times with and without seismic activity;

¹ On page 38, the document reads: "plans call for the completion of data acquisition prior to 25 August 2012". We assume this should refer to 2013.

- c. Obtain data on the behavior and movement patterns of marine mammals observed to compare those times with and without seismic activity.
- 2) Acoustic monitoring to:
 - a. Conduct sound source verifications for each of the three different seismic array configurations. This involves measurement of received sound levels as a function of distance from each of the airgun sound source configurations (within 72 h after completion of the sound source verification field work) using a standard protocol. These data will be used to calculate and validate estimates of airgun source levels and sound source characteristics;
 - b. Measure received sound levels as a function of distance for each of the support vessels [the panel strongly recommends that this include the seismic vessels without airguns operating] and use to calculate estimates of each vessel's sound level and sound source characteristics;
 - c. Establish safety zones around each seismic survey vessel in order to implement mitigation measures during seismic operations.
- 3) Reports to NMFS on:
 - a. Preliminary sound source verification results within 14 days after completion of the tests;
 - b. All relevant monitoring and mitigation results within 90 days after the end of the seismic survey.

In this report, the panel members answer the questions set forth by the National Marine Fisheries Service's Office of Protected Resources (OPR) and provide additional recommendations. Both answers and recommendations are based on the general monitoring requirements outlined in the Marine Mammal Protection Act (MMPA) implementing regulations and further guidance provided by OPR, which were included in the instruction document and are provided below at the end of this document.

Questions

I. Will the applicant's stated objectives effectively further the understanding of the impacts of their activities on marine mammals and otherwise accomplish the goals stated in the applicant's marine mammal monitoring and mitigation plan? If not, how should the objectives be modified to better accomplish the goals above?

For Objective 1 (visual monitoring), the panel notes that the monitoring and mitigation plans will not necessarily further the understanding of impacts inasmuch as these measures are intended to avoid impacts in a nearshore area where sightings of marine mammals are expected to be rare. Monitoring and mitigation are closely related functions and some information from mitigation might provide some insights into impacts on marine mammals if PSOs record relevant data on marine mammals while implementing mitigation measures.

As stated in the 2012 panel report for BP's marine mammal monitoring plan for its proposed OBC seismic survey in Simpson Lagoon, in the Beaufort Sea, PSOs are subject to a number of limitations that impair their ability to collect the necessary marine mammal occurrence

information. For example, PSOs cannot observe and record animals potentially affected at distances within the “deep water” area within which received levels are expected to be in the 160-170 dB range (see Table 5). Similarly, because PSOs are only on the source vessels, BP will not be able to assess potential impacts of the numerous support vessels. The manner in which the PSOs (or analysts working with their data) correct the recorded data for these and other shortcomings will determine the reliability of the final take estimates.

For Objective 2, the panel notes that the proposed acoustic monitoring will provide valuable information on the physical acoustic signatures of the three types of seismic systems proposed for use (one airgun array, two airgun arrays, and the mitigation airgun) in this very shallow water situation. It will also collect valuable physical acoustic data on support vessels, as needed. These data are important for establishing the various sound fields generated by each of the different project-related sound sources, and for beginning to predict the sound fields to which animals would be exposed and therefore the number of animals potentially affected by a sound-generating activity.

The panel also notes that there are several existing, yet important issues in the application related to acoustic exposure that are either ambiguous or simply not included or considered in the document. These include the need to estimate cumulative noise fields from combinations of all types of sound generating activities. It would also be valuable that such estimates enable readers of the document the opportunity to gain a realistic sense of how those cumulative noise fields would vary over time as different numbers and types of activities occurred. Although the panel recognizes that predicting physical acoustic fields in this particular area is fraught with difficulties and that the overall likely biological impact of the total project is relatively small, given where it will occur and that very few animals are expected to occur in the project area, we recommend that some attempt be made to produce a quantitative assessment of the cumulative noise field under a most-likely or typical operational scenario and a worst-case operational scenario.

The panel noted that the list of stated objectives does not include estimation of the numbers of animals exposed to operational acoustic activities either as a result of sounds from the cumulative noises from their collective activities (e.g., seismic airgun, support vessels). Given the extensive complexity of this operation, this would seem to be an imperative task that should be a specific objective. Although the document’s Section 14 states BP’s commitment to working with others to address the issues of cumulative noise, it would seem imperative that this issue be address explicitly in this application relative to this 2013 activity.

For Objective 3, the panel believes that this standard reporting schedule is appropriate and realistic.

II. Can the applicant achieve the stated objectives based on the methods described in the plan?

For Objective 1a and 1b, the panel noted and appreciated BP’s response to the 2012 panel’s concern regarding the limitations of having only one PSO per seismic vessel. The 2013 plan

states that there will be two PSO's per seismic vessel, only one of which would be on watch. This doubling of PSO capacity addresses some of the panel's former concerns. However, this does not satisfy the panel's recommendation that each seismic vessel should have at least two PSOs on duty at any given time. As in the panel report for BP's 2012 draft IHA application, the panel does not believe that a single PSO can adequately view the entire safety zone around a seismic vessel to determine when shutdowns or power-downs are needed. Although the PSO on watch will be instructed to observe from a location with the "best view around the vessel" and to "scan the area around the vessel systematically," he or she likely will be stationed at the front of the vessel, where their primary view will be the area immediately in front of the boat. If that is the case, he or she likely will not be able to effectively watch the area behind the vessel nearer the airgun array, which is the area in which an animal would receive the highest sound levels.

As stated last year, another difficulty with having only one PSO on duty at any given time is that he or she must both observe and record data. Marine mammals are missed when a single PSO is recording data and there is no one else to maintain the continuity of the visual watch. PSO data will require some correction for the biases introduced by the limitations of having a single PSO, but the reliability of the correction factors is unknown. As stated last year, at best, the data will provide a basis for estimating the minimum number of marine mammals exposed to airgun sounds, but the closeness of that minimum estimate to the actual number exposed will be uncertain.

For Objective 1c, the panel noted that, given the context under which PSO observations of marine mammal behaviors and movement patterns are conducted, those observations will be relatively rare, and an observer's ability to interpret context will be limited. Therefore, the sample size of such observations will be low, which will limit the interpretation of any comparative evaluation between "seismic" and "non-seismic" operating conditions. Furthermore, given that BP likely will have two airguns arrays operating in the area at the same time, it seems unlikely that both arrays will be inoperable or shut down for periods of time long enough to be considered non-seismic. Thus, BP may be able to collect only small amounts of data during conditions in which animals are not affected by seismic sounds. The panel believes it would be a mistake to consider data collected during brief interludes when no airguns are firing as a legitimate baseline for comparisons with data collected when airguns are firing. The panel noted that the definition of a non-seismic operating condition needs to be explicitly stated in the application.

For Objective 2, the panel noted that the proposed acoustic monitoring methods should allow for the collection of information on the physical acoustic signatures for the three types of seismic systems proposed and for each of the support vessels. The present application does not provide enough detail on the basis by which a decision would be made regarding which support vessels would require sound source verification and for which vessels a proxy signature is available and adequate. The present application also does not provide enough detail on the sound source verification specifications that will be used to establish an adequate data set for source characterization. That is, what types and amounts of data and what levels of analyses are necessary to meet a sound source verification requirement?

III. Are there technical modifications to the proposed monitoring techniques and methodologies proposed by the applicant that should be considered to better accomplish their stated objectives?

This question only applies to Objective 1.

The panel appreciates BP's modification to its field procedures after the 2012 panel review for Simpson Lagoon and notes that these improved the efficacy of a PSO. As recommended in the 2012 panel review, this year's panel recommends that PSOs follow a predetermined regime for scanning that is based on the relative importance of detecting marine mammals in the near- and far fields.

PSOs also need training in documenting the behaviors of marine mammals. Some panel members had the impression that past PSOs were encouraged to document thoroughly the behaviors of marine mammals, essentially conducting "focal follows" of individual animals. The panel also had the impression that previously used behavioral categories were too detailed and complicated. Although detailed observations of behavior may be valuable in some contexts, in this context, where only a single PSO is on watch at a time, PSOs should simply record the primary behavioral state (i.e., traveling, socializing, feeding, resting, approaching or moving away from vessels) and relative location of the observed marine mammals, and not try to precisely (and potentially erroneously) determine the behavior or the context.

PSOs often focus solely on marine mammals in the water, but in doing so they may fail to document observations that might provide insight into the effects of seismic surveys. Because of the location of BP's proposed survey, most (if not all) of the marine mammals observed in the lagoon will be pinnipeds. It is feasible that the surveys may alter the hauling out patterns of pinnipeds, so observations of all pinnipeds on land and in the water should be recorded.

PSOs on the seismic vessels will be responsible for observing and recording data. Given that a PSO's ability to make observations is compromised when he or she is recording data, BP should work to develop a means by which observers record data with as little impact on observation time as possible.

BP has proposed to compare relative distributions and behaviors of marine mammals during periods of seismic vs. non-seismic activity. Because BP will have two seismic source vessels operating simultaneously in the survey area, it seems likely there will be at least one airgun array operating most of the time. As stated above under question 2, the document does not define what constitutes a seismic vs. non-seismic activity period, or how BP will comparatively evaluate impacts on marine mammal distribution from seismic operations. The panel recommends that if and when there is an extended period when neither airgun is operating, then PSOs will continue to stand watch and collect visual observation data.

The 2012 review panel discussed the difficulties of using PSO data to estimate takes and many of the same concerns remain. For example, PSO data collection will be lacking or compromised during darkness or inclement weather. Estimation of the actual level of takes will need to account for other factors too, such as water depth.

IV. Are there techniques not proposed by the applicant (i.e., additional monitoring techniques or methodologies) that should be considered for inclusion in the applicant’s monitoring program to better accomplish their stated objectives?

BP’s main monitoring technique is to use PSOs on source vessels. They also intend to conduct sound source verifications. It seems that BP does not intend to have a marine mammal survey vessel outside the barrier islands as in the 2012 Simpson Lagoon work. They have not proposed to use aerial surveys and acoustic monitoring of marine mammals. Although both techniques can improve a monitoring plan, their efficacy and benefit for this project is most likely rather low.

Although aerial surveys would improve the monitoring plan, continuous surveys should not be necessary. As just noted, they may be helpful for pre-, during, and post seismic survey comparisons. In addition, aerial surveys would be helpful for monitoring marine mammals that may be affected in the far-field. However, the panel recognized that an aerial survey might not be necessary given the timing and location of BP’s seismic surveys. BP will conduct those surveys offshore of the barrier islands prior to 25 August, when few cetaceans are likely to be in the area. After 25 August, seismic surveys will be within the barrier islands. In addition, aerial survey data collected through other programs (e.g., Bowhead Whale Aerial Survey Project, or BWASP) may be helpful in better understanding potential impacts to cetaceans in late August, September or October. NMFS should encourage BP to examine data from BWASP and other such programs to assess possible impacts from their seismic surveys.

Acoustic monitoring can also be used to improve understandings of impacts to marine mammals. Acoustic data from 2012 show that received sound levels from operational activities outside of the barrier islands are expected to be very low. As in 2012, the panel recommends some collection of passive acoustic data to augment the visual sighting data, empirically validate propagation model predictions and empirically measure cumulative noise fields under operational conditions.

Finally, the panel encourages BP to continue to develop and test observational aids to assist with visibility during night, poor light conditions, inclement weather, etc. Improvement in techniques is needed to better mitigate Level A takes and understand the nature and importance of Level B takes.

V. What is the best way for an applicant to present their data and results (formatting, metrics, graphics, etc.) in the required reports that are to be submitted to NMFS (i.e., 90-day report and comprehensive report)?

The panel believes that the best ways to present data and results are described in peer-review reports from previous years. The panel also recommends that BP should be very clear in their report about what periods are considered “seismic” and “non-seismic” for their analyses.

Monitoring Plan Requirements

The MMPA implementing regulations generally indicate that the monitoring program of each Incidental Harassment Authorization (IHA) applicant should be designed to accomplish the following: document the effects of the activity (including acoustic) on marine mammals; document or estimate the actual number and nature of takes as a result of the activity (in this case, seismic surveys or exploratory drilling programs); increase the knowledge of the affected species; or increase knowledge of the anticipated impacts on marine mammal populations. As additional specific guidance beyond that provided in the MMPA regulations, NMFS further recommends that monitoring measures prescribed in MMPA authorizations should be designed to *accomplish or contribute to one or more of the following top-level goals*:

(a) An increase in our understanding of the likely occurrence of marine mammal species in the vicinity of the action, i.e., presence, abundance, distribution, and/or density of species.

(b) An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammal species to any of the potential stressor(s) associated with the action (e.g., sound, explosive detonation, or expended materials), through better understanding of one or more of the following: 1) the action itself and its environment (e.g., sound source characterization, propagation, and ambient noise levels); 2) the affected species (e.g., life history or dive patterns); 3) the likely co-occurrence of marine mammal species with the action (in whole or part) associated with specific adverse effects, and/or; 4) the likely biological or behavioral context of exposure to the stressor for the marine mammal (e.g., age class of exposed animals or known pupping, calving or feeding areas).

(c) An increase in our understanding of how individual marine mammals respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, e.g., at what distance or received level).

(d) An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: 1) the long-term fitness and survival of an individual; or 2) the population, species, or stock (e.g., through effects on annual rates of recruitment or survival).

(e) An increase in our understanding of the effectiveness of mitigation and monitoring measures.

(f) A better understanding and record of the manner in which the authorized entity complies with the incidental take authorization and incidental take statement.

(g) An increase in the probability of detecting marine mammals (through improved technology or methodology), both specifically within the exclusion zone (thus allowing for more effective implementation of the mitigation) and in general, to better achieve the above goals.

The panel concurs that these are all useful objectives.