

Open Water Peer Review Panel Monitoring Plan Recommendations Report February 2012

The Open Water Peer Review Panel has reviewed British Petroleum's (BP's) marine mammal monitoring plan for its proposed Simpson Lagoon Ocean Bottom Cable seismic survey in the Beaufort Sea. 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.

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 above? If not, how should the objectives be modified to better accomplish the goals above?

BP plans to conduct its seismic survey primarily in Simpson Lagoon, on the shore side of barrier islands. It also will survey areas offshore of the barrier island prior to 25 August 2012, but after that will limit its survey to the lagoon 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 proposed primary monitoring method will be the use of onboard Marine Mammal Observers (MMOs).

BP has four main monitoring objectives (see page 51 of their Incidental Harassment Authorization application):

- 1) To implement mitigation measures during seismic operations;
- 2) To record marine mammal data needed to estimate the number of animals potentially affected, which will be reported to NMFS;
- 3) To compare the distance and distribution of marine mammals relative to the source vessel at times with and without seismic activity; and
- 4) To obtain data on the behavior and movement patterns of marine mammals observed and compare those at times with and without seismic activity

Objective 1 will not necessarily further the understanding of impacts inasmuch as these measures are intended to avoid impacts. However, mitigation and monitoring are closely related functions and some information from mitigation is likely to provide insights into impacts on marine mammals. That is, MMOs should be able to record relevant data on marine mammals while implementing mitigation measures.

With regard to objective 2, the proposed measures should allow collection of information needed to estimate the number of animals potentially affected. However, one question is whether the resulting estimates are reliable and later in this report the panel recommends measures needed to

evaluate the reliability of survey records. As useful as they are, MMOs are subject to a number of limitations that impair their ability to collect the necessary information. For example, MMOs cannot observe and record animals potentially affected in the far field. Similarly, because MMOs 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 MMOs (or analysts working with their data) correct the recorded data for these and other shortcomings will determine the reliability of the final take estimates.

Objectives 3 and 4 should further the understanding of BP's impacts on marine mammals to a degree. Records of distance from vessels and distribution could be helpful in this regard, but here again, these surveys are not designed to be scientifically rigorous and the information collected must be interpreted with caution. For example, some panel members expressed concern that the term "distribution" might imply that the surveys are systematic, which is not the case. Nonetheless, MMOs should be able to provide information about the distribution of marine mammals relative to the vessel, and that information could be useful. In addition, the distinction between "seismic" vs. "non-seismic" periods must be carefully defined. Presumably, "seismic" means when the airguns are firing and "non-seismic" means when they are not. However, comparing data collected during seismic versus non-seismic periods could be meaningless or even misleading if the two periods are not separated by sufficient time for animals to adjust. The panel recommends that, in the context of objectives 3 and 4, the term "non-seismic" be used to describe periods after an appropriate amount of time has elapsed after the airguns have been shut down so that lingering effects from the airguns are no longer present.

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

For objective 1, BP's implementation of its mitigation measures will be limited because its plans call for only one MMO on duty at any given time. The panel does not believe that a single MMO can view the entire safety zone to determine when shutdowns or powerdowns might be needed. The MMO likely will be stationed at the front of the vessel to view the area immediately in front of the boat. If that is the case, he or she likely will not be able to watch the area near the airgun array.

Another difficulty with having only one MMO on duty at any given time is that he/she must both observe and record data. Marine mammals could be missed when the MMO is recording data.

BP also will be limited in its ability to achieve objective 2, largely for the same reasons. A single MMO cannot observe the entire area around the vessel and he/she will be distracted when recording information. Furthermore, the MMO will not be observing during darkness and inclement weather. Thus, his/her ability to observe the entire safety zones will be compromised when he/she is on duty, and he/she will not be observing at all during other periods. MMO data will require some correction for the biases introduced by these problems, but the reliability of the correction factors is unknown. 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 objectives 3 and 4, BP will be able to obtain some information about relative distribution and behavior of marine mammals as it relates to operation of airguns. However, the proposed approach suffers from several shortcomings. BP likely will have two or three airgun arrays in operation in the same area at the same time. The airgun arrays will alternate shots between or among arrays by several seconds. It seems unlikely that all arrays will be inoperable or all shutdown at one time or for long periods of time. Thus, BP may be able to collect only small amounts of data during periods when all airgun arrays are silent. The panel further 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 the airguns are firing.

The panel also recognizes that MMOs may have conflicting objectives. They need to scan for marine mammals, record them when they are sighted, identify them if possible, and note their behavior. All of the information that could be collected under such circumstances could be useful depending on the MMO's objectives. However, if the MMO's main objectives are to determine if animals are in, or may enter, the safety zone and to document the number of animals seen for the purpose of estimating total takes, then they should be devoting as much of their time as possible with their eyes on the water. That being the case, the panel recommends that the MMOs be trained and instructed to simply record the initial behavioral state of the animal and its species identification (if it can be readily determined) and then continue monitoring the general area. The more time the observers spend scanning, the more likely they are to achieve their main objectives.

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?

The efficacy of MMOs could be improved with several approaches.

Crew members as observers: BP plans to use source vessels that have space limitations. This is the primary reason why only one MMO will be on duty at a time. Crew members should not be used as primary MMOs because they have other duties and generally do not have the same level of expertise, experience, or training as MMOs. However, they could assist the MMO by monitoring certain areas and helping to implement certain mitigation functions. For example, they could be stationed on the fantail of the vessel to observe the near field, especially the area around the airgun array and implement a rampdown or shutdown if a marine mammal enters the safety zone. If crew members are to be used as MMOs, they should go through some basic training consistent with the functions they will be asked to perform. The best approach would be for crew members and MMOs to go through the same training together. The panel recognizes that crew members may be subject to a conflict of interest but, under these circumstances, sees no alternative for improving the power of observations.

Training: BP could improve its MMO training by implementing panel recommendations from previous years. In addition, the panel discussed concerns regarding the scanning patterns of observers. The experience of panel members suggests that, left to their own discretion, observers can vary significantly in their observing habits and effectiveness. For example,

observers often spend much of their time looking through binoculars for marine mammals at some distance from the vessel. This pattern, if followed by BP's MMOs, would undermine their effectiveness when monitoring the safety zones. In fact, the MMOs should be following a predetermined regime for scanning that is based on the relative importance of detecting marine mammals in the near and far fields. Observing in both fields is necessary. The panel recognizes the tradeoffs between collecting data about marine mammal density and monitoring the near-field to implement mitigation measures, but also believes that the MMO's primary purpose should be to implement mitigation measures related to safety zones. With that in mind, the panel recommends that BP train its MMOs to follow a scanning schedule that consistently distributes scanning effort according to the purpose and need for observations. For example, the schedule might call for 60 percent of scanning effort to be directed toward the near field and 40 percent at the far field. All MMOs should follow the same schedule to ensure consistency in their scanning efforts.

MMOs also need training in documenting the behaviors of marine mammals. Some panel members had the impression that past MMOs were encouraged to document thoroughly the behaviors of marine mammals, essentially conducting "focal follows" of some 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, they should not be the main objective of the MMOs. MMOs 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. ABR Inc. has used a relatively simple suite of behavioral states for observations in the Chukchi Sea that might be helpful.

MMOs 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. Therefore, MMOs should record observations of marine mammals hauled out on barrier islands. 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 them should be recorded.

Recording data: MMOs onboard BP's seismic vessels will have the responsibility to both observe and record data. The ability of MMOs to make observations is compromised when they are recording data. BP should work with its observers to develop a means for recording data that does not reduce observation time significantly. Possible options include the use of a voice recorder during observations followed by later transcriptions, or well-designed software programs that minimize the time required to enter data. Other techniques also may be suitable.

Analyses: BP has proposed to compare relative distribution and behavior of marine mammals during periods of "seismic" vs. "non seismic" activity. Because BP will have two or three seismic source vessels operating in the survey area, it seems likely there will be at least one airgun array operating at most times. If there are few periods of time that are categorized as "non-seismic" it is not clear how BP will evaluate impacts on marine mammal distribution from seismic operations. One option would be to spend several days on the water in the

areas to be surveyed collecting pre- or post-survey data (or both) on the presence of marine mammals in the survey area. Two other options would be to conduct aerial surveys or use acoustic monitoring before, during, and after the seismic survey.

One of BP's objectives is to estimate the number of animals potentially affected as a result of the seismic survey. The panel discussed the difficulties of using MMO data to estimate takes. As mentioned above, MMO data may be lacking or compromised during darkness or inclement weather. Some panel members suggested that estimation of potential takes or exposures could be improved for times with missing or limited data through interpolation or possibly using a probability approach. For instance, for periods of fog or darkness one could use marine mammal observations obtained during a specified period of time before or after the time when visibility was restricted. Those data could be used to interpolate possible takes during periods of restricted visibility. Estimation of the actual level of takes will need to account for other factors too. Simpson Lagoon is relatively shallow and marine mammal distribution likely will be closely linked to water depth. To account for this confounding factor, depth should be continuously recorded by the vessel and for each marine mammal sighting. Water depth should be accounted for in the analysis.

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 MMOs on source vessels. They also intend to conduct sound source verifications and have a marine mammal survey vessel outside the barrier islands after 25 August. They have not proposed to use aerial surveys and acoustic monitoring of marine mammals, although both techniques could improve BP's monitoring plan.

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 may 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 also could improve understanding of impacts to marine mammals from BP's seismic surveys. BP has proposed to monitor the offshore area using their marine mammal survey vessel and a dipping hydrophone. The panel supports use of this tool and recommends that BP use the offshore vessel to monitor (periodically) the propagation of airgun sounds from within the lagoon into offshore areas. Among other things, such monitoring could be used to help verify the propagation models, especially with regard to the location of the 120 dB isopleth.

The panel also recommends additional acoustic monitoring with bottom mounted recorders. Recorders should be deployed throughout the seismic survey. One suggestion is to deploy instruments including: one at the cut, or break, between Leavitt and Spy islands at about the 5 m isobath; one north of the center of Leavitt Island at the 10 m isobath; and one off the east end of Pingok Island at the 10m isobath. The purposes of these recorders would be to help verify the propagation model results, as well as to monitor for calling marine mammals. It may be possible to evaluate calling rates relative to seismic operations or received levels of seismic sounds. Additionally, Shell will have several acoustic arrays in the general area. Those arrays will provide a basis for determining locations of calling marine mammals. NMFS should encourage BP to request data from Shell to help examine impacts of the seismic survey on the distribution of calling bowheads and other marine mammals.

The offshore marine mammal monitoring vessel also could be used for several purposes. As just described, BP could use the vessel to help monitor propagation of sounds and to deploy acoustic recorders. BP also could use MMOs on the vessel to monitor for the presence and behavior of marine mammals in the offshore area projected to be exposed to seismic sounds. Transects running perpendicular (in a square wave pattern) to the general trend of the coast and the bowhead migration may be the best way to visually monitor the area. Transects should extend to at least the 10m isobath. The eastern extent of the survey should occur about midway through Leavitt Island and the western extent of the survey could be about halfway across Spy Island. The surveys may not be suitable for assessing numbers of cow/calf pairs within the 120 dB, as has been required in previous years, but should help determine if large numbers of whales or other marine mammals pass through the offshore area. If this situation occurs, BP should consult with NMFS as to the proper action to take to mitigate impacts to large numbers of animals.

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 has only one additional recommendation in that regard. That is, BP should be very clear in their report about what periods are considered “non-seismic” for analyses.

Monitoring Plan Requirements

The MMPA implementing regulations generally indicate that 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.