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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RTID 0648-XC318

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to Geophysical Surveys Related to Oil and Gas Activities in the Gulf of Mexico

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of issuance of Letter of Authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA), as amended, its implementing regulations, and NMFS' MMPA Regulations for Taking Marine Mammals Incidental to Geophysical Surveys Related to Oil and Gas Activities in the Gulf of Mexico, notification is hereby given that a Letter of Authorization (LOA) has been issued to Shell Offshore Inc. (Shell) for the take of marine mammals incidental to geophysical survey activity in the Gulf of Mexico.

DATES: The LOA is effective from October 1, 2022, through August 31, 2023.

ADDRESSES: The LOA, LOA request, and supporting documentation are available online at: *www.fisheries.noaa.gov/action/incidental-take-authorization-oil-and-gas-industry-geophysical-survey-activity-gulf-mexico*. In case of problems accessing these documents, please call the contact listed below (see **FOR FURTHER INFORMATION CONTACT**).

FOR FURTHER INFORMATION CONTACT: Ben Laws, Office of Protected Resources, NMFS, (301) 427-8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 *et seq*.) direct the Secretary of Commerce to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival.

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

On January 19, 2021, we issued a final rule with regulations to govern the unintentional taking of marine mammals incidental to geophysical survey activities conducted by oil and gas industry operators, and those persons authorized to conduct activities on their behalf (collectively "industry operators"), in Federal waters of the U.S. Gulf of Mexico (GOM) over the course of 5 years (86 FR 5322, January 19, 2021). The

rule was based on our findings that the total taking from the specified activities over the 5-year period will have a negligible impact on the affected species or stock(s) of marine mammals and will not have an unmitigable adverse impact on the availability of those species or stocks for subsistence uses. The rule became effective on April 19, 2021.

Our regulations at 50 CFR 217.180 *et seq*. allow for the issuance of LOAs to industry operators for the incidental take of marine mammals during geophysical survey activities and prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on marine mammal species or stocks and their habitat (often referred to as mitigation), as well as requirements pertaining to the monitoring and reporting of such taking. Under 50 CFR 217.186(e), issuance of an LOA shall be based on a determination that the level of taking will be consistent with the findings made for the total taking allowable under these regulations and a determination that the amount of take authorized under the LOA is of no more than small numbers.

Summary of Request and Analysis

Shell plans to conduct a 3D ocean bottom node (OBN) survey in Garden Banks Lease Block GB555 and GB556 and the surrounding 414 lease blocks, with approximate water depths ranging from 150 to 1,975 meters (m). See Section F of the LOA application for a map of the area.

Shell anticipates using two dual source vessels, towing either low-frequency tuned pulse sources (TPS) or conventional airgun array sources. Use of the TPS is preferred by Shell, but the airgun array sources may be used if the TPS are not available, or if the TPSs fail during acquisition. The airgun array sources would consist of 32 elements, with a total volume of 5,110 cubic inches (in^3).

The TPS was not included in the acoustic exposure modeling developed in support of the rule. However, the rule anticipated the possibility of new and unusual technologies (NUT) and determined they would be evaluated on a case-by case basis (86

FR 5322, 5442, January 19, 2021). This source has previously been evaluated through the NUT process as described in the notice of issuance of a previous LOA to Shell (86 FR 37309, July 15, 2021). Please see that notice for additional discussion.

The TPS operates on the same basic principles as a traditional airgun source in that it uses compressed air to create a bubble in the water column which then goes through a series of collapses and expansions creating primarily low-frequency sounds. The difference between the two sources is that the TPS releases a larger volume of air (the TPS planned for use here has a volume of 28,000 in^3 per element, whereas the standard airgun array used in the acoustic exposure modeling supporting the rule has a total volume of 8,000 in^3), but at lower pressure (the TPS operates at 1,000 pounds per square inch (psi), whereas traditional airguns are typically operated at 2,000 psi). This creates a larger bubble resulting in more of the energy being concentrated in low-frequencies. The release of the air is also "tuned" so that the primary signal has an extended rise time and lower peak pressure level than that of a traditional airgun array source. The results of initial acoustic modeling, quarry tests, and field measurements of TPS sources show the sounds produced have lower peak pressures and less energy at higher frequencies than conventional airgun arrays. We discussed the results of initial modeling and of acoustic tests performed in a quarry in the aforementioned notice of LOA issuance (July 15, 2021, 86 FR 37309). During the survey associated with that notice, field measurements of a 26,500-in^3 TPS were obtained using a hydrophone recorder on the seafloor at 2,830 m water depth directly below the operating sources.

The newer data confirm that the TPS produces more sound at lower frequencies (approximately 2-4 Hertz (Hz)) compared to an airgun source, while producing much less sound (lower decibel levels) at frequencies above 4 Hz, meaning that the source produces significantly reduced energy at frequencies used by marine mammals for hearing and communication. This means that even for species in the low-frequency hearing group

(mysticete whales) most affected by seismic survey sounds, the TPS is expected to have less impact than a traditional airgun array in terms of overlap with frequencies the species use. Potential impacts on mid- and high-frequency hearing groups will be reduced even more.

Besides producing less energy in frequencies used by marine mammals, the TPS produces sounds with overall lower energy at the source. Test data for the TPS were obtained at a quarry, showing that the source produces significantly less output than a traditional airgun array at all frequencies above 5 Hz. For example, the measured source level (at the typical reference distance of 1 m) has a peak sound pressure level (SPL_{peak}) of 236 decibels (dB), approximately 19 dB less than the modeled SPL_{peak} source level for the 8,000-in^3 airgun array used in the acoustic exposure modeling. For every 6-dB reduction in source level, the approximate distance to the same threshold level would be cut in half, meaning that there would be more than an 8-fold reduction in distance to SPL_{peak} thresholds. This reduction would be even greater when considering the actual 5,110-in^3 airgun array that may be used as a secondary option for this planned survey, with SPL_{peak} source level approximately 25 dB greater than the TPS. The same relative reduction would apply to root mean square SPL threshold distances as well.

There would also be a significant reduction in the likelihood that auditory injury could result from the accumulation of energy (which is expected to dictate occurrence of injury for low-frequency cetaceans). The much lower peak sound pressure levels near the source and extended rise time reduce the potential for auditory injury (Level A harassment) for all marine mammal species, since these are the two main physical characteristics of impulsive sounds that are considered most injurious.

The planned survey may use two 28,000-in^3 TPS sources discharged simultaneously, versus the single 26,500-in^3 source measured during field trials. The relative difference in output between a single 28,000-in^3 source and single 26,500-in^3

source is indicated by the cube root of the ratio of the two volumes, equating to an approximate 2 percent increase in source level. Therefore, evaluation of the source levels measured for the 26,500-in^2 source is a reasonable approximation. Adding a second source identical to the first effectively doubles the combined output resulting in a 6-dB increase in the source level. Even with the increased sound levels, the dual TPS source is anticipated to produce much lower sound levels than a conventional source array at all frequencies above approximately 5 Hz.

These factors lead to a conclusion that take by Level B harassment associated with use of the TPS would be less than would occur for a similar survey instead using the modeled airgun array as a sound source, and that use of the TPS results in lower potential for the occurrence of Level A harassment than does use of the modeled airgun array. Based on the foregoing, we have determined there will be no effects of a magnitude or intensity different from those evaluated in support of the rule. Moreover, use of modeling results relating to use of the 72 element, 8,000-in^3 airgun array are expected to be significantly conservative as a proxy for use in evaluating potential impacts of use of the TPS.

Consistent with the preamble to the final rule, the survey effort proposed by Shell in its LOA request was used to develop LOA-specific take estimates based on the acoustic exposure modeling results described in the preamble (86 FR 5398, January 19, 2021). In order to generate the appropriate take numbers for authorization, the following information was considered: (1) survey type; (2) location (by modeling zone[1]); (3) number of days; and (4) season.[2] The acoustic exposure modeling performed in support

[1] For purposes of acoustic exposure modeling, the GOM was divided into seven zones. Zone 1 is not included in the geographic scope of the rule.
[2] For purposes of acoustic exposure modeling, seasons include Winter (December-March) and Summer (April-November).

of the rule provides 24-hour exposure estimates for each species, specific to each modeled survey type in each zone and season.

No 3D OBN surveys were included in the modeled survey types, and use of existing proxies (*i.e.*, 2D, 3D NAZ, 3D WAZ, Coil) is generally conservative for use in evaluation of 3D OBN survey effort, largely due to the greater area covered by the modeled proxies. Summary descriptions of these modeled survey geometries are available in the preamble to the proposed rule (83 FR 29212, 29220, June 22, 2018). Coil was selected as the best available proxy survey type in this case because the spatial coverage of the planned survey is most similar to the coil survey pattern. The planned 3D OBN survey will involve two source vessels sailing along survey lines ranging in length from approximately 20-95 km in length. The coil survey pattern was assumed to cover approximately 144 kilometers squared (km^2) per day (compared with approximately 795 km^2, 199 km^2, and 845 km^2 per day for the 2D, 3D NAZ, and 3D WAZ survey patterns, respectively). Among the different parameters of the modeled survey patterns (*e.g.*, area covered, line spacing, number of sources, shot interval, total simulated pulses), NMFS considers area covered per day to be most influential on daily modeled exposures exceeding Level B harassment criteria. Although Shell is not proposing to perform a survey using the coil geometry, its planned 3D OBN survey is expected to cover approximately 140 km^2 per day, meaning that the coil proxy is most representative of the effort planned by Shell in terms of predicted Level B harassment exposures.

In addition, all available acoustic exposure modeling results assume use of a 72-element, 8,000 in^3 array. Thus, estimated take numbers for this LOA are considered conservative due to differences between the acoustic source planned for use (TPS or 32 element, 5,200 in^3 airgun array) and the proxy array modeled for the rule.

The survey will take place over approximately 105 days, including 63 days of sound source operation, all within Zone 5. The seasonal distribution of survey days is not

known in advance. Therefore, the take estimates for each species are based on the season that produces the greater value.

Additionally, for some species, take estimates based solely on the modeling yielded results that are not realistically likely to occur when considered in light of other relevant information available during the rulemaking process regarding marine mammal occurrence in the GOM. The approach used in the acoustic exposure modeling, in which seven modeling zones were defined over the U.S. GOM, necessarily averages fine-scale information about marine mammal distribution over the large area of each modeling zone. This can result in unrealistic projections regarding the likelihood of encountering particularly rare species and/or species not expected to occur outside particular habitats. Thus, although the modeling conducted for the rule is a natural starting point for estimating take, our rule acknowledged that other information could be considered (see, *e.g.*, 86 FR 5442 (January 19, 2021), discussing the need to provide flexibility and make efficient use of previous public and agency review of other information and identifying that additional public review is not necessary unless the model or inputs used differ substantively from those that were previously reviewed by NMFS and the public). For this survey, NMFS has other relevant information reviewed during the rulemaking that indicates use of the acoustic exposure modeling to generate a take estimate for certain marine mammal species produces results that are inconsistent with what is known regarding their occurrence in the GOM. Accordingly, we have adjusted the calculated take estimates for those species as described below.

Rice's whales (formerly known as GOM Bryde's whales)[3] are mostly found in a "core habitat area" located in the northeastern GOM in waters between 100-400 m depth along the continental shelf break (Rosel *et al.*, 2016). (Note that this core habitat area is

[3] The final rule refers to the GOM Bryde's whale (*Balaenoptera edeni*). These whales were subsequently described as a new species, Rice's whale (*Balaenoptera ricei*) (Rosel *et al*., 2021).

outside the scope of the rule.) However, whaling records suggest that Rice's whales historically had a broader distribution within similar habitat parameters throughout the GOM (Reeves *et al.*, 2011; Rosel and Wilcox, 2014). In addition, habitat-based density modeling identified similar habitat (*i.e.*, approximately 100-400 m water depths along the continental shelf break) as being potential Rice's whale habitat (Roberts *et al.*, 2016), although the core habitat area contained approximately 92 percent of the predicted abundance of Rice's whales. See discussion provided at, *e.g.*, 83 FR 29228, 83 FR 29280 (June 22, 2018); 86 FR 5418 (January 19, 2021).

There are few data on Rice's whale occurrence outside of the northeastern GOM core habitat area. There were two sightings of unidentified large baleen whales (recorded as *Balaenoptera* sp. or Bryde's/sei whale) in 1992 in the western GOM during systematic survey effort and, more recently, a NOAA survey reported observation of a Rice's whale in the western GOM in 2017 (NMFS, 2018). There were five potential sightings of Rice's whales by protected species observers (PSOs) aboard industry geophysical survey vessels west of New Orleans from 2010-2014, all within the 200-400 m isobaths (Rosel *et al.*, 2021). In addition, sporadic, year-round recordings of Rice's whale calls were made south of Louisiana within approximately the same depth range between 2016 and 2017 (Soldevilla *et al.*, 2022).

Although Rice's whales may occur outside of the core habitat area, we expect that any such occurrence would be limited to the narrow band of suitable habitat described above (*i.e.*, 100-400 m) and that, based on the few available records, these occurrences would be rare. Shell's planned activities will overlap this depth range, with approximately 18 percent of the area expected to be ensonified by the survey above root-mean-squared pressure received levels (RMS SPL) of 160 dB (referenced to 1 micropascal (re 1 μPa)) overlapping the 100-400 m isobaths. Therefore, while we expect take of Rice's whale to be unlikely, there is some reasonable potential for take of Rice's

whale to occur in association with this survey. However, NMFS' determination in reflection of the data discussed above, which informed the final rule, is that use of the generic acoustic exposure modeling results for Rice's whales would result in estimated take numbers that are inconsistent with the assumptions made in the rule regarding expected Rice's whale take (86 FR 5322, 5403; January 19, 2021).

Killer whales are the most rarely encountered species in the GOM, typically in deep waters of the central GOM (Roberts *et al*., 2015; Maze-Foley and Mullin, 2006). As discussed in the final rule, the density models produced by Roberts *et al*. (2016) provide the best available scientific information regarding predicted density patterns of cetaceans in the U.S. GOM. The predictions represent the output of models derived from multi-year observations and associated environmental parameters that incorporate corrections for detection bias. However, in the case of killer whales, the model is informed by few data, as indicated by the coefficient of variation associated with the abundance predicted by the model (0.41, the second-highest of any GOM species model; Roberts *et al*., 2016). The model's authors noted the expected non-uniform distribution of this rarely-encountered species and expressed that, due to the limited data available to inform the model, it "should be viewed cautiously" (Roberts *et al*., 2015).

NOAA surveys in the GOM from 1992-2009 reported only 16 sightings of killer whales, with an additional three encounters during more recent survey effort from 2017-18 (Waring *et al*., 2013; *www.boem.gov/gommapps*). Two other species were also observed on less than 20 occasions during the 1992-2009 NOAA surveys (Fraser's dolphin and false killer whale[4]). However, observational data collected by PSOs on industry geophysical survey vessels from 2002-2015 distinguish the killer whale in terms of rarity. During this period, killer whales were encountered on only 10 occasions,

[4] However, note that these species have been observed over a greater range of water depths in the GOM than have killer whales.

whereas the next most rarely encountered species (Fraser's dolphin) was recorded on 69 occasions (Barkaszi and Kelly, 2019). The false killer whale and pygmy killer whale were the next most rarely encountered species, with 110 records each. The killer whale was the species with the lowest detection frequency during each period over which PSO data were synthesized (2002-2008 and 2009-2015). This information qualitatively informed our rulemaking process, as discussed at 86 FR 5334 (January 19, 2021), and similarly informs our analysis here.

The rarity of encounter during seismic surveys is not likely to be the product of high bias on the probability of detection. Unlike certain cryptic species with high detection bias, such as *Kogia* spp. or beaked whales, or deep-diving species with high availability bias, such as beaked whales or sperm whales, killer whales are typically available for detection when present and are easily observed. Roberts *et al*. (2015) stated that availability is not a major factor affecting detectability of killer whales from shipboard surveys, as they are not a particularly long-diving species. Baird *et al*. (2005) reported that mean dive durations for 41 fish-eating killer whales for dives greater than or equal to 1 minute in duration was 2.3-2.4 minutes, and Hooker *et al*. (2012) reported that killer whales spent 78 percent of their time at depths between 0-10 m. Similarly, Kvadsheim *et al*. (2012) reported data from a study of four killer whales, noting that the whales performed 20 times as many dives to 1-30 m depth than to deeper waters, with an average depth during those most common dives of approximately 3 m.

In summary, killer whales are the most rarely encountered species in the GOM and typically occur only in particularly deep water. While this information is reflected through the density model informing the acoustic exposure modeling results, there is relatively high uncertainty associated with the model for this species, and the acoustic exposure modeling applies mean distribution data over areas where the species is in fact less likely to occur. In addition, as noted above in relation to the general take estimation

methodology, the assumed proxy source (72-element, 8,000-in^3 array) results in a significant overestimate of the actual potential for take to occur. NMFS' determination in reflection of the information discussed above, which informed the final rule, is that use of the generic acoustic exposure modeling results for killer whales for this survey would result in estimated take numbers that are inconsistent with the assumptions made in the rule regarding expected killer whale take (86 FR 5403, January 19, 2021).

In past authorizations, NMFS has often addressed situations involving the low likelihood of encountering a rare species such as Rice's whales or killer whales in the GOM through authorization of take of a single group of average size (*i.e.*, representing a single potential encounter). See 83 FR 63268, December 7, 2018. See also 86 FR 29090, May 28, 2021 and 85 FR 55645, September 9, 2020. For the reasons expressed above, NMFS determined that a single encounter of Rice's whales or killer whales is more likely than the model-generated estimates and has authorized take associated with a single group encounter (*i.e.*, up to 2 and 7 animals, respectively).

Based on the results of our analysis, NMFS has determined that the level of taking authorized through the LOA is consistent with the findings made for the total taking allowable under the regulations for the affected species or stocks of marine mammals. See Table 1 in this notice and Table 9 of the rule (86 FR 5322, January 19, 2021).

Small Numbers Determination

Under the GOM rule, NMFS may not authorize incidental take of marine mammals in an LOA if it will exceed "small numbers." In short, when an acceptable estimate of the individual marine mammals taken is available, if the estimated number of individual animals taken is up to, but not greater than, one-third of the best available abundance estimate, NMFS will determine that the numbers of marine mammals taken of a species or stock are small. For more information please see NMFS' discussion of the

MMPA's small numbers requirement provided in the final rule (86 FR 5438, January 19, 2021).

The take numbers for authorization are determined as described above in the **Summary of Request and Analysis** section. Subsequently, the total incidents of harassment for each species are multiplied by scalar ratios to produce a derived product that better reflects the number of individuals likely to be taken within a survey (as compared to the total number of instances of take), accounting for the likelihood that some individual marine mammals may be taken on more than one day (see 86 FR 5404, January 19, 2021). The output of this scaling, where appropriate, is incorporated into adjusted total take estimates that are the basis for NMFS' small numbers determinations, as depicted in Table 1.

This product is used by NMFS in making the necessary small numbers determinations through comparison with the best available abundance estimates (see discussion at 86 FR 5391, January 19, 2021). For this comparison, NMFS' approach is to use the maximum theoretical population, determined through review of current stock assessment reports (SAR; *www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments*) and model-predicted abundance information (*https://seamap.env.duke.edu/models/Duke/GOM/*). For the latter, for taxa where a density surface model could be produced, we use the maximum mean seasonal (*i.e.*, 3-month) abundance prediction for purposes of comparison as a precautionary smoothing of month-to-month fluctuations and in consideration of a corresponding lack of data in the literature regarding seasonal distribution of marine mammals in the GOM. Information supporting the small numbers determinations is provided in Table 1.

Table 1 -- Take Analysis

Species	Authorized take	Scaled take[1]	Abundance[2]	Percent abundance
Rice's whale	2	n/a	51	3.9
Sperm whale	1,657	700.9	2,207	31.8

Kogia spp.	626[3]	190.4	4,373	5.1
Beaked whales	7,314	738.7	3,768	19.6
Rough-toothed dolphin	1,258	360.9	4,853	7.4
Bottlenose dolphin	5,959	1,710.1	176,108	1.0
Clymene dolphin	3,539	1,015.6	11,895	8.5
Atlantic spotted dolphin	2,380	683.1	74,785	0.9
Pantropical spotted dolphin	16,058	4,608.7	102,361	4.5
Spinner dolphin	4,303	1,234.9	25,114	4.9
Striped dolphin	1,382	396.7	5,229	7.6
Fraser's dolphin	397	114.0	1,665	6.8
Risso's dolphin	1,040	306.7	3,764	8.1
Melon-headed whale	2,325	685.9	7,003	9.8
Pygmy killer whale	547	161.4	2,126	7.6
False killer whale	870	256.8	3,204	8.0
Killer whale	7	n/a	267	2.6
Short-finned pilot whale	673	198.4	1,981	10.0

[1]Scalar ratios were applied to "Authorized Take" values as described at 86 FR 5322, 5404 (January 19, 2021) to derive scaled take numbers shown here.

[2]Best abundance estimate. For most taxa, the best abundance estimate for purposes of comparison with take estimates is considered here to be the model-predicted abundance (Roberts *et al.*, 2016). For those taxa where a density surface model predicting abundance by month was produced, the maximum mean seasonal abundance was used. For those taxa where abundance is not predicted by month, only mean annual abundance is available. For Rice's whale and killer whale, the larger estimated SAR abundance estimate is used.

[3]Includes 33 takes by Level A harassment and 593 takes by Level B harassment. Scalar ratio is applied to takes by Level B harassment only; small numbers determination made on basis of scaled Level B harassment take plus authorized Level A harassment take.

Based on the analysis contained herein of Shell's proposed survey activity described in its LOA application and the anticipated take of marine mammals, NMFS finds that small numbers of marine mammals will be taken relative to the affected species or stock sizes and therefore is of no more than small numbers.

Authorization

NMFS has determined that the level of taking for this LOA request is consistent with the findings made for the total taking allowable under the incidental take regulations and that the amount of take authorized under the LOA is of no more than small numbers. Accordingly, we have issued an LOA to Shell authorizing the take of marine mammals incidental to its geophysical survey activity, as described above.

Dated: September 6, 2022.

Catherine G. Marzin,

Deputy Director, Office of Protected Resources,

National Marine Fisheries Service.

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