October 6, 2023

VIA Federal eRulemaking Portal: http://www.regulations.gov

Mr. David Bernhart
Assistant Regional Administrator, Protected Resources Division
National Marine Fisheries Service, Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

Re: Comments of Trade Associations regarding the proposed rule to designate Rice's whale critical habitat – NOAA-NMFS-2023-0028

Dear Mr. Bernhart:

This letter provides the comments of the American Petroleum Institute ("API"), EnerGeo Alliance ("EnerGeo"), National Ocean Industries Association ("NOIA"), and Independent Petroleum Association of America ("IPAA") (collectively, the "Associations") in response to the National Marine Fisheries Service's ("NMFS") proposal to designate Rice's whale (*Balaenoptera ricei*) critical habitat in the Gulf of Mexico ("GOMx") ("Proposed Rule").[1] The Associations appreciate NMFS's consideration of these comments, which include the attached *Review of the Rice's Whale Proposed Critical Habitat and Related Scientific Literature* prepared by LGL Ecological Research Associates (hereinafter referred to as "Ireland (2023)") (Attachment A) and *The Economic Impacts of Gulf of Mexico Oil and Natural Gas Vessel Transit Restrictions* prepared by Energy & Industrial Advisory Partners (hereinafter referred to as "EIAP (2023)") (Attachment B). The Associations request that this comment letter and all attachments be included in the administrative record for this rulemaking.

I. THE ASSOCIATIONS

API is a national trade association representing nearly 600 member companies involved in all aspects of the oil and natural gas industry, including those that operate within the GOMx in areas that NMFS is proposing to designate as Rice's whale critical habitat. API's members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. API and its members are dedicated to

[1] *Endangered and Threatened Species; Designation of Critical Habitat for the Rice's Whale*, 88 Fed. Reg. 47,453 (July 24, 2023) (proposing to add 50 C.F.R. § 226.230 designating critical habitat for Rice's whale). NMFS extended the period to submit comments on the Proposed Rule to October 6, 2023. *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Rice's Whale, Public Hearing and Extension of Public Comment Period*, 88 Fed. Reg. 62,522 (Sept. 12, 2023).

meeting environmental requirements, while economically developing and supplying energy resources for consumers.

EnerGeo is the international trade association representing the industry that provides geophysical services (geophysical data acquisition, processing and interpretation, geophysical information ownership and licensing, and associated services and product providers) to the oil and natural gas industry. EnerGeo member companies, which operate within the GOMx in areas that NMFS is proposing to designate as Rice's whale critical habitat, play an integral role in the successful exploration and development of offshore hydrocarbon resources through the acquisition and processing of geophysical data.

The National Ocean Industries Association represents the interests of all segments of the offshore energy industry, including offshore oil and gas, offshore wind, offshore minerals, offshore carbon capture, use and sequestration, and other emerging technologies. NOIA's membership includes energy project leaseholders and developers and the entire supply chain of companies that make up an innovative ecosystem contributing to the safe and responsible development and production of offshore energy.

The Independent Petroleum Association of America is a national upstream trade association representing thousands of independent oil and natural gas producers and service companies across the United States. Independent producers develop 91 percent of the nation's oil and natural gas wells. These companies account for 83 percent of America's oil production, 90 percent of its natural gas and natural gas liquids production, and support over 4.5 million American jobs.

II. SUMMARY OF COMMENTS

NMFS proposes to designate over 28,000 square miles of GOMx continental shelf and slope that it asserts are all "occupied" by Rice's whales.[2] This proposal (if adopted) is arbitrary, capricious, and violates the Administrative Procedure Act ("APA") and the Endangered Species Act ("ESA") as follows:

- NMFS's determination that the entire GOMx is "occupied" is not supported by the best available science or the record before the agency, and is contradicted by NMFS's own statements that the Rice's whale's range is primarily restricted to the De Soto Canyon area of the northeastern GOMx and that Rice's whales rely on that area for all of their life history stages. NMFS cites only a single Rice's whale sighting off the central Texas coast and potential acoustic detections in the western and northern GOMx as support for its conclusion that Rice's whales "occupy" the entire GOMx (while simultaneously dismissing equally rare Atlantic continental shelf sightings). This is both legally and scientifically insufficient to demonstrate that Rice's whales actually use the entire GOMx with sufficient regularity to qualify as occupied habitat.

[2] 88 Fed. Reg. at 47,455; *id.* at 47,460.

- Because NMFS has not demonstrated that Rice's whales occupy the entire GOMx, it fails to meet the ESA's requirement to designate as critical habitat the "*specific* areas *within*" the broader geographical area occupied by the species.

- Even within the areas proposed for designation, NMFS has failed to demonstrate that all areas are occupied by Rice's whales—or even qualify as "habitat." Conclusions regarding the presence of Rice's whales in much of the central and northwestern GOMx continental shelf appear to be based on predictive modeling, not on sightings or other evidence. There is no regular pattern in the acoustic data suggesting a persistent Rice's whale presence in these areas. Moreover, there are no data regarding mating, births, prey availability, or other information that would demonstrate that these areas actually support the life history parameters of Rice's whales. For these reasons, NMFS has failed to demonstrate that the central and northwestern GOMx continental shelf and slope are "occupied" or even "habitat."

- NMFS is required to identify specific locations within the proposed critical habitat designation where essential habitat features "are found." Instead, NMFS identifies a single oceanographic feature—the 100- to 400-meter isobath—as "essential" to Rice's whales but acknowledges that the "attributes" making this area valuable to Rice's whales are prey availability, certain water characteristics, and quiet conditions. NMFS does not identify where, within the proposed critical habitat designation, these key attributes are found, in violation of the ESA's requirement to identify the "specific areas" where such essential features exist.

- NMFS's identification of "sufficiently quiet conditions" as a valuable "attribute" of Rice's whale habitat is arbitrary and capricious because in-water sound is not an element of habitat but rather the result of natural and anthropogenic sources introducing sound to the marine environment. "Sufficiently quiet conditions" is not a "feature" that can be "found" in a "specific area" as required by the ESA. Furthermore, NMFS admits that much of the area proposed for designation is subject to anthropogenic sound, which means that NMFS does not know if "quiet conditions" are even present in areas proposed as critical habitat.

- Finally, NMFS's economic analysis fails to identify and consider known and likely costs of a critical habitat designation, falling materially short of the ESA's requirements by dismissing the potential for substantive modifications to federally permitted activities. Most critically, although NMFS acknowledges that energy development activities may be subject to conservation measures or other "special management" protections, it irrationally concludes that a designation would not result in project modifications. Indeed, burdensome protection measures and development restrictions that appear to derive from NMFS's proposed critical habitat designation have already been included in GOMx lease stipulations and acreage exclusions in the very area proposed for designation.[3] These measures and all the other future measures, the effects of which were ignored by NMFS, will have enormous economic impacts. NMFS's failure to identify or consider these impacts violates the ESA.

For these reasons, as described in the Associations' detailed comments below, NMFS must withdraw the Proposed Rule and reissue a critical habitat proposal that identifies for designation only those "specific areas within" areas of the GOMx actually occupied by Rice's whales that qualify as habitat and on which are "found" the "essential features" of Rice's whale habitat that require special management. NMFS must consider the material economic, national security, and other relevant impacts of such a designation, including from "adverse modification" findings, as well as the revenue implications for the federal and state governments. Should NMFS move forward with designation of Rice's whale critical habitat, it should exclude from such designation the central and northwestern GOMx where the impact of a designation would far outweigh any potential benefits to Rice's whales.

III. DETAILED COMMENTS

A. NMFS's determination that the entire GOMx is "occupied" is not supported by the best available science or the record before the agency, and is contradicted by NMFS's own statements.

The ESA provides for designation of critical habitat to the extent "prudent and determinable"[4] in "specific areas within the geographical area *occupied by the species*" at the time of listing.[5] Unoccupied habitat can also be designated as "critical" but only after a determination that occupied habitat is inadequate for the species' conservation[6]—a conclusion that NMFS does not make in the Proposed Rule.[7] Therefore, before determining which "specific areas within" Rice's whale's occupied habitat should be designated as critical, NMFS must define its occupied habitat. In the Proposed Rule, NMFS finds that "at the time of listing Rice's whales occupied the

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[3] A federal court has preliminarily enjoined these stipulations and acreage exclusions. *Louisiana v. Haaland*, No. 23-30666 (5th Cir. Sept. 25, 2023) (slip op.), *aff'g*, Nos. 2:23-CV-01157 & 2:23-CV-01167 (W.D. La. Sept. 21, 2023) (Memorandum Order).

[4] 16 U.S.C. § 1533(a)(3)(A).

[5] *Id*. § 1532(5)(A)(i) (emphasis added).

[6] *Id*. § 1532(5)(A)(ii) (unoccupied habitat may be designated if the area is "essential for the conservation of the species"); 50 C.F.R. § 424.12(b)(2) ("The Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied would be inadequate to ensure the conservation of the species.").

[7] *See Endangered Species Act Rice's Whale Critical Habitat Report, Proposed Information Basis and Impact Considerations of Critical Habitat Designation*, at 29 (July 2023), https://www.fisheries.noaa.gov/s3/2023-07/Critical-Habitat-Report-508-Final.pdf (stating that NMFS is not able to identify any areas outside of the geographical area occupied by the species that are essential for its conservation) ("Critical Habitat Report").

Gulf of Mexico."[8] This finding is not supported by the best available science or the record before the agency, and is arbitrary and capricious.

In support of its conclusion that Rice's whales occupy the entire GOMx,[9] NMFS cites only (1) a single 2017 confirmed sighting in the western GOMx off the central Texas coast and (2) potential acoustic detection of Rice's whale calls in the western and northern GOMx from July 2016 to August 2017.[10] Based on these limited data—and despite rejecting similarly limited data on the Atlantic coast in determining occupancy[11]—NMFS explains that Soldevilla et al. (2022b) concluded that Rice's whales "persistently occur over a broader distribution in the GOMx than was previously understood."[12] From this alone, NMFS takes an arbitrary and unscientific leap to conclude that the Rice's whales "occupied the Gulf of Mexico" at the time of listing.[13]

The ESA's implementing regulations define the "geographical area occupied by the species" to include areas that are used "periodically," but they must in fact be "used" (and "not solely by vagrant individuals").[14] Courts have found that an area is occupied only if a species uses the area "with sufficient regularity that it is likely to be present during any reasonable span of time."[15] Sightings of one or two individuals of a species are not sufficient to determine that an area is

[8] 88 Fed. Reg. at 47,460 ("[W]e have determined that at the time of listing Rice's whales occupied the Gulf of Mexico.").

[9] The absence of any further specificity in the Proposed Rule with regard to locations of Rice's whale occupation in the GOMx together with the statutory requirement to identify the area "occupied by the species" before designating its critical habitat makes clear that NMFS is reaching *and relying on* a conclusion that Rice's whales occupy the *entire* GOMx. Should NMFS determine that Rice's whales do not occupy the entire GOMx, then it must issue a new proposed rule for public review and comment.

[10] 88 Fed. Reg. at 47,460; Critical Habitat Report at 8.

[11] On the Atlantic coast, two Rice's whale strandings were deemed insufficient by NMFS to reach an "occupied" finding despite expressing just months ago that the data were unclear. *Compare U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments 2022*, at 114 (June 2023), https://media.fisheries.noaa.gov/2023-08/Final-Atlantic-and-Gulf-of-Mexico-SAR.pdf ("Two strandings from the southeastern U.S. Atlantic coast share the same genetic characteristics with those from the northern Gulf of Mexico …, but it is unclear whether these are extralimital strays … or whether they indicate the population extends from the northeastern Gulf of Mexico to the Atlantic coast of the southern U.S. …." (citations omitted)) ("Stock Assessment Report"), *with* 88 Fed. Reg. at 47,458 (stating that Bryde's whales are "effectively absent from the U.S. east coast"). NMFS's sudden certainty that the Atlantic coast is not occupied while taking an entirely different approach to similarly limited data within the GOMx demonstrates the arbitrary nature of NMFS's use of limited scientific information.

[12] 88 Fed. Reg. at 47,460.

[13] *Id.*

[14] 50 C.F.R. § 424.02.

[15] *Ariz. Cattle Growers' Ass'n v. Salazar*, 606 F.3d 1160, 1165 (9th Cir. 2010).

"occupied."[16] The limited sighting and acoustic data identified in the Proposed Rule are therefore insufficient to support NMFS's determination that Rice's whales "occupied the Gulf of Mexico" at the time of listing.

The best available science demonstrates that the Rice's whale does not occupy the entire GOMx. As described in Ireland (2023):

> There are no available data to support that Rice's whales occur in shallower or deeper waters of the GOMx away from the continental shelf break. There have been no reported sightings in waters < 100 m or > 408 m deep (Rosel et al. 2021).[17]

NMFS previously agreed, stating in its 2019 listing determination that Rice's whales are "restricted primarily to a small region along the continental shelf break in the De Soto Canyon area" of the northeastern GOMx.[18] On August 11, 2023—just weeks after issuing the Proposed Rule—NMFS issued in its Rice's whale stock assessment report restating this conclusion:

> The species has a relatively restricted range within the northern Gulf of Mexico…. Sighting records and acoustic detections of Rice's whales in the northern Gulf of Mexico (i.e., U.S. Gulf of Mexico) occur primarily in the northeastern Gulf in the De Soto Canyon area, along the continental shelf break between 100 m and 400 m depth, with a single sighting at 408 m ….[19]

Survey work confirms that Rice's whales are not found throughout the GOMx. From 2017 to 2018, 34,464 kilometers of aerial surveys of waters less than 200 meters deep and 19,576 kilometers of vessel-survey effort in waters deeper than 200 meters resulted in *no* Rice's whale sightings outside of the 100- to 400-meter water depth range.[20]

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[16] *See Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 67 F.4th 1027, 1039 (9th Cir. 2023) (single jaguar sighting in nearby mountain range is not sufficient to determine that area is occupied several years later); *Otay Mesa Prop., L.P. v. U.S. Dep't of Interior*, 646 F.3d 914, 916-17 (D.C. Cir. 2011) (single sighting of four shrimp in one tire rut on the property four years after species' listing was not sufficient to designate land as occupied).

[17] Ireland (2023) at 11.

[18] *Endangered and Threatened Wildlife and Plants; Endangered Status of the Gulf of Mexico Bryde's Whale*, 84 Fed. Reg. 15,446, 15,460 (Apr. 15, 2019). NMFS revised the common name of the species from Bryde's whale to Rice's whale in 2021. *Endangered and Threatened Wildlife and Plants; Technical Corrections for the Bryde's Whale (Gulf of Mexico Subspecies)*, 86 Fed. Reg. 47,022 (Aug. 23, 2021).

[19] Stock Assessment Report at 114; *see Final 2022 Marine Mammal Stock Assessment Reports*, 88 Fed. Reg. 54,592 (Aug. 11, 2023) (announcing release of Stock Assessment Report).

[20] Rappucci et al., U.S. Dep't of the Interior, BOEM, *Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPPS): Marine Mammals, Volume 1: Report*, OCS Study BOEM 2023-042 (June 2023).

The Proposed Rule itself raises questions regarding whether the entire GOMx is occupied. For example, NMFS states that the 100- to 400-meter isobath area constitutes the Rice's whale's "restricted range," explaining that "Rice's whales *rely entirely* on the GOMx continental shelf and slope waters between the 100 and 400 m isobaths to support *all* of their life history stages."[21] Furthermore, NMFS states that Soldevilla et al. (2022b) "did not record Rice's whale calls at a site offshore of Grand Isle, Louisiana or during 2 months at a site in the north-central GOMx."[22] NMFS concedes that the absence of call detections at these sites "*could indicate an absence of Rice's whales*."[23] NMFS even lacks confidence that Rice's whales occupy parts of the northwestern GOMx shelf where it proposes to designate critical habitat, stating that predictive modeling only indicates that Rice's whales "may" occupy the 200-meter isobath area along the northwestern GOMx shelf break.[24]

NMFS cannot reconcile its conclusion that Rice's whales occupy the entire GOMx with its acknowledgment that Rice's whales may or may not occupy many parts of the GOMx (including areas proposed as critical habitat) or with its conclusions that Rice's whales are restricted to, and "rely entirely" on, northeastern GOMx for "all" of their life history needs.[25] Indeed, expecting the small population of Rice's whales to "occupy" the entire GOMx defies logic. Accordingly, NMFS's conclusion that the entire GOMx consists of "occupied" habitat is not supported by the best available science and is arbitrary and capricious.[26] This flawed conclusion—on which the

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[21] 88 Fed. Reg. at 47,461 (emphases added).

[22] *Id.* at 47,457.

[23] *Id.* (emphasis added); *see also* Critical Habitat Report at 8, 9 (contemporary sightings are primarily confined to the core distribution area in the northeastern GOMx, but Rice's whales "historically *may* have had a broader distribution" (emphasis added)).

[24] 88 Fed. Reg. at 47,457. NMFS recognizes in the Proposed Rule that *only two sightings* fell outside the 151- to 252-meter isobaths. *Id.* at 47,462.

[25] *See* 84 Fed. Reg. at 15,460 ("The best available scientific information … indicate[s] that Bryde's whales in the Gulf of Mexico are now restricted primarily to a small region along the continental shelf break in the De Soto Canyon area of the northeastern Gulf of Mexico."); 88 Fed. Reg. at 47,456-57 (acknowledging that Rice's whale core habitat "is considered to be in the northeastern GOMx, centered over the De Soto Canyon in waters between 150 m and 410 m depth"). Without a reasonable explanation for reversing its position, NMFS's conclusion that Rice's whales occupy the entire GOMx is arbitrary and capricious. *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (agency must "display awareness that it *is* changing position" and provide a reasoned explanation for change in position); *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983) ("'An agency's view of what is in the public interest may change …. But an agency changing its course must supply a reasoned analysis[.]'" (citation omitted)).

[26] NMFS's own Critical Habitat Report does not support a conclusion that the entire GOMx is occupied, finding only that a recent study concluded that Rice's whales "persistently occur over a broader distribution in the GOMx than was previously understood, which is documented to include both the northeastern and northwestern GOMx." Critical Habitat Report at 14. NMFS may not reasonably reach a

Proposed Rule is fundamentally premised—undermines all of the subsequent analyses and conclusions in the Proposed Rule, rendering the entire Proposed Rule arbitrary and capricious.

B. NMFS has not demonstrated that it is proposing to designate "specific areas within" Rice's whale occupied habitat.

As described above, NMFS may only designate as "critical habitat" the "specific areas" that are "within" a broader geographical area that is occupied by a species.[27] As one court has explained:

> [T]he statute contemplates that the agency will first determine "the geographical area occupied by the species" and *then* proceed to identify the "areas *within* the geographical area occupied by the species" on which the [physical or biological features ("PBFs")] are found. 16 U.S.C. § 1532(5)(A)(i) (emphasis added). This reading is underscored by the governing regulations, which require the [U.S. Fish and Wildlife Service ("FWS")] to *begin* by "(i) [i]dentify[ing] the geographical area occupied by the species at the time of listing" and also "(ii) [i]dentify[ing] physical and biological features essential to the conservation of the species at an appropriate level of specificity using the best available scientific data." 50 C.F.R. § 424.12(b)(1). And it is only *after* the FWS has made these individual determinations that the regulations require FWS to "(iii) [d]etermine the specific areas within the geographical area occupied by the species that contain the physical or biological features essential to the conservation of the species."[28]

determination that the entire Gulf of Mexico is occupied based on the information presented in the Critical Habitat Report.

[27] 16 U.S.C. § 1532(5)(A)(i); *see also N. Spotted Owl v. Lujan*, 758 F. Supp. 621, 623 (W.D. Wash. 1991) ("[C]ritical habitat only includes the minimum amount of habitat needed to avoid short-term jeopardy or habitat in need of immediate intervention.").

[28] *Otay Mesa Prop., L.P. v. U.S. Dep't of the Interior*, 344 F. Supp. 3d 355, 371 (D.D.C. 2018) (citation omitted; emphasis in original; first, second, and third brackets added); *see also Ctr. for Biological Diversity*, 67 F.4th at 1038 ("For land to be classified as occupied critical habitat, it must be 'within the geographical area occupied by the species, at the time [the species] is listed.'" (brackets in original) (quoting 16 U.S.C. § 1532(5)(A)(i))); *Cape Hatteras Access Pres. All. v. U.S. Dep't of Interior*, 344 F. Supp. 2d 108, 119-20 (D.D.C. 2004) ("Whether and how an area becomes critical habitat first depends on whether a listed species occupies that area … [and] [o]nce the Service properly determines that a species occupies a candidate area for critical habitat, the Service must then determine that [PBFs] ... are 'found' on specific areas *within* that area." (emphasis added)).

Although NMFS asserts that the Rice's whale "occupied the Gulf of Mexico" at the time of listing,[29] this conclusion is arbitrary, capricious, and not supported by the best available science, as demonstrated above. Consequently, NMFS may not rely on this unsupported conclusion to meet its obligation to designate a specific area "within" Rice's whale occupied habitat.

C. NMFS has not demonstrated that the central and northwestern GOMx continental shelf and slope are "occupied."

In the Proposed Rule, NMFS does not propose to designate unoccupied habitat, nor has it attempted to demonstrate that any unoccupied habitat is "essential for the conservation of the species,"[30] or that designating only occupied habitat would be "inadequate to ensure the conservation of the species."[31] Accordingly, NMFS may propose to designate critical habitat only in areas that are occupied by Rice's whales. However, NMFS has not demonstrated that the central and northwestern GOMx continental shelf and slope (as proposed for designation) are, in fact, occupied by Rice's whales. According to Ireland (2023):

> Based on sightings and acoustic detections (Rosel et al. 2021; Soldevilla et al. 2022a,b), the only habitat in which Rice's whales are known to consistently and regularly occur in the GOMx is the core habitat in the northeastern GOMx (Figure 1). As reviewed in Section 3, evidence of Rice's whale occurrence in the northwestern GOMx is based on infrequent and irregular acoustic detections (Soldevilla et al. 2022a,b) and a single confirmed sighting (NMFS 2018a). There is no evidence of persistent presence or a regular pattern of occurrence in the acoustic data (Soldevilla et al. 2022b) that would provide insight into how the whales use this area, such as for migration, seasonal foraging, or breeding.[32]

The ESA's implementing regulations define the "geographical area occupied by the species" to mean an area "delineated around species' *occurrences*,"[33] not areas where modeling suggests a species *may* occur. The area must actually be "used" by the species with "sufficient regularity that it is likely to be present during any reasonable span of time."[34] NMFS's conclusions

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[29] 88 Fed. Reg. at 47,460.

[30] 16 U.S.C. § 1532(5)(A)(ii).

[31] 50 C.F.R. § 424.12(b)(2) ("The Secretary will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied would be inadequate to ensure the conservation of the species.").

[32] Ireland (2023) at 11.

[33] 50 C.F.R. § 424.02 (emphasis added).

[34] *Ariz. Cattle Growers' Ass'n*, 606 F. 3d at 1165; *see also* 50 C.F.R. § 424.02 (the geographical area occupied by the species "may include those areas *used* throughout all or part of the species' life cycle" (emphasis added)).

regarding the presence of Rice's whales in the central and northwestern GOMx continental shelf appear to be largely based on predictive modeling and not on sightings.[35] Just as the sighting of one or two individuals is insufficient to determine an area is occupied,[36] the absence of sightings or other evidence of occurrence in a "specific area" must also be insufficient. For these reasons, NMFS may not reasonably conclude that the central and northwestern GOMx continental shelf and slope are areas occupied by the Rice's whale.

D. NMFS has not demonstrated that the central and northwestern GOMx continental shelf and slope are "habitat."

The U.S. Supreme Court has confirmed that an area must be "habitat" in order to be "critical habitat."[37] The Proposed Rule does not support a conclusion that the entire area proposed for designation constitutes Rice's whale habitat. It is unknown how much of the GOMx continental shelf and slope-associated waters between the 100- and 400-meter isobaths actually support the life history parameters of the Rice's whale.[38] There is no direct evidence to show what Rice's whales are feeding on and whether that prey exists throughout the continental shelf and slope of the GOMx.[39] A critical habitat designation is arbitrary and capricious where, as here, it is based on oceanographic features (*i.e.*, water depth) without analysis of whether specific areas actually support the species.[40]

Indeed, as noted above, NMFS has recognized that Rice's whales are "restricted primarily to a small region along the continental shelf break in the De Soto Canyon area" of the northeastern GOMx.[41] As explained in the Proposed Rule, the concentration of Rice's whales in the northeastern GOMx appears to be explained by "higher summer chlorophyll-a concentrations, an indicator of phytoplankton abundance and biomass in coastal and estuarine waters, … as compared to other regions in the GOMx with suitable bottom temperatures, but less surface

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[35] Ireland (2023) at 6-8. NMFS appears to be basing its designation outside of the northwestern GOMx primarily on the habitat-based density prediction model. *Id*. Ireland (2023) describes the significant limitations in the ability of such models to predict the presence of species outside of where survey effort or observations are made. *Id.* at 7-9. In addition, to the extent NMFS is basing its determination on limited acoustic data, that is insufficient to designate an area as occupied.

[36] *See supra* note 16.

[37] *Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv.*, 139 S. Ct. 361, 368 (2018) ("'[C]ritical habitat' is the subset of 'habitat' that is 'critical' to the conservation of an endangered species.").

[38] Ireland (2023) at 12.

[39] *Id.*

[40] *See*, *e.g.*, *Otay Mesa*, 344 F. Supp. 3d at 366 (critical habitat designation cannot be made "solely vis-à-vis the topography of the pertinent geographical [area] without further analysis of whether and to what extent the area actually functions as [a] watershed" that supports the species).

[41] 84 Fed. Reg. at 15,460; *see also* Stock Assessment Report at 114 (explaining that sightings and acoustic detections have primarily been documented in the De Soto Canyon area).

productivity."[42] The unique De Soto Canyon physical structure and location result in recurring cold-water masses not known to occur anywhere else in the GOMx.[43] This habitat has been defined as "core habitat" for Rice's whales[44] and is the only area within the GOMx that the Proposed Rule demonstrates contains essential features needed to support the Rice's whale population. NMFS has failed to demonstrate that all of the area proposed for designation, and particularly the central and northwestern GOMx continental shelf and slope, even qualify as "habitat," much less "occupied habitat" or "critical habitat."

E. NMFS may not circumvent the ESA's requirement to identify essential features "found" in proposed critical habitat areas by calling such features "attributes."

In order to designate an area as critical habitat, NMFS must find that it includes "those physical or biological features [PBFs] (I) essential to the conservation of the species and (II) which may require special management considerations or protection."[45] PBFs are those "features that occur in specific areas and that are essential to support the life-history needs of the species."[46] It is well settled that those features must be "found" in the specific areas proposed for designation;[47] NMFS may not "rely on hope" that PBFs will "likely be found in the future."[48]

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[42] 88 Fed. Reg. at 47,458.

[43] Ireland (2023) at 12 (citing Schroeder and Woods (2000)). The Mississippi River, Loop Current, and associated eddies cause mixing in this area, which in turn can lead to elevated productivity compared to surrounding areas, and variations in bottom features likely contribute to unique biological processes in the area that support Rice's whales. *Id.*; *see also* Critical Habitat Report at 6 (core habitat area "is characterized by seasonal advection of low salinity, high productivity surface waters (i.e., waters with high production of organic matter by planktonic plants), leading to persistent upwelling driven by both winds and interactions with the loop current").

[44] Critical Habitat Report at 6 (noting that Rice's whale core habitat is considered to be in the northeastern GOMx "centered over the De Soto Canyon in waters between 150 m and 410 m depth" (citing Rosel et al. (2021))). This area is also sometimes known as the "core distribution area." *Id.*

[45] 16 U.S.C. § 1532(5)(A)(i).

[46] 50 C.F.R. § 424.02.

[47] 16 U.S.C. § 1532(5)(A)(i) (providing for designation of "the specific areas within the geographical area occupied by the species, at the time it is listed … *on which are found* those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection" (emphasis added)); *Home Builders Ass'n of N. Cal. v. U.S. Fish & Wildlife Serv.*, 268 F. Supp. 2d 1197, 1214-15 (E.D. Cal. 2003) (PBFs must be "found" on occupied land before that land can be eligible for critical habitat designation), *disapproved of on other grounds by Home Builders Ass'n of N. Cal. v. U.S. Fish & Wildlife Serv.*, 616 F.3d 983, 988 (9th Cir. 2010).

[48] *Cape Hatteras*, 344 F. Supp. 2d at 122-23 (finding it improper to "cast a net over tracts of land with the mere hope that they will develop [PBFs]").

In the Proposed Rule, NMFS identifies a single "essential feature" of Rice's whale habitat—the GOMx continental shelf and slope from the 100- to 400-meter isobath.[49] This is indeed an oceanographic feature that is very easy to "find" on a map, but it does not constitute an appropriate PBF without evidence demonstrating that each part of it is "essential" to the species. Instead of satisfying that requirement, however, NMFS simply states that the whole area qualifies as "essential" to the species "[b]ecause Rice's whales rely entirely on the GOMx continental shelf and slope waters between the 100 and 400 m isobaths to support all of their life history stages…."[50] This circular argument—that this location qualifies as essential to Rice's whales because it is relied on by Rice's whales—does not meet the ESA's requirement to identify the actual "physical or biological features" that are "essential to the species" and that *cause* Rice's whales to use the specific locations within the GOMx proposed for designation.[51]

After identifying the GOMx continental shelf and slope as "essential," NMFS acknowledges that certain "attributes" of the area "influence the value" of the GOMx continental shelf and slope "to the conservation of the species."[52] According to NMFS, these "attributes" are (1) prey availability, (2) water characteristics, and (3) quiet conditions.[53] NMFS states that these three attributes "support Rice['s] whales' ability to forage, develop, communicate, reproduce, rear calves, and migrate throughout the GOMx continental shelf and slope waters."[54] Despite their importance to the habitat's value, however, NMFS makes no attempt to identify where, within the proposed critical habitat designation, each of these key habitat attributes can be found. Tellingly, each of the features that NMFS says is a mere "attribute" of PBF in the Proposed Rule is commonly identified by NMFS as a PBF itself in other critical habitat rules.[55] In fact, the definition of "[p]hysical or biological features essential to the conservation of the species" refers to "water characteristics" and "prey" as examples of such features.[56]

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[49] 88 Fed. Reg. at 47,471 (proposing new regulations at 50 C.F.R. § 226.230(b) describing the "essential feature" of the critical habitat); Critical Habitat Report at 17.

[50] 88 Fed. Reg. at 47,461; Critical Habitat Report at 15.

[51] 16 U.S.C. § 1532(5)(A)(i).

[52] 88 Fed. Reg. at 47,461.

[53] *Id.*

[54] *Id.*

[55] *See*, *e.g.*, 50 C.F.R. § 226.203(a) (identifying physical oceanographic conditions such as currents and circulation patterns, bathymetric features, and temperatures as a PBF for the North Atlantic right whale); *id.* § 226.211(c) (listing specific water quality conditions as essential elements of California salmon critical habitat); *id.* § 226.206(b) (identifying water quality as essential feature of critical habitat for Southern Resident killer whale critical habitat); *id.* (identifying prey species as essential feature of Southern Resident killer whale critical habitat); *id.* § 226.227(f) (identifying prey species as essential feature of Pacific humpback whale habitat); *id.* § 226.215(a) (identifying prey species found within North Pacific right whale habitat).

[56] *Id.* § 424.02.

NMFS may not sidestep the ESA's obligation to demonstrate the specific locations on which essential features are "found" by identifying a large oceanographic feature as a PBF and then describing that large area's essential features as "attributes" without making any attempt to identify the specific areas where they occur within that large area.[57] Such an approach both evades and violates the ESA's clear edict to identify "the specific areas" where essential features are "found."[58]

F. The existence of "sufficiently quiet conditions" is not a PBF.

As part of the continental shelf and slope PBF, the Proposed Rule identifies as an attribute "[s]ufficiently quiet conditions for normal use and occupancy, including intraspecific communication, navigation, and detection of prey, predators, and other threats."[59] NMFS explains that sound "impair[s] sufficiently quiet conditions for normal use and occupancy" if it inhibits the whale's ability to "receive and interpret sound for the purposes of navigation, communication, and detection [of] prey, predators, and other threats."[60] This is not an essential feature for purposes of critical habitat designation.

First, in-water sound is not an element of habitat but rather the result of natural and anthropogenic sound introduced to the marine environment that has the potential to affect marine mammals and other species. Likewise, the existence of "sufficiently quiet conditions" is not a "feature" that can be "found" in a "specific area."[61] Indeed, rather than identifying where, within the proposed critical habitat, such conditions currently exist, NMFS describes a range of acoustic frequencies that are "most likely to adversely affect" the whale's acoustic soundscape.[62] In doing so, NMFS implicitly recognizes that sound results in direct impacts to individuals and that the absence of sound is not a habitat feature that can be "found" in a specific geographic location.

In recent years, NMFS has declined to identify the absence of sound as a PBF for a variety of species, despite recognizing the significance of in-water sound to those species.[63] Nor has NMFS identified the absence of sound as a PBF for any other baleen whale, including the North Pacific

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[57] This is equivalent to identifying a terrestrial species' occupied habitat as an entire mountain range, identifying land above a certain altitude as its PBF, and then describing the specific habitat features it actually depends upon as "attributes" without identifying where they occur within the mountain range.

[58] 16 U.S.C. § 1532(5)(A)(i).

[59] 88 Fed. Reg. at 47,461.

[60] *Id.*

[61] 16 U.S.C. § 1532(5)(A)(i).

[62] 88 Fed. Reg. at 47,461.

[63] *See* 88 Fed. Reg. 46,572 (July 19, 2023) (green sea turtle (proposed rule for six distinct population segments)); 87 Fed. Reg. 19,180 (Apr. 1, 2022) (bearded seal); 87 Fed. Reg. 19,232 (Apr. 1, 2022) (ringed seal); 86 Fed. Reg. 21,082 (Apr. 21, 2021) (humpback whale); 86 Fed. Reg 41,668 (Aug. 2, 2021) (Southern Resident killer whale).

right whale, the North Atlantic right whale, or any of three populations of humpback whale.[64] In fact, NMFS specifically rejected requests to identify the absence of sound as an element of critical habitat for the Southern Resident killer whale because the effects of sound "are direct effects to the animal itself and not to its habitat."[65]

Second, the purpose of the ESA's critical habitat provision is to identify and locate geographically those "specific areas" in which essential "physical or biological features" are found.[66] These features must be characteristics that can be located within the critical habitat area at the time of designation.[67] Yet the Proposed Rule does not describe *specifically* where "sufficiently quiet conditions" currently exist (or do not exist) within the proposed critical habitat area.[68] Moreover, as NMFS acknowledges, the westernmost sites within the core area studied by Soldevilla et al. (2022b) are "not far from a major shipping fairway and vessel traffic noise was common in the recordings at those sites."[69] Therefore, the "quiet conditions" that NMFS seeks to protect demonstrably are *not* "found" in some areas of the proposed critical habitat area, nor are they identified with any specificity as required by the ESA.

Third, marine sound is a complex and dynamic phenomenon that is heavily affected by salinity, pressure, and natural temperature gradients the further away the water column is from heat sources such as the sun. Cetaceans such as Rice's whales are known to utilize and exploit sound layers and gradients to their advantage in hunting and hiding from potential harm.[70] To characterize "sufficiently quiet conditions" as an "attribute" or element of Rice's whale critical

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[64] 73 Fed. Reg. 19,000 (Apr. 8, 2008) (North Pacific right whale); 59 Fed. Reg. 28,793 (June 3, 1994) (North Atlantic right whale); 86 Fed. Reg. 21,082 (Apr. 21, 2021) (humpback whale).

[65] *Endangered and Threatened Species; Designation of Critical Habitat for Southern Resident Killer Whale*, 71 Fed. Reg. 69,054, 69,055 (Nov. 29, 2006). NMFS previously used the term "primary constituent element" or "PCE," which has the same meaning as PBF. *See Listing Endangered and Threatened Species and Designating Critical Habitat; Implementing Changes to the Regulations for Designating Critical Habitat*, 81 Fed. Reg. 7,414, 7,426 (Feb. 11, 2016) (change in terminology from PCE to PBF "is not intended to substantively alter anything about the designation of critical habitat").

[66] 16 U.S.C. § 1532(5)(A)(i); *see also* 50 C.F.R. § 424.12(b)(1)(iii) (requiring determination of "the specific areas within the geographical area occupied by the species that contain the physical or biological features essential to the conservation of the species"); 81 Fed. Reg. at 7,420 (in designating critical habitat, NMFS and U.S. Fish and Wildlife Service will determine which areas "contain" the features essential to conservation of the species).

[67] *See Cape Hatteras*, 344 F. Supp. 2d at 122-23 (U.S. Fish and Wildlife Service must observe essential feature in critical habitat area at the time of designation).

[68] *See* 88 Fed. Reg. at 47,461; Critical Habitat Report at 15.

[69] 88 Fed. Reg. at 47,457 (noting the apparent presence of shipping and airgun sound in this area).

[70] *See* Richardson, W. J., C. R. Greene, Jr., C. I. Malme, and D. H. Thomson. 1995. Marine mammals and noise. Academic Press, San Diego, CA.; Southall, B.L., D.P. Nowacek, A.E. Bowles, V. Senigaglia, L. Bejder, P.L. Tyack. 2021. Marine Mammal Noise Exposure Criteria: Assessing the Severity of Marine Mammal Behavioral Responses to Human Noise. Aquatic Mammals 47(5): 421-464.

habitat demonstrates a concerning lack of scientific understanding of how cetaceans are known to utilize both layers and areas of the ocean that are both quieter and less quiet than the average.

G. NMFS's economic analysis is inconsistent with its own assumptions and fails to account for significant project modifications and other economic costs resulting from a critical habitat designation.

Before designating habitat, ESA section 4(b)(2) "imposes a categorical requirement that the Secretary tak[e] into consideration economic and other impacts before such a designation."[71] NMFS must consider the economic impact of a designation and may exclude areas from the designation if the benefits of exclusion outweigh the benefits of designating the area.[72] Specifically, section 4(b)(2) of the ESA requires NMFS to consider the economic impact of designating an area as critical habitat by comparing impacts with and without the critical habitat designation (the "4(b)(2) Analysis").[73]

NMFS provides the 4(b)(2) Analysis in its Critical Habitat Report,[74] which is also summarized in the Proposed Rule.[75] Unfortunately, NMFS's 4(b)(2) Analysis falls materially short of the statutory and regulatory requirements by dismissing the potential for substantive modifications to federally permitted activities and associated economic costs.[76] The proposed critical habitat designation will cause such modifications and, in fact, has already resulted in such modifications, as described below.

The Proposed Rule identifies federally permitted oil and gas exploration and development as an activity that has the potential to affect essential features of the Rice's whale proposed critical habitat.[77] NMFS cites to these and other activities in reaching a conclusion that the critical habitat designation is necessary to provide "special management considerations or protections" to Rice's whale habitat.[78] Specifically, NMFS states that "conservation measures might be required in the future through section 7 consultations on particular proposed Federal actions,"

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[71] *Weyerhaeuser*, 139 S. Ct. at 371 (brackets in original; internal quotation marks and citation omitted).

[72] 16 U.S.C. § 1533(b)(2); 50 C.F.R. § 424.19(b).

[73] 16 U.S.C. § 1533(b)(2).

[74] Critical Habitat Report at 21-56.

[75] 88 Fed. Reg. at 47,463-67.

[76] Critical Habitat Report at 35 (proposed critical habitat "will not change the outcome of Section 7 consultations, and additional project modifications will not be necessary"); *id.* at 39 ("[W]e anticipate that incremental costs associated with oil and gas exploration and production as a result of the Rice's whale critical habitat will be limited to administrative costs of consultation.").

[77] 88 Fed. Reg. at 47,464.

[78] *Id.* at 47,461-62 (providing analysis under 16 U.S.C. § 1532(5)(A)(i)); *see also* Critical Habitat Report at 16.

including energy development activities.[79] NMFS describes energy development as one activity that could "result in the need for special management or protections of the essential feature" of the proposed critical habitat.[80]

Despite this, NMFS concludes that the Proposed Rule "is not anticipated to result in incremental project modifications."[81] NMFS appears to base this conclusion in relevant part on an assumption that most project modifications resulting from an ESA section 7 consultation would already be required to protect the species and therefore cannot be attributed solely to the designation of critical habitat.[82] As a result, NMFS asserts that it does "not expect designation of critical habitat for the Rice's whale to result in project modifications for any of the activities that may affect the critical habitat … so long as such actions do not result in the destruction or adverse modification of critical habitat."[83] Indeed, NMFS estimates the overall incremental costs to all activities from the critical habitat designation at merely $37,000 in annualized costs.[84] NMFS cannot rationally conclude that modifications to energy development activities are both necessary to manage and protect habitat *and* that the critical habitat designation will not result in significant changes to those same activities.[85]

In addition, NMFS's caveat that project modifications are not expected "so long as such actions do not result in the destruction or adverse modification of critical habitat"[86] exemplifies NMFS's failure to analyze the very scenarios that the statute contemplates could result in economic costs—*i.e.*, where measures may be imposed because an action may destroy or adversely modify critical habitat. As NMFS understands, a proposed action that is expected to result in destruction or adverse modification of critical habitat may not move forward as originally proposed. Instead, either (1) the action agency or applicant will modify the proposed action to bring potential

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[79] 88 Fed. Reg. at 47,462.

[80] *Id.*

[81] *Id.* at 47,467.

[82] *Id.* at 47,464 ("When the same modification would be required due to impacts to both the species and critical habitat, there would be no additional or incremental impact attributable to the critical habitat designation beyond the administrative impact associated with conducting the critical habitat analysis."); *see also* Critical Habitat Report at 34.

[83] 88 Fed. Reg. at 47,465.

[84] Critical Habitat Report at 22.

[85] Although NMFS is not correct that designation of Rice's whale critical habitat will result in no new requirements, if it were correct, then its determination under 16 U.S.C. § 1532(5)(A)(i) that "special management measures" are needed to protect essential features is arbitrary. *See* 88 Fed. Reg. at 47,461-62. Congress certainly did not intend for NMFS to meet its obligation under that provision by merely asserting that measures may be needed while also knowing that the critical habitat designation will not require such measures. In short, NMFS cannot rationally conclude that *both* economic costs from the designation are *de minimis* and special management measures may be required.

[86] 88 Fed. Reg. at 47,465.

impacts of a proposed action under the "adverse modification" threshold,[87] or (2) NMFS will propose a "reasonable and prudent alternative," which must be adopted by the action agency in order for the activity to move forward.[88] Either of these scenarios would require significant project changes to avoid impacts that purportedly rise to a level of "adverse modification,"[89] but NMFS's 4(b)(2) Analysis entirely fails to describe the cost or impact of these anticipated modifications in any way.[90] This is a material failure and NMFS may not move forward with a final critical habitat designation without first analyzing and providing for public review and comment a 4(b)(2) Analysis that properly considers the full economic costs likely to result from the proposed designation.

Moreover, even in the absence of an "adverse modification" finding, a critical habitat designation or proposal can cause federal agencies to impose new, precautionary measures that are economically significant and must also be considered. On August 23, 2023, the Bureau of Ocean Energy Management ("BOEM") issued a lease stipulation in the Final Notice of Sales ("FNOS") for GOMx Lease Sale 261 that includes burdensome new operating restrictions across

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[87] *See* 50 C.F.R. § 402.14(g)(8) (requiring Service to take into account beneficial actions proposed by the action agency or applicant when formulating its biological opinion). In its 4(b)(2) Analysis, NMFS calls this the "incremental impact" of critical habitat designation, *i.e.*, "the extent to which Federal agencies modify their proposed actions to ensure they are not likely to destroy or adversely modify the critical habitat beyond any modifications the agencies would make because of listing and the requirement to avoid jeopardy to the Rice's whale." 88 Fed. Reg. at 47,464; *see also* Critical Habitat Report at 21.

[88] 16 U.S.C. § 1536(b)(3)(A) ("If jeopardy or adverse modification is found, the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate" section 7(a)(2), the prohibition against jeopardy and adverse modification); *Nat. Res. Def. Council v. Zinke*, 347 F. Supp. 3d 465, 476 (E.D. Cal. 2018) (If a biological opinion concludes that the action would "destroy or adversely modify critical habitat, … then the action may not go forward unless the wildlife agency can suggest a 'reasonable and prudent alternative[]' ('RPA') that avoids jeopardy, destruction, or adverse modification." (brackets in original; citation omitted)).

[89] "Adverse modification" findings are consequential and necessarily indicate that significant project changes are required in order for a proposed action to proceed. *See Interagency Cooperation – Endangered Species Act of 1973, as Amended; Definition of Destruction or Adverse Modification of Critical Habitat*, 79 Fed. Reg. 27,060, 27,063 (May 12, 2014) (to adversely modify critical habitat, an action "must in some way cause the deterioration of the critical habitat's pre-action condition, which includes its ability to provide recovery support to the species").

[90] *See generally* 88 Fed. Reg. at 47,464-65; Critical Habitat Report at 21-56 & 39 ("[W]e anticipate that incremental costs associated with oil and gas exploration and production as a result of the Rice's whale critical habitat will be limited to administrative costs of consultation."). NMFS's conclusion that the proposed critical habitat "will not change the outcome of Section 7 consultations, and additional project modifications will not be necessary," Critical Habitat Report at 35, directly contradicts its statement that "conservation measures might be required in the future through section 7 consultations on particular proposed Federal actions," 88 Fed. Reg. at 47,462.

a newly defined and vastly enlarged "Expanded Rice's Whale Area."[91] This area—which is more than double the size of the Rice's whale area identified in BOEM's Proposed Notice of Sale ("PNOS")—appears to be identical to the area that NMFS is proposing for designation as Rice's whale critical habitat.[92] As BOEM's PNOS did not include these measures, and as they match the geographic area proposed for critical habitat designation, it is reasonable to conclude that BOEM added these conservation measures to its FNOS in whole or in part as a result of NMFS's critical habitat proposal.[93] Alternatively, it is reasonable to conclude that any such measures that are currently not required will become required as terms and conditions in future biological opinions that are imposed on the regulated community, as a direct result of the critical habitat designation.

NMFS accurately predicts that the implications of underestimating the costs of a critical habitat designation are "[p]otentially major."[94] Oil and gas activities in the GOMx account for approximately 15 percent of U.S. crude production and 5 percent of U.S. dry natural gas production.[95] At least 2,400 companies across all 50 states are dependent on GOMx-derived production as part of their supply chain.[96] In 2023, the GOMx oil and gas industry supported approximately 412,000 jobs and will generate an estimated $34.3 billion in gross domestic product and over $6.1 billion in government revenue.[97] As demonstrated in Attachment B to these comments, restrictions on oil and gas activities in the northwestern and central GOMx, including a 10-knot speed restriction, limitations on transit from dusk to dawn and during periods of low visibility, and other restrictions on transiting vessels,[98] are estimated to cost the oil and gas industry up to $9.4 billion annually, result in a loss of up to 101,000 jobs, and reduce

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[91] *Final Notice of Sale Gulf of Mexico Oil and Gas Lease Sale 261 Lease Stipulations*, Stipulation 4(B)(4) (describing measures required in "Expanded Rice's Whale Area") ("Lease Sale 261 Stipulations"). These requirements have been preliminarily enjoined. *See supra* note 3.

[92] Lease Sale 261 Stipulations at Fig. 1 (identifying the northeastern GOMx Rice's whale habitat from NMFS's 2020 biological opinion and a "Rice's Whale Expanded Area" that appears to match the remainder of NMFS's proposed Rice's whale critical habitat designation); *cf.* BOEM, Proposed Notice of Sale Gulf of Mexico Oil and Gas Lease Sale 261 Lease Stipulations, Stipulation 4(B).

[93] Such measures, added in advance of an ESA section 7 consultation (or, in the present case, a reinitiated consultation) are referred to by NMFS as "conservation measures," which are actions incorporated into a proposed action by a federal agency and which minimize or compensate for project effects. *See* Critical Habitat Report at 29.

[94] Critical Habitat Report at 54.

[95] U.S. Energy Information Administration, Gulf of Mexico Fact Sheet (June 21, 2023), https://www.eia.gov/special/gulf_of_mexico/.

[96] Energy and Industrial Advisory Partners, *The Economic Impacts of the Gulf of Mexico Oil and Natural Gas Industry*, at 69-86 (May 26, 2020), https://www.noia.org/wp-content/uploads/2020/05/The-Economic-Impacts-of-the-Gulf-of-Mexico-Oil-and-Natural-Gas-Industry-2.pdf.

[97] EIAP (2023) at 4-5.

[98] Lease Sale 261 Stipulations, Stipulation 4(B)(4).

government revenues up to $8.7 billion annually.[99] Furthermore, BOEM has now withdrawn from Lease Sale 261 all acreage falling within this expanded area (for a total of approximately six million acres),[100] which also appears to stem from the proposed critical habitat designation. This represents lost development opportunities and lost federal and state government revenues in the range of hundreds of millions of dollars.

NMFS must evaluate the economic and other relevant impacts of these conservation measures in a revised proposal, and propose any warranted exclusions based on that new analysis, before finalizing Rice's whale critical habitat. Failure to do so will violate the ESA's requirement to consider the economic impact of designating an area as critical habitat by comparing impacts with and without the critical habitat designation.[101] But at the very minimum, if NMFS evades its ESA responsibilities and proceeds with a final designation without a full assessment of the economic costs, the proposed designation of critical habitat across the central and northwestern continental shelf and slope of the GOMx should be excluded from the designation.[102] It cannot be disputed that designation of critical habitat across that area will result in significant impacts, and thus costs, to many industries and thousands of vessels that transit that area every day. The Proposed Rule identifies no benefits to designating that area as "critical habitat" and, as explained above, actually demonstrates that there are no such benefits given the extremely rare and questionable Rice's whale detections (much less demonstration of essential features) in that area. Therefore, even the *de minimis* costs NMFS has found, much less the *actual* costs that will be incurred, outweigh any benefits of a designation of the central and northwestern shelf and slope of the GOMx.[103]

IV. CONCLUSION

For the reasons set forth above, the Proposed Rule is overbroad, not based on the best available science, and arbitrary and capricious, in violation of the APA and the ESA. The Associations request that NMFS withdraw the Proposed Rule and reissue a proposed rule that complies with the APA, the ESA, and NMFS's implementing regulations.

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[99] EIAP (2023) at 2, Table 1.

[100] *See* Final Gulf of Mexico Oil and Gas Lease Sale 261 27 September 2023 Stipulations and Deferred Blocks (map illustrating that "Extended Rice's Whale Area" is not among lease tracts offered for sale and subject to stipulations). This acreage withdrawal has also been preliminarily enjoined. *See supra* note 3.

[101] 16 U.S.C. § 1533(b)(2); 50 C.F.R. § 424.19(b).

[102] NMFS has also failed to prepare a Statement of Energy Effects as required by Executive Order No. 13,211. *See* Exec. Order No. 13,211 (May 18, 2001) (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use).

[103] The Associations want to make clear that they vigorously oppose designation of that area in the first place, for the reasons stated elsewhere in this letter.

We appreciate your consideration of these comments. Please do not hesitate to contact the undersigned with any questions.

Sincerely,

Holly Hopkins
Vice-President, Upstream Policy
American Petroleum Institute

Dustin Van Liew
Vice President, Global Policy & Government Affairs
EnerGeo Alliance

Erik Milito
President
National Ocean Industries Association

Dan Naatz
COO and SVP of Government Relations and Political Affairs
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Attachment A

Review of the Rice's Whale Proposed Critical Habitat and Related Scientific Literature

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1 Background and Introduction

This report reviews the scientific information presented by NMFS in the proposed critical habitat rule for Rice's whale, *Balaenoptera ricei* (88 FR 47453, 24 July 2023), as well as other best available scientific information, and examines whether the proposed critical habitat is supported by the best available science. NMFS has taken into account several recent studies to inform the proposed critical habitat including Rosel et al. (2021), Soldevilla et al. (2021a,b), Kiszka et al. (2023), and updated habitat-based density modeling (Rappucci et al. 2023; Garrison et al. 2023). Nonetheless, there are many data gaps related to the occurrence, distribution, and life history of the Rice's whale.

In 2015, LaBrecque et al. (2015) defined a Biologically Important Area (BIA) in the waters of the northeastern Gulf of Mexico (GOMx) between the 100–300 m isobath from south of Pensacola Florida to west of Fort Meyers, Florida (Figure 1), on the basis that this area is biologically important to the Bryde's whale, *Balaenoptera edeni*. In 2016, after receiving a petition to list the Bryde's whale in the GOMx as an "endangered species" under the Endangered Species Act (ESA), NMFS conducted a status review of the "GoMx Bryde's whale" in which the BIA was taken into account when defining the habitat of the population (Rosel et al. 2016; Figure 1). In 2019, the GOMx Bryde's whale was listed as an "endangered species" under the ESA as the GOMx subspecies of the Bryde's whale (84 FR 15446, April 15, 2019). In 2021, a final rule was published that revised the listing of the GOMx Bryde's whale to reflect the change in taxonomy (Rosel et al. 2021) to Rice's whale, *B. ricei* (86 FR 47022, 23 August 2021). In the final listing rule, NMFS noted that critical habitat was not determinable at the time of the listing because of insufficient data on the areas occupied by Rice's whale. However, the final rule defined the "core habitat" as an area categorized by a convex hull polygon of all GOMx baleen whale sightings clipped at the 410-m isobath (NMFS 2021; Figure 1). On July 23, 2023, NMFS proposed to designate critical habitat for Rice's whale in the GOMx, consisting of approximately 28,270 square miles of continental shelf and slope-associated waters between the 100-m to 400-m isobaths. NMFS is currently requesting comments regarding the proposed rule (88 FR 47453, 24 July 2023).

2 Rice's Whale Life History

2.1 Reproduction and Growth

There is limited information on the life history of the Rice's whale, specifically regarding the reproduction and growth of the species; thus, information about the closely related Bryde's whale is provided, when appropriate. The Rice's whale is a rorqual whale most well-defined by three distinct ridges in front of its blowhole (NOAA 2023a). Its body is sleek and uniformly dark gray on top with a pale/pink colored belly (NOAA 2023a). The dorsal fin is pointed and strongly hook-shaped, located about two-thirds of the way back on its body (NOAA 2023a). The Rice's whale is commonly observed traveling in pairs but may travel alone or in larger groups while feeding (Maze-Foley and Mullin 2006). The estimated length of time between Bryde's whale generations is 18.4 years based on a maximum age of 58 years (Best 1977) and an age at first reproduction/sexual maturity of 9 years (Lockyer 1984; IWC 1997). Bryde's whales are believed to be pregnant for 10–12 months followed by up to 12 months of nursing (NOAA 2023a). Taylor et al. (2007) estimate that the Bryde's whale reproduces every 2–3 years (single calf). Based on the available life history of Bryde's whale, it has been inferred that Rice's whale has a low reproductive rate, consistent with other baleen whale species; however, we are unable to locate studies that document the Rice's whale reproductive cycle. It is also important to note that the life history traits of

Rice's whale are based on what is known about Bryde's whale within the North Pacific Ocean and off South Africa, which may not be directly applicable to the Rice's whale in the GOMx.

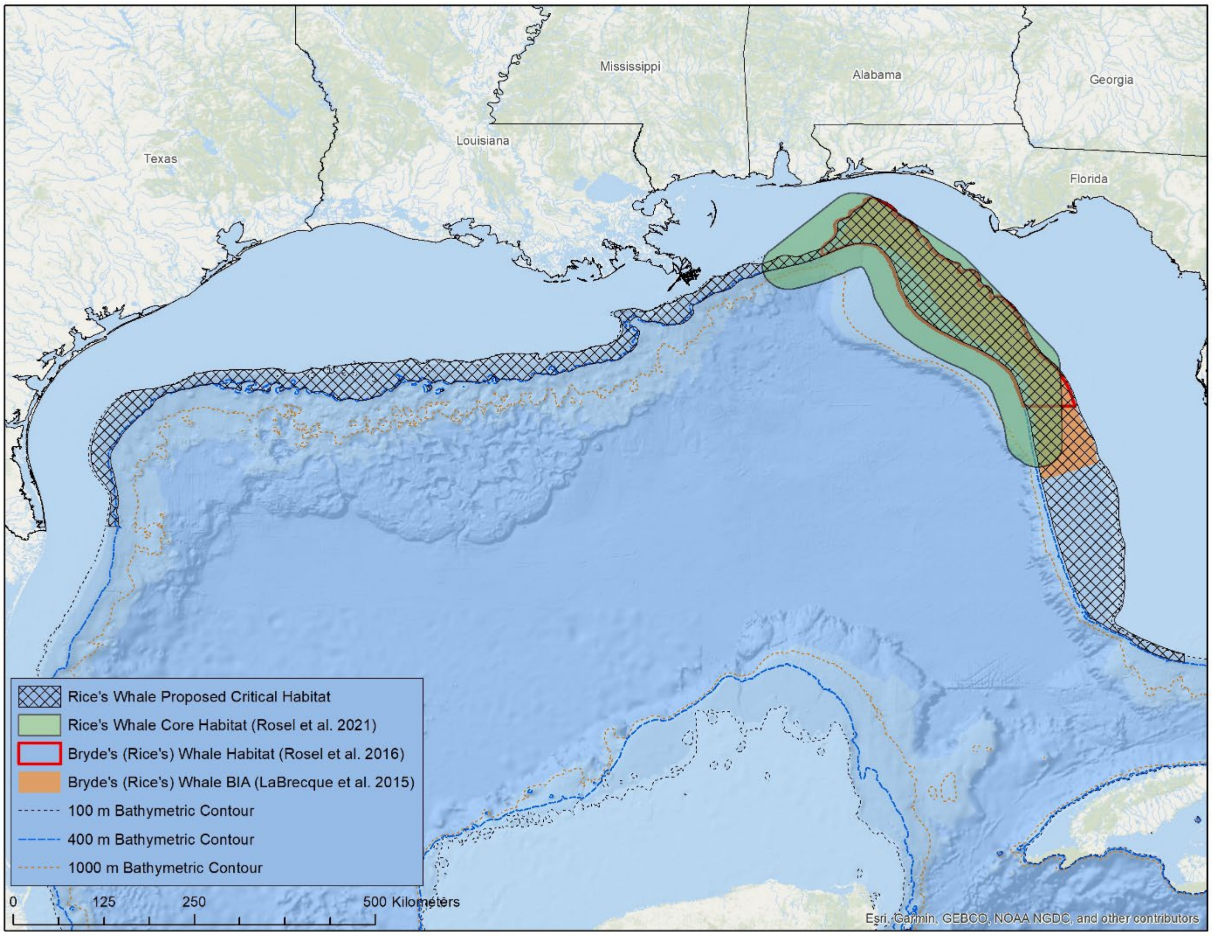

Figure 1. Rice's whale habitat designations from 2015–2021. BIA (orange shading) by LaBrecque et al. (2015), Bryde's (Rice's) whale habitat (red outline) defined in species status review by Rosel et al. (2016), "core habitat" (green shading) defined in Rice's whale taxonomy revision (Rosel et al. 2021) and proposed critical habitat (checkered area).

Stranding and biopsy data indicate both sexes of Rice's whale occur in portions of the GOMx (Rosel et al. 2021). The stranding records also include smaller Rice's whales, most likely calves, suggesting the species may engage in reproductive activity within portions of the GOMx (Rosel et al. 2021). The largest stranded individual was a 12.65 meters (m) lactating female reported in 2014 (Rosel and Wilcox 2014). Two Bryde's whale calves have been recorded stranded off the coast of Florida – one in the Florida Panhandle in 2006 (470 cm), and a juvenile north of Tampa, Florida, in 1988 (693 centimeter [cm]) (NOAA 2021; Edds et al. 1993). Current and maximum net productivity rates are unknown for this species due to limited data availability (Hayes et al. 2021). The most recent mean abundance estimate is 51 individuals (CV 0.50; Garrison et al. 2020) based on the summer 2017 and summer/fall 2018 line-transect surveys covering waters from the 200-m isobath to the seaward extent of the U.S. exclusive economic zone (EEZ).

2.2 Vocalizations

Balaenopterid whales are known to produce a variety of low-frequency tonal and broadband calls, ranging from 1–60 seconds, frequencies between 10–1,000 hertz (Hz), and high source levels from around 145 to over 190 dB re 1 µPa at 1 m (Richardson et al. 1995; Miller et al. 2021). Bryde's-like whale calls are easy to differentiate from those produced by other low-frequency cetaceans within the GOMx (e.g., fin and sei whales) (e.g., Baumgartner et al. 2008; Delarue et al. 2009; Castellote et al. 2012). Distinct low-frequency (60–950 Hz) pulses, tonals, and moans have been reported in free-ranging Bryde's whale adults and calves in the Eastern Tropical Pacific, Gulf of California, southern Caribbean, and North Pacific (Cummings et al. 1986; Oleson et al. 2003; Heimlich et al. 2005; McDonald 2006; Kerosky et al. 2012).

The call repertoire of the Rice's whale is not well known; however, several call types have been determined to be produced by Rice's whales in certain areas of the GOMx including three verified calls and a number of proposed high- and low-frequency downsweep call types (Rice et al. 2014; Širović et al. 2014; Soldevilla et al. 2022a,b). The first verified call type is characterized by a sequence of two or more short-duration downsweep pulses (mean: 8 downsweeps, range 2–27) ranging in frequency from 110 ± 4 to 78 ± 7 Hz (mean ± standard error [SE]) with a mean duration of 0.4 ± 0.01 seconds, an inter-pulse interval of 1.3 ± 0.01 seconds, and source level of 155 ± 14 dB re 1 µPa at 1 m (Rice et al. 2014; Širović et al. 2014). This pulsed downsweep sequence was recorded during concurrent visual and passive acoustic monitoring (PAM) surveys using directional sonobuoys deployed in the surrounding waters of the De Soto Canyon within the northeastern GOMx (Širović et al. 2014).

A second call type of the Rice's whale was recorded during the deployment of four bottom-mounted archival marine autonomous recording units (MARUs) within the northeastern GOMx (Rice et al. 2014). This long-moan call type starts with a short duration (2–3 seconds) constant tone at ~150 Hz, followed by a frequency-modulated downsweep, and ending with a long (10–20 second) duration tonal tail at ~100 Hz (Rice et al. 2014). During a long-term PAM study conducted by Soldevilla et al. (2022b), the loan-moan call type was recorded on a maximum of 90–100% of study days within the northeastern GOMx, suggesting consistent presence of the Rice's whale near the De Soto Canyon (Soldevilla et al. 2022b).

The third verified call starts with the long-moan call but is then followed by a tonal sequence of 1–6 narrow-band nearly constant-frequency tones in a sequence, with the tonals centered at ~103 Hz and an average duration of 3.6 seconds per tone (Rice et al. 2014). Other than the three verified call types, similar low-frequency downsweep stereotyped calls, recorded primarily outside of the core habitat in the northeastern GOMx, have been proposed as potential Rice's whale calls (Soldevilla et al. 2022b).

Soldevilla et al. (2022b) conducted a single-year deployment of autonomous PAM recorders at five sites along the northern GOMx shelf to determine where the Rice's whale occurs seasonally (Figure 2). Calls recorded at a 6th long-term site located within the known core habitat of the Rice's whale in the northeastern GOMx were used for comparison. Six new stereotyped variants calls were detected at the northwestern GOMx recording sites. These western sub-type calls had many similar features to the northeastern GOMx long-moan call including a brief 2–3 second start, a downsweep transition, and long 10–20 second tonal tail to the call (at ~100 Hz) (Soldevilla et al. 2022b). These similarities with the long-moan call also make it likely that these calls are from Rice's whales, as these same features are what distinguish the Rice's whale long-moan from other whale species. However, visual confirmation of the species making the western sub-type calls has not occurred, leaving some uncertainty. It is also theoretically possible that the western sub-type calls are from whales that do not regularly occur in the northeastern GOMx.

The six western sub-type calls are distinguished from one another, as well as from the long-moan eastern call, by the start of the call. Specifically, the transition zone is distinctly different between each western sub-type call and is followed by a sharp frequency drop (Soldevilla et al. 2022b). Western variant calls were rarely recorded within the known Rice's whale core habitat (150 out of 66,583 total calls recorded [<0.25%] on 21 recording days [6.4%]). At each of the five sites where western variant calls were detected, the calls showed temporal clustering with long periods of time (often multiple weeks) without any calls (Soldevilla et al. 2022b; Figure 6).

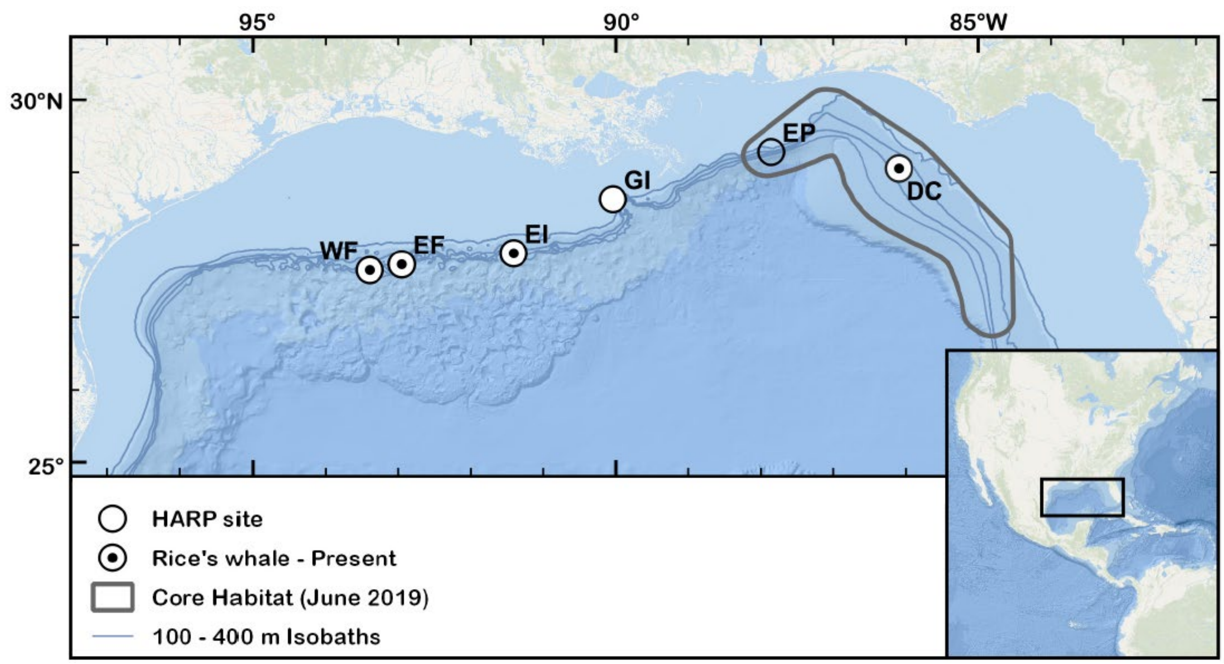

Figure 2. [*Reproduced from Soldevilla et al. 2022b*] Location of acoustic recording devices deployed at sites in potential Rice's whale habitat from July 2016 to August 2017 and a long-term acoustic recording site in the core habitat area. White-filled circles indicate successful data collection; black dots indicate Rice's whale call presence.

2.3 Feeding Ecology

Members of the Bryde's whale complex have been observed feeding using a variety of foraging techniques at the sea surface on a variety of prey species, largely in the order *Clupeiformes* (sardines, herring, menhaden, and anchovies) (Best 2001; Konishi et al. 2009; Murase et al. 2007; Siciliano et al. 2004; Tershy 1992; Watanabe et al. 2012). The specific diet of the Rice's whale is poorly characterized as few studies have observed Rice's whale foraging habits (NMFS 2023b). Kiszka et al. (2023) deployed mid-water fish trawls in the summer of 2019 at stations during daylight hours in Rice's whale core habitat in the northeastern GOMx to investigate prey selection in relation to prey availability and energy density.

Measurement of carbon isotopes, energy content, percent lipid, and percent protein were estimated from samples of each species collected within the trawls (e.g., *Ariomma bondi, Doryteuthis pealeii, Diaphus dumerilii, Marolicus weitzaman*) and compared to stable isotopes in biopsy samples from Rice's whales also collected in the northeastern GOMx (Kiszka et al. 2023). Results indicated that Rice's whales are selective predators consuming schooling prey with the highest energy content, specifically *A. bondi*. This species had the lowest abundance, but the highest biomass of potential prey in trawls sampled within the northeastern GOMx. Kiszka et al. (2023) deployed trawls only within the currently known Rice's whale core habitat in the northeastern GOMx; thus, the study does not provide evidence for the presence of this prey species, or use of it by Rice's whale, elsewhere in the GOMx. If *A. bondi* or other suitable prey are present elsewhere in the GOMx, further research is required to determine whether Rice's whales move out of the core habitat area for feeding purposes.

Both echosounder and trawl data collected in the Rice's whale core habitat within the northeastern GOMx showed that small schooling fish and invertebrates concentrate near the seafloor during the daytime, with occasional high-density aggregations, and move upward closer to the surface at night (Kiszka et al. 2023; NOAA 2023b). Although the echosounder and trawl survey data show the daily patterns of possible prey within the Rice's whale core habitat, it is unknown how Rice's whales locate their prey. One attribute of the proposed critical habitat suggests that the Rice's whale may use sound to locate prey at depth, but there is no evidence to support this theory (see additional discussion in Section 4.2.1). Additionally, it is unknown whether the small, schooling fish Rice's whales feed on that are found in the core habitat are present in sufficient numbers year-round in order to meet the daily energetic demands of Rice's whales (Kiszka et al. 2023).

Limited information is available regarding the foraging behaviors of Rice's whales in the GOMx. It has been inferred that Rice's whales spend the daytime diving near the seafloor and spend the majority of their time at night closer to the surface based on the tagging of a single Bryde's whale (Soldevilla et al. 2017). Using a kinematic tag attached to a Rice's whale for 3 days in the core habitat, dive patterns showed a slow descent to the seafloor (271 m) where the whale was then observed making a circular lunge pattern which was associated with foraging behavior (Soldevilla et al. 2017). Foraging lunges were characterized by concurrent changes in pitch, roll, and depth associated with short increases in broadband flow noise (Soldevilla et al. 2017). During the night, the whale was observed making shallow dives with occasional deeper dives between 30–150 m (Soldevilla et al. 2017).

3 Rice's Whale Occurrence and Distribution

The location of confirmed and suspected Rice's whale sightings and strandings was summarized by Rosel et al. (2021) and a map showing those locations is reproduced in Figure 3. The core habitat for the Rice's whale identified in Rosel et al. (2021) was defined using a convex hull polygon of all GOMx baleen whale sightings clipped at the 410 m isobath (because the deepest sighting of a rice's whale occurred in water 408 m deep) (NMFS 2021; Rosel et al. 2021). This area was based on 119 recorded sightings of GOMx baleen whales (Rice's whale, Rice's/sei, and Rice's/sei/fin) visually observed between 1989–2018 (Figure 3), telemetry locations (n = 52) from a single female Rice's whale tagged in 2010, and focal-follow sighting locations (n = 41) of a whale tagged with an Acousonde tag in 2015 (Rosel et al. 2021; Soldevilla et al. 2017). The convex hull polygon was then buffered by 30 km to account for the 10 km strip width of surveys as well as an additional 20 km to account for the median daily range of movements from satellite-tagged animals (Rosel et al. 2021). The addition of the full 20 km median daily range of movement to the buffer is illogical because assuming a total of 20 km of movement in a day means that a whale could only move 10 km beyond the maximum extent of known sightings and return those 10 km to get back within a single day. A 10–15 km buffer around the convex hull polygon is better supported by the movement data and potential error associated with sighting locations.

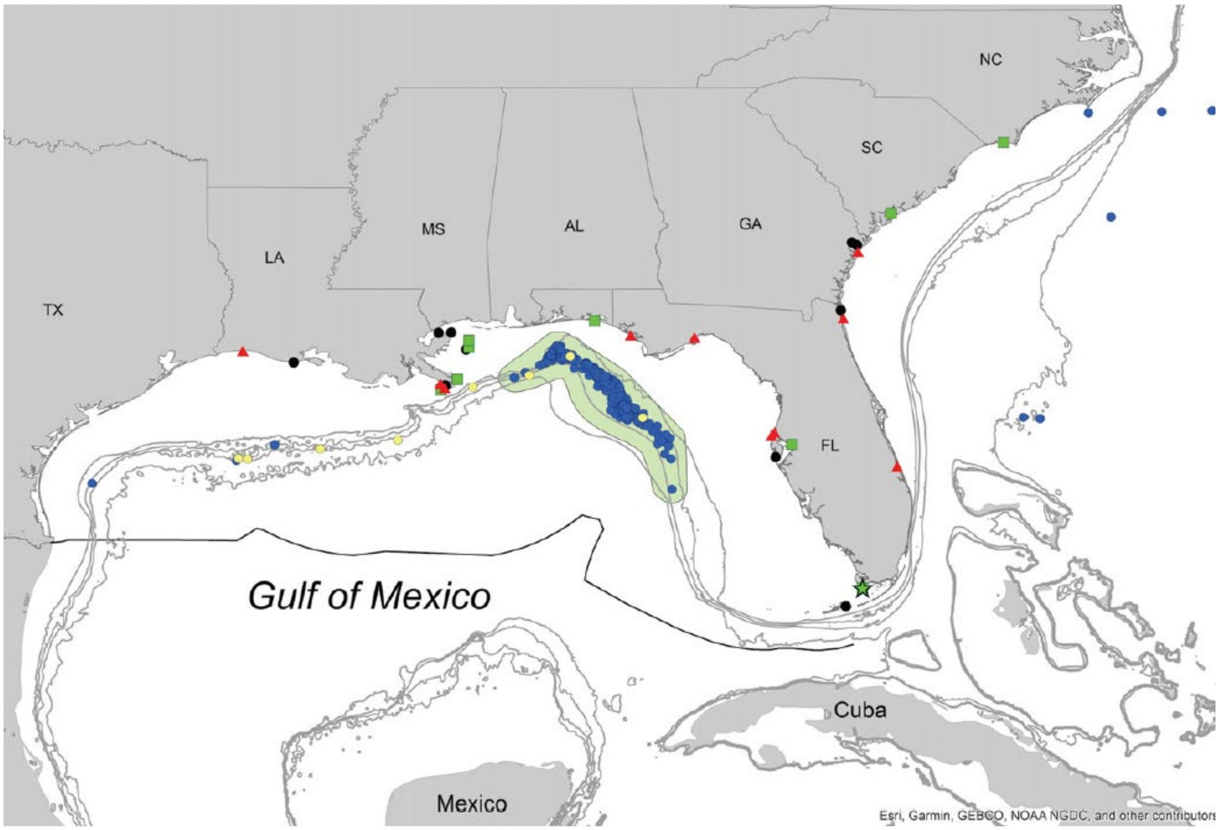

Figure 3. [R*eproduced from Rosel et al. 2021*]. Distribution of all sightings and strandings of Bryde's-like whales in the Gulf of Mexico and Atlantic U.S. EEZ. All visual survey sightings (blue circles) recorded as "Bryde's," "Bryde's/sei," and "Balaenoptera sp.". whales during NMFS vessel and aerial surveys from 1992 to 2019, including all sightings listed as "Bryde's/sei whales" or "Balaenoptera sp." in the western North Atlantic and sightings recorded by protected species observers (PSO) on seismic vessels (yellow circles) that could potentially have been a baleen whale. All strandings recorded as "Bryde's whales" (red triangle; presence of rostral ridges confirmed in stranding record or photos) or unconfirmed Bryde's-like whale (black circle; could not confirm presence of rostral ridges in stranding record), and genetically confirmed Gulf of Mexico Bryde's-like whale (green square) through May 2019, including the extralimital strandings in the western North Atlantic. Green polygon represents the core habitat for the whales in the northeastern Gulf of Mexico. The 100 m, 200 m, 400 m, and 1,000 m isobaths and the U. S. EEZ are shown.

The latest habitat-based marine mammal density models predict that the Rice's whale occurs within the core habitat, but also throughout the central and northwestern GOMx within the 100–400 m isobath (Rappucci et al. 2023; Garrison et al. 2023; Figure 4). This is based on the selection of a statistical model that identified a set of habitat characteristics (water depths 100–400 m, seafloor water temperatures 10–19 °C and intermediate Chlorophyll-*a* concentrations) most often associated with locations where confirmed Rice's whale sightings have been recorded (almost exclusively in the core habitat area, Figure

5). That set of habitat characteristics was then used to predict the presence of Rice's whales throughout the GOMx.

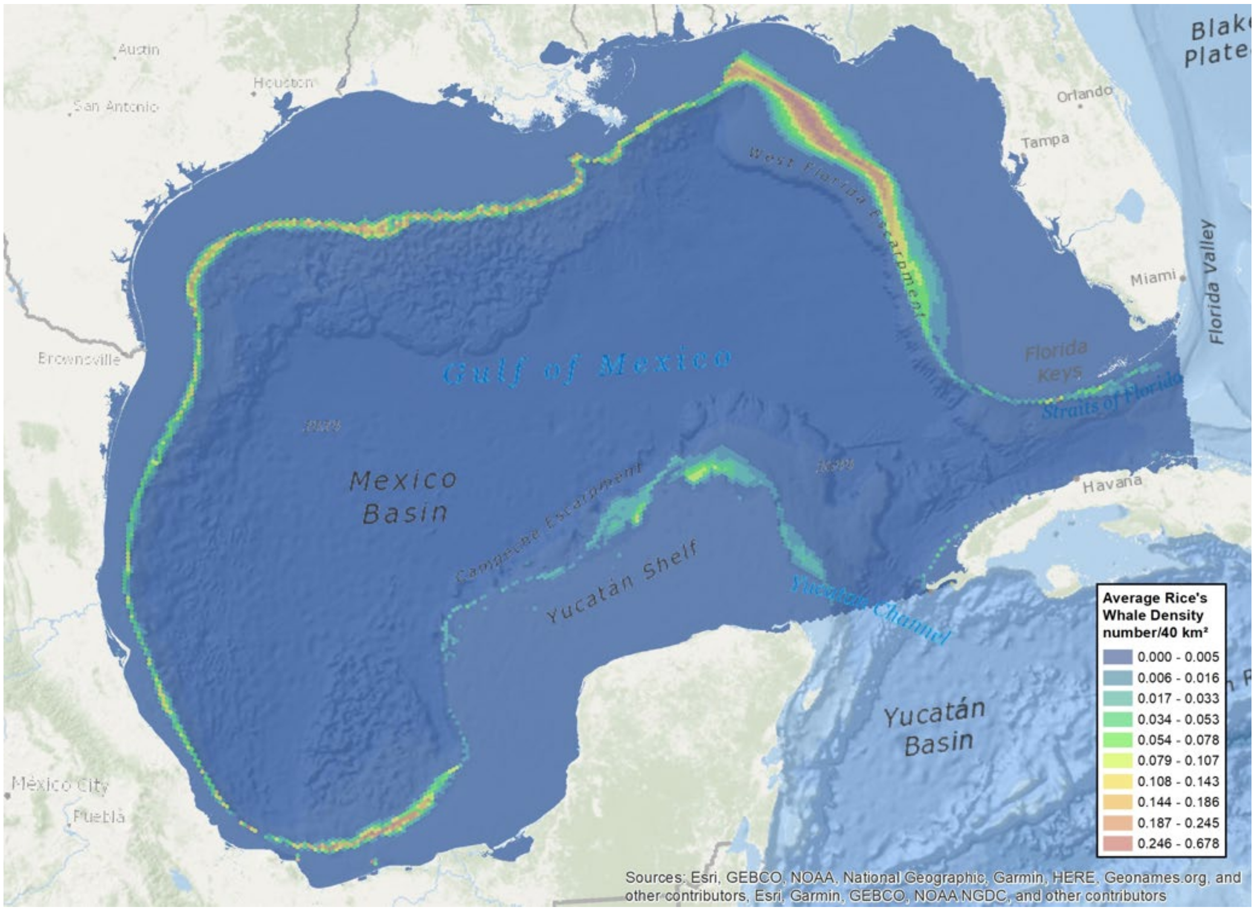

Figure 4. Annual average predicted density of Rice's whales in the GOMx calculated from monthly habitat based density predictions (Garrison et al. 2023).

While this overall modeling approach is generally accepted for marine mammals, there are significant limitations to the ability of these types of models to predict the presence of species outside of where survey effort or observations were made. The prediction of species presence outside of areas where detections were made assumes that species-habitat relationships are consistent throughout the GOMx and, as noted by the authors, this may not be the case (Garrison et al. 2023; Rappucci et al. 2023). The physical characteristics and resulting model-predicted higher density of Rice's whales occur primarily in the northeastern core habitat. It cannot be assumed that the simple presence of similar physical features elsewhere in the GOMx means that Rice's whales will be present there as well. In fact, Garrison et al. (2023) note such limitations and caution against the over-interpretation of their model predictions for species in the southern GOMx. This same level of caution should be applied to model predictions in areas where survey effort occurred, but only a single sighting was recorded (Figure 5).

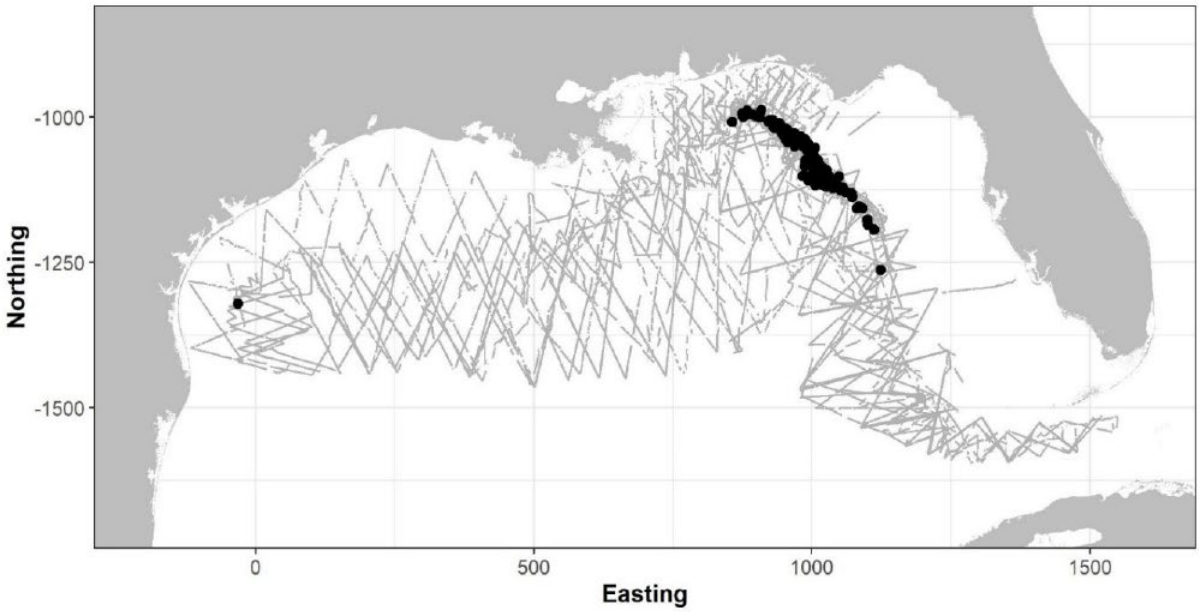

Figure 5. [*Reproduced from Garrison et al. 2023*] Survey effort and Rice's whale sightings used to develop the Rice's whale habitat-based density models (Garrison et al. 2023).

Overprediction is a common issue in Species Distribution Models (SDMs) and can have significant effects when used in conservation planning (Mendes et al. 2020; Velazco et al. 2020). Overprediction is common because SDMs rarely account for biotic interactions (e.g., competition, predation) or dispersal constraints (e.g., philopatry), and rely on coarse environmental datasets – of which each tend to result in coarser/broader predictions than actual populations exhibit (Mendes et al. 2020). Without accounting for potential overprediction of SDMs this "can lead to a misallocation of limited economic resources towards low-effective regions and misdirect conservation policies" (Velazco et al. 2020). As such, it is considered important to "…emphasize that predictions from SDMs, especially when used to inform conservation decisions, should be treated as hypotheses to be tested with independent data rather than as stand-ins for the population parameters we seek to know" (Lee-Yaw et al. 2021). In the case of the Rice's whale SDM that was used in defining Critical Habitat, it is difficult to ascertain exactly what environmental variables were included in the initial analyses. It appears that the center of abundance is in the Desoto Canyon region and eastward, along the edge of the West Florida Shelf. This Desoto Canyon region is somewhat unique within the Gulf of Mexico and there are a variety of biological discontinuities that occur here. Phylogeographic breaks in this region occur for species with diverse life and evolutionary histories, including octocorals, crustaceans, and squid (Quattrini et al. 2014, Drumm & Kreiser 2012, Herke & Foltz 2002), demographic breaks exist here for several fish species (Johnson et al. 2009), and the region has the greatest decapod species richness in the Gulf of Mexico (Wicksten & Packard 2005).

Whether Garrison et al. (2023) included variables that could, in part, account for features that might be unique to this area (e.g., distance to the west wall of the Desoto Canyon, predictions of prey occurrence, the acoustic soundscape), is unclear. However, the variables included in the model that were ultimately used to predict Rice's whale density would not specifically account for the physical and biogeographic uniqueness of this region. It is interesting to note that the SDM of Garrison et al. (2023) predicts abundances in the U.S. Gulf of Mexico ranging from 82–280 individuals by month (low =

October, high = January) whereas Roberts et al. (2015) predict 44 individuals. In concern that their models might be overpredicting Rice's whale, Roberts et al. (2015) state "The habitat predicted by our model might be too expansive–for example, Bryde's whales may not occur near the Florida Keys or west of the Mississippi River Delta, even though the model predicts them in these locations. …In any case, in the northeastern area where all of the sightings occurred in the 1994–2009 period, our model predicts density to be an order of magnitude or more higher than these more questionable areas."

As noted above, the model predicted presence of Rice's whale in the western GOMx is not well supported by visual detections which are limited to the single genetically verified Rice's whale sighting off Corpus Christie, Texas in 2017 (included in the modeling), two medium-size balaenopterid whale sightings off Louisiana, and two Bryde's-like whale strandings in western Louisiana none of which were confirmed to be Bryde's or Rice's whales (Rosel et al. 2016, 2021). PAM data collected in the central and northwestern GOMx provides support for the infrequent presence of Rice's whales west of the core habitat area in the northeastern GOMx. Rice's whale western sub-type long-moan variant calls were present on a maximum of 16% of study days within the northwestern GOMx compared to the original long-moan call being present on 90–100% of days at the northeastern GOMx site (Soldevilla et al. 2022b). The temporal pattern of vocalizations detected within the northwestern GOMx (Figure 6) does not suggest the types of behavior(s) the whales are engaging in while present in the area (e.g., breeding or feeding). For example, if this area were used for breeding on a seasonal basis, one might expect a period of persistent presence at the site followed by a longer period of absence the rest of the year. Instead, calls were only detected for a day to a week at a time, followed by an absence of calls for several weeks to more than a month.

Considering the very low number or absence of detections at the PAM deployment sites in the northcentral GOMx (Soldevilla et al. 2022b), it remains unknown whether the whales occasionally detected in the northwestern GOMx near the Flower Garden Banks National Marine Sanctuary (FGBNMS) are from the same population or social group that is regularly present within the core habitat area in the northeastern GOMx. There is a lack of data on the possible occurrence of Rice's whales outside the U.S. GOMx. NMFS (2023b) assumes that there are no Rice's whales outside the U.S. GOMx, and that there are no Rice's whales moving into the GOMx from outside of the Gulf despite two strandings on the U.S. Atlantic coast (in South Carolina and North Carolina, Figure 3; Rosel et al. 2021). The low number or lack of detections at the northcentral GOMx sites (Soldevilla et al. 2022b) could have several explanations including that few or no Rice's whales use that area, that Rice's whales did not or rarely vocalized when present in the area when the recorders were deployed, or that the ambient sound conditions were too loud to detect Rice's whale calls very far from the recorders. All of these alternative explanations should be thoroughly considered and evaluated when using the acoustic data as a part of defining the distribution and habitat of Rice's whale.

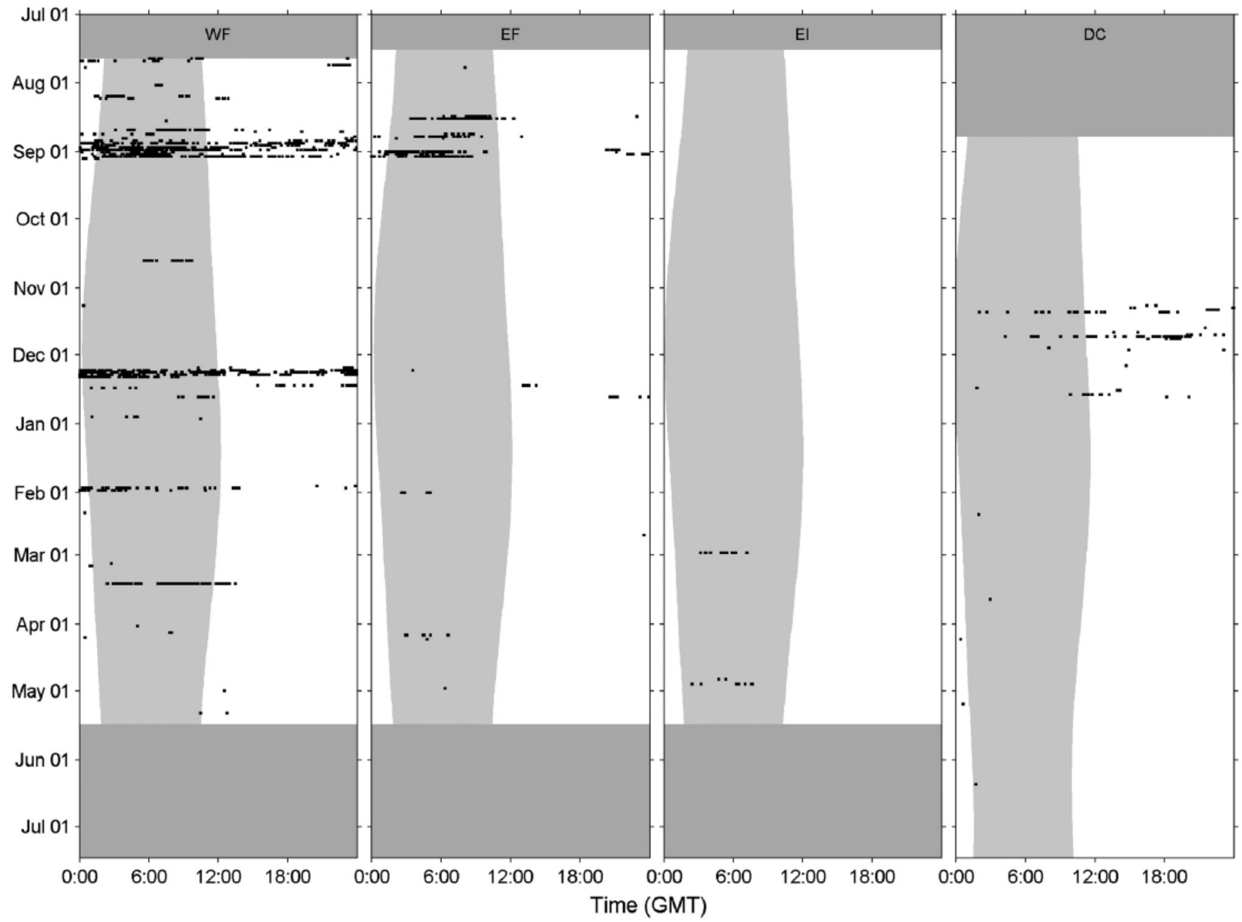

Figure 6. [*Reproduced from Soldevilla et al. 2022b*] Temporal occurrence of Rice's whale calls from long-term spectral average analyses at the WF (western Flower Garden Banks), EF (eastern Flower Garden Banks), EI (south of Eugene Isle), and DC (De Soto Canyon) from 2016–2017. Gray hourglass shading represents nighttime, while darker gray shading indicates periods of no effort. The black markers represent western long-moan variant calls; eastern long-moans detected at site DC are not plotted.

4 Proposed Critical Habitat

Critical habitat is defined in Section 3 of the ESA (16 U.S.C. 1532(3)), as "(1) Specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation." The proposed critical habitat for Rice's whale in the GOMx (88 FR 47453, 24 July 2023) appears to be primarily based on the habitat-based density model by Garrison et al. (2023). The model predicts the whales' presence throughout the GOMx in the 100-400 m water depth range.

4.1 Occupied Habitat

Here we refer to occupied habitat (or geographical areas occupied by the species), as outlined in the statutory definition of critical habitat (16 U.S.C. 1532(5)(A)(i)). By regulations, it is defined as "an area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e., range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g., migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals)" (50 CFR 424.02).

NMFS (2023b) states "we have determined that at the time of listing Rice's whales occupied the Gulf of Mexico" (pg. 47460). This statement is only true to the extent that Rice's whales are only known to occur within the GOMx (aside from the two strandings along the southeastern U.S. Atlantic coast (Figure 3; Rosel et al. 221). It is incorrect to state that Rice's whales actually occupy the entire GOMx. At present, there are no data to suggest that all portions of the GOMx are actually occupied by the Rice's whale.

There are no available data to support that Rice's whales occur in shallower or deeper waters of the GOMx away from the continental shelf break. There have been no reported sightings in waters <100 m or >408 m deep (Rosel et al. 2021). Based on sightings and acoustic detections (Rosel et al. 2021; Soldevilla et al. 2022a,b), the only habitat in which Rice's whales are known to consistently and regularly occur in the GOMx is the core habitat in the northeastern GOMx (Figure 1). As reviewed in Section 3, evidence of Rice's whale occurrence in the northwestern GOMx is based on infrequent and irregular acoustic detections (Soldevilla et al. 2022a,b) and a single confirmed sighting (NMFS 2018a). There is no evidence of persistent presence or a regular pattern of occurrence in the acoustic data (Soldevilla et al. 2022b) that would provide insight into how the whales use this area, such as for migration, seasonal foraging, or breeding.

4.2 Physical and Biological Features

ESA regulations define physical and biological features as "those that occur in specific areas and that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features." (50 CFR 424.02). NMFS (2023b) has identified one "catch-all" feature as essential to the conservation of the Rice's whale: "GOMx continental shelf and slope associated waters between the 100 and 400 m isobaths that support individual growth, reproduction, and development, social behavior, and overall population growth." However, very little is known about the life history of Rice's whales (see Section 3), and much of the information has been gleaned from Bryde's whales (NMFS 2023b). Thus, there is very little scientific evidence upon which to precisely define the physical and biological features that support the largely unknown life-history needs of the Rice's whale.

NMFS (2023b) assumes that "Rice's whales rely entirely on the GOMx continental shelf and slope waters between the 100 and 400 m isobaths to support all of their life history stages", although the evidence to support this is largely limited to the location of all visual sightings. It is inferred that Rice's whales, particularly in the core habitat, use the area for reproduction and feeding.

Indirect evidence of feeding within the core habitat is provided by Soldevilla et al. (2017) and Kiszka et al. (2023). However, it is still somewhat uncertain what Rice's whales actually prey on. According to NMFS (2023b), "Diet is poorly characterized for Rice's whales" and, in fact, very few studies have examined the feeding ecology of Rice's whales. There have been no studies that examined stomach contents or fecal samples and no surface feeding events have been reported (NMFS 2023b). Soldevilla et al. (2017, 2022a) did report dives in the core habitat to depths near the seafloor with lunging and the lunging behavior is commonly associated with foraging in baleen whales. As summarized in Section 2.3, Kiszka et al. (2023) examined the feeding ecology of Rice's whales in the northeastern GOMx via stable isotopes, prey availability, and energy density, and suggested that Rice's whales are selective predators consuming schooling prey with the highest energy content, specifically *A. bondi*. However, there is no direct evidence to show what specific prey species Rice's whales are actually feeding on within or outside the core habitat (NMFS 2023b).

Although NMFS (2023b) noted that there is evidence of breeding in the GOMx, this statement appears to be based on records of smaller Bryde's-like whales in the GOMx, but no confirmed records of living Rice's whale calves. As no mating or births have been reported in the GOMx, there is no direct evidence to indicate that breeding or calving actually occurs in the GOMx. Nonetheless, indirect evidence was offered by Rosel et al. (2021) in that two Bryde's whale calves have been recorded stranded off the coast of Florida – one in the Florida Panhandle in 2006 (470 cm), and a juvenile north of Tampa, Florida, in 1988 (693 centimeter [cm]) (NOAA 2021; Edds et al. 1993). This suggests that calving likely does take place in the eastern GOMx.

Additionally, it is unknown how much of the GOMx continental shelf and slope-associated waters between the 100 and 400 m isobaths actually support the life history needs of the Rice's whale. Based on the regular occurrence (both sightings and acoustic detections) in the core habitat (Rosel et al. 2021; Soldevilla et al. 2022b), it is likely that this region has more of the essential features needed for Rice's whale than the rest of the shelf/slope region in the GOMx. In particular, the De Soto Canyon region (the area where the core habitat is located) appears to have unique oceanographic characteristics that are not known to occur in the same combination anywhere else in the GOMx. Because of the De Soto Canyon's physical structure and location relative to water masses, upwelling appears to drive the circulation patterns in this area, which in turn leads to recurring cold-water masses that are atypical for its latitude (Schroeder and Woods 2000). Farmer et al. (2022) noted that in addition to water masses such as the Loop Current, wind also plays a factor in the persistent upwelling in this region. The Mississippi River and the Loop Current and associated eddies interact in this area leading to mixing (Kendall and Schroeder 2000), which can in turn lead to elevated productivity. The variation in bottom features of the Canyon itself likely has a significant effect on the biological processes in the area (Schroeder and Woods 2000). Despite the uniqueness of the De Soto Canyon area, it is largely unknown why Rice's whales congregate in this area. Areas of seasonal upwelling are also known to occur along the slope of the western and central GOMx (Zavala-Hidalgo et al. 2006); it is uncertain whether other areas of upwelling may be important to Rice's whales.

A more thorough evaluation of existing data describing the physical and biological oceanography in the De Soto Canyon and core habitat area should have been performed to determine what characteristics make this area unique and result in it being the only location where Rice's whales are consistently present. The oceanographic features most associated with Rice's whale sightings in this area (water depths 100–400 m, seafloor water temperatures 10–19 °C and intermediate Chlorophyll-*a* concentrations, as determined by the habitat-based density model selection process (Garrison et al. 2023)) are not necessarily what make this area unique. That combination of oceanographic features are present along the shelf break throughout much of the GOMx. Therefore, the habitat-based density model predicts Rice's whales are present in all of those other areas, even though what makes the De Soto Canyon and core habitat area uniquely suitable to the Rice's whale may not actually be present in those locations.

4.2.1 Attributes

NMFS (2023b) noted the following "attributes" of the single broad biological and physical feature used to define critical habitat: "(1) Sufficient density, quality, abundance, and accessibility of small demersal and vertically migrating prey species, including scombriformes, stomiiformes, myctophiformes, and myopsida; (2) Marine water with (i) elevated productivity, (ii) bottom temperatures of 10–19 degrees Celsius, and (iii) levels of pollutants that do not preclude or inhibit any demographic function; and (3) Sufficiently quiet conditions for normal use and occupancy, including intraspecific communication, navigation, and detection of prey, predators, and other threats." NMFS (2023b) notes that these attributes "support Rice's whales' ability to forage, develop, communicate, reproduce, rear calves, and migrate throughout the GOMx continental shelf and slope waters and influence the value of the feature to the conservation of the species".

The first attribute identifies likely prey species of Rice's Whale. Having sufficient prey available to sustain life history functions is certainly an essential part of potential critical habitat. However, it does not appear that an effort was made to identify where else in the GOMx, outside of the core habitat where the Kiszka et al. (2023) study occurred, these species may occur and whether that information could be used to better define where critical habitat is or may be located. Additional information regarding the distribution of the *A. bondi* species in the GOMx outside of the core habitat area can be found within the fishery-independent survey system (FINSS) (NMFS 2018b). A brief review of data from "fish" and "high opening" trawls from 1985–2006 and shrimp trawls from 1982–2022 in the FINSS for the presence of *A. bondi* in the GOMx shows that *A. bondi* primarily occurs near the shelf edge (Figure 7), but also in water depths <100 m where no Rice's whales have been observed (NMFS 2018b). Using a catch-per-unit-effort (CPUE) metric, *A. bondi* is not uniformly distributed within shelf and slope waters of the GOMx, but tends to occur in high densities in a few locations (Figure 8). The FINSS data and other fisheries information were available when assessing Rice's whale habitat requirements and should have been thoroughly evaluated and used to define specific biological and physical oceanographic features necessary for Rice's whale prey species.

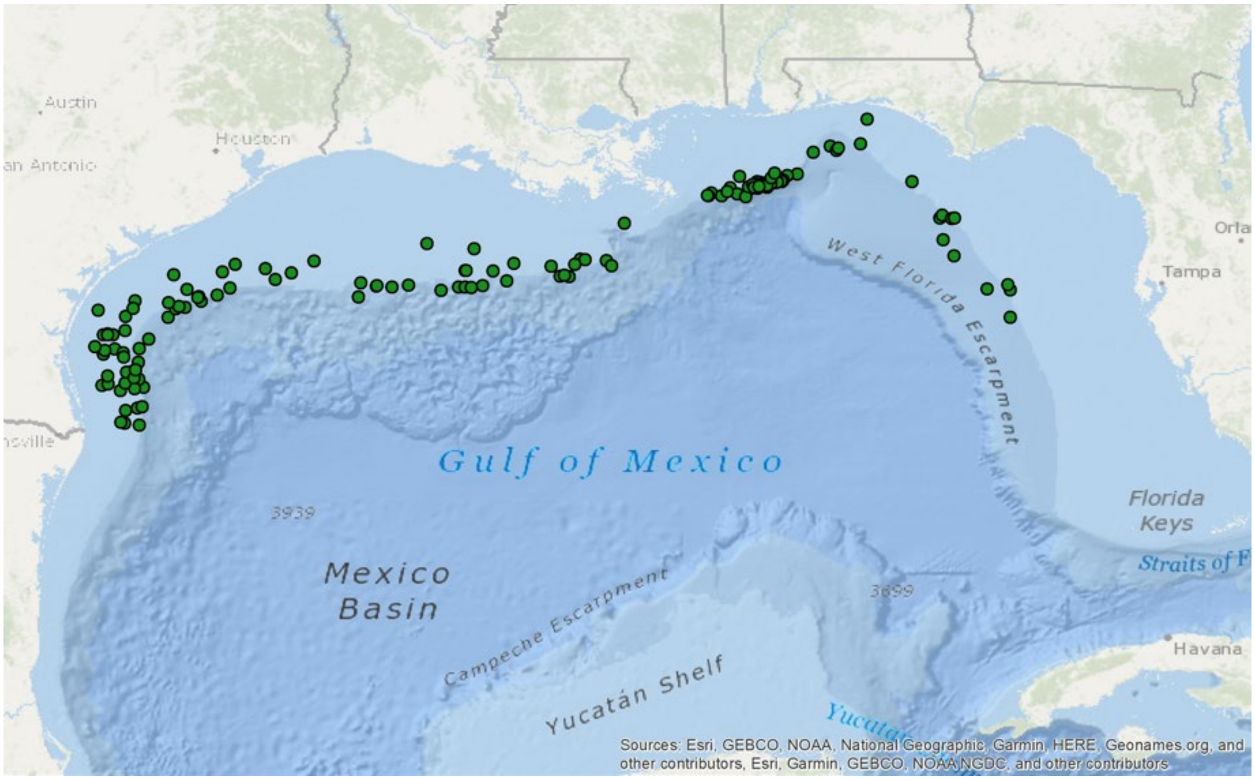

Figure 7. Map showing the location of all "fish", "high opening" and shrimp trawl samples in which *A. bondi* were present in the fishery-independent survey system database.

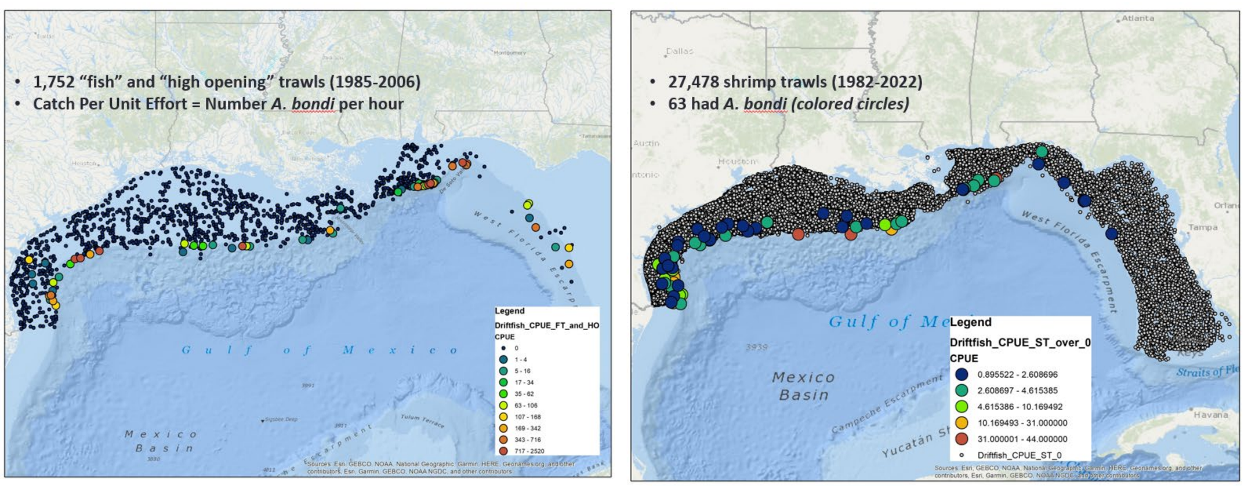

Figure 8. Map showing the catch per unit effort (number of *A. bondi* per hour) from fishery-independent survey "fish" and "high opening" trawls (left panel) and shrimp trawls (right panel).

The second attribute identifies marine waters with a specific range of seafloor water temperatures and elevated productivity that have low levels of pollutants. The reasoning behind the identification of these specific parameters is not explained in NMFS (2023b). We assume that these parameters are somehow related to where Rice's whale prey species occur or what those species require, but a rationale or evidence for this is not clearly presented in NMFS (2023b). According to NMFS (2023b) and Farmer et al. (2022), habitat-based density modeling identified surface chlorophyll-a concentration, water depth, and bottom temperature as the primary factors that predict Rice's whale habitat. Farmer et al. (2022) references Garrison (2021) regarding oceanographic characteristics of the core habitat, but that document does not appear to be publicly available. The modeling results presented in Garrison et al. (2023) and Rappucci et al. (2023) do show that Rice's whale detections are most associated with waters 100–400 m deep with bottom temperatures of 10-19°C and intermediate surface chlorophyll-a concentrations. Farmer et al. (2022) also noted that the core habitat area is characterized by (1) seasonal advection of low salinity, high productivity surface waters, leading to persistent upwelling driven by wind and intrusion of the Loop current, and (2) mixing of coastal and deep oceanic waters. These additional features noted by Farmer et al. (2022) were not present in the final habitat-based density model selected by Garrison et al. (2023). Therefore, the predictions of that model are limited to the few oceanographic variables that are not very unique to the De Soto Canyon and core habitat areas. Thus, the habitat-based density model may not represent the unique oceanographic characteristics of Rice's whale habitat area and therefore over-predict the occurrence of Rice's whales outside of the core habitat.

The third attribute relates to sufficiently quiet conditions for normal use and occupancy. However, no definition is provided for what is considered 'sufficiently quiet conditions' for Rice's whale or what is meant by 'normal use and occupancy'. NMFS (2023b) notes that Rice's whales rely on their ability to produce and receive sound within their environment to navigate, communicate, and detect prey and predators"; however, no sound threshold levels specific to Rice's whales are available to examine what levels may interfere with communication, navigation, or detection of prey or threats. NMFS (2023b) also noted that Rice's whale foraging strategy "is adapted to the waters near the continental shelf and slope of the Gulf of Mexico", and that Rice's whale may use acoustic cues to find prey near the seafloor where light levels are diminished; however, there have been no directed studies to test the hypothesis that baleen whales use acoustic cues to find prey. Thus, there is no evidence to support that sound plays a role in foraging for Rice's whales.

4.2.2 Specific Areas as Critical Habitat

NMFS is required to "determine the specific areas within the geographical area occupied by the species that contain the physical or biological features essential to the conservation of the species." 50 CFR 424.12(b)(1)(iii). According to NMFS (2023b), the geographical area occupied by Rice's whale is the GOMx and the specific area is the shelf/slope between the 100-m and 400-m isobaths. However, the entire GOMx is not occupied by Rice's whale. Based on the available data, the shelf/slope area between the 100-400 m isobaths shows high occurrence in some areas (e.g., the core area) and little or no occurrence in other areas (see Section 5.1 above). There have been no records of Rice's whales in the northcentral GOMx (shelf/slope waters between the core habitat and east of 91°W) or in the shelf/slope area south of approximately 26.9°N to the edge of the U.S. EEZ (Figure 3). Although there have been detections in the shelf/slope region west of 91°W, it is unknown whether this area has the physical or biological features essential to the conservation of Rice's whale.

The physical and biological features identified by NMFS (2023b) should allow for specific portions of the actual occupied habitat to be delineated. However, the one PBF (100–400 m water depths that support Rice's whales) is so broadly defined that it is indistinguishable from any potentially occupied habitat. The attributes associated with the PBF are similarly broad or undefined. There is no measure of productivity given to define areas of "elevated" productivity or levels of pollutants that could be harmful and no sound level is provided to assess what is considered quiet enough for "normal use and occupancy".

The only part of an attribute for which a quantitative value is given, bottom water temperature 10–19 °C, is highly correlated with the 100–400 m water depth PBF definition, providing little further information about specific areas that are critical. As a result, the PBF and attribute definitions do not allow for specific areas to be identified and the only remaining option is to identify where Rice's whales are most often observed, which is in the core habitat in the northeastern GOMx.

5 Summary

The proposed critical habitat has been deemed, by NMFS, to have the essential physical and biological features needed for the Rice's whale to feed, breed, and reproduce. However, direct evidence for what oceanographic features within the 100-400 m isobath band identified by NMFS are required to sustain the Rice's whale is lacking, and the extent of those truly important features elsewhere in the GOMx is uncertain and may not reach into the central or northwestern GOMx as predicted by the habitat-based density model (Garrison et al. 2023). Even though there is evidence to support the possible occurrence of Rice's whale near the FGBNMS in the northwestern GOMx, there are no data that show this area is being used to support important life history functions such as breeding, feeding, or migrating. Additionally, the sightings and acoustic detections that have been recorded there are much less frequent than those recorded for Rice's whale in the core habitat in the northeastern GOMx. Based on the limited data available on the use and occurrence of Rice's whale in the central and northwestern GOMx (one acoustic study (Soldevilla et al. 2022b), one confirmed sighting (NMFS 2018a) and a few unconfirmed sightings (Rosel et al. 2021)), there is insufficient scientific evidence to determine that essential features for Rice's whale conservation are indeed present in the central and northwestern GOMx. In fact, data on the life-history requirements of Rice's whale even in the core habitat are still lacking and need further investigation.

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EDUCATION

2004 Master of Science (***Fish and Wildlife Management***), Montana State University, Bozeman, MT
2000 Bachelor of Arts (***Biology***), Colby College, Waterville, ME

PROFESSIONAL EXPERIENCE

Senior Wildlife Biologist, VP – LGL **2005 – Present**

Project manager for permitting and monitoring projects related to Marine Mammal Protection Act (MMPA), National Environmental Protection Act (NEPA), and Endangered Species Act (ESA) compliance during offshore activities in Alaska, Gulf of Mexico, and Atlantic regions.

- Authored or co-authored more than 60 MMPA take authorization applications and supporting NEPA and ESA documents, including the calculation of marine mammal densities and the use of sound propagation and sound exposure modeling outputs for estimating potential take related to various activities such as high-resolution geophysical surveys, pile driving related to offshore wind foundations, 2D and 3D seismic surveys, geotechnical investigations, exploration drilling programs, as well as development projects.
- Developed and managed the implementation of multi-disciplinary monitoring plans to record and estimate potential impacts from industrial operations around permitted activities including the use of vessel-based observers, aerial surveys, unmanned aerial systems, static and towed passive acoustic recorders, and infrared camera systems.
- Worked closely with client management and planning teams to develop operational plans and monitoring programs to reduce and document potential impacts to marine mammals, subsistence users and other stakeholders.
- Directed Protected Species Observer (PSO) field operations including vessel and aerial survey programs involving over 60 observers simultaneous deployed across 20 vessels and aircraft as well as acoustic monitoring activities.
- Supervised and conducted daily reporting from monitoring programs to clients and regulatory agencies to meet multiple levels of reporting requirements with different notification timelines.
- Directed and conducted end-of-season data analysis and report writing to meet client's MMPA authorization requirements (90-day, annual, and comprehensive reports).
- Presented significant results at numerous scientific conferences.

Team lead for various technology development efforts associated with projects including the evaluation of fixed-wing unmanned aircraft for marine mammal surveys, automated software for the detection of marine mammals in aerial digital imagery, evaluation of infrared camera systems for the detection of marine mammals, and the development of observer data entry software to streamline collection, QA/QC and reporting procedures.

Graduate Research Assistant **2002 – 2004**

Developed methods for estimating the mass of adult female and pup Weddell seals in Antarctica from digital photographs. Tagged adult and pup Weddell seals as part of an ongoing population study. Assisted in the collection of blood and blubber samples and the application of time-depth recorders. Wrote annual progress reports and coordinated efforts in the field with other research teams studying Weddell seals.

**** Department of Ecology, Montana State University, Bozeman, Montana***

Graduate Teaching Assistant **Fall 2004**

Taught three laboratory sections of Introductory Biology to undergraduate students. Prepared brief lectures and introductory materials for weekly lab assignments and assisted students with the development of critical thinking skills integral to the scientific method, as well as experimental design, data collection and analysis, presentation, and report writing skills.

**** Department of Ecology, Montana State University, Bozeman, Montana***

Biological Science Technician **1999 – 2002**

Assisted with and supervised data collection including hair samples for DNA analysis using barbed wire hair snares, identification and measurement of bear tracks, aerial and ground radio telemetry of radio-collared animals, scat collection, and annual surveys of food abundance.

Assisted and supervised the locating, trapping, and handling of grizzly and black bears in and around Yellowstone N.P. Conducted roadside crowd control and removed carcasses along roadsides. Analyzed data and created maps for the Fish and Wildlife Service during ESA consultations concerning effects of road building on grizzly bear habitat. Wrote a grant proposal and procured funding for a study of fire effects on grizzly bear vegetal foods. Designed, conducted, and wrote a biological assessment on the presence of Canada lynx along roads scheduled for re-construction.

**** Bear Management Office, Yellowstone National Park, Wyoming***

Field Technician **2000 – 2001**

Located mountain lions and wolves using radio telemetry from the ground as well as in small aircraft across the northern range of Yellowstone. Tracked mountain lions to study behavior and locate kills as well as interactions with wolves and elk. Investigated, performed necropsies, and collected samples from wolf and cougar kills which included elk, mule deer, and bighorn sheep. Conducted track surveys looking for other forest predators. Assisted with the capture and handling of kitten and adult mountain lions. Supervised and instructed co-workers on use of radio-telemetry equipment, winter backcountry survival and first aid.

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PUBLICATIONS

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Attachment B

The Economic Impacts of Gulf of Mexico Oil and Natural Gas Vessel Transit Restrictions

Prepared By

EIAP

Energy & Industrial Advisory Partners

Key Findings

The Gulf of Mexico offshore oil and natural gas industry plays a major role in domestic energy production, and is expected to continue for decades to come, despite the evolving energy landscape. The offshore oil and natural gas industry relies on a wide variety of supplies to explore for new resources, drill exploration and production wells, develop new projects, and to conduct production operations. These supplies vary greatly, from pipe, to chemicals, to drilling mud, food, fuel, and thousands of other commodities and pieces of equipment. Significantly restricting the movement of the vessels that transport these things is projected to have a major impact on the industry's ability to supply the necessary materials to conduct offshore oil and natural gas development. This reduction in activity is projected to lead to reduced industry spending, supported employment and GDP, government revenues, and oil and natural gas production. (Table 1)

Table 1: Key Findings

		Vessel Transit Restrictions Case Impacts		
Economic Impact	**Base Case Average (2023-2040)**	**Maximum Year Impact**	**Average Impact (2023-2040)**	**Cumulative Impact (2023-2040)**
Capital Investment and Spending ($ Billions)	$29.0	-$9.4	-$4.1	-$74.0
Employment	354,053	-101,469	-44,466	N/A
Contributions to GDP ($ Billions)	$29.9	-$8.7	-$3.9	-$70.9
Government Revenues ($ Billions)	$7.3	-$2.4	-$1.6	-$29.7
Oil and Natural Gas Production (MMBOED)	2.58	-0.92	-0.62	-4.1 Billion Barrels of Oil Equivalent

Source: Energy and Industrial Advisory Partners

Executive Summary

Introduction

As the economy continues to struggle with inflation, and with energy accounting for a material part of inflation, the continued need for domestic oil and natural gas production is clear. Offshore oil and natural gas production, which is a key part of domestic production, is also a significant source of employment, gross domestic product, and government revenues.

Following a lawsuit filed against the National Marine Fisheries Service (NMFS) relating to various marine species, NMFS entered into a settlement with the plaintiffs calling for the implementation of new restrictions applicable to the transit of oil and gas vessels between the 100 to 400 m isobath across the northern Gulf of Mexico on the Outer Continental Shelf (OCS), eastward from the Mexican border with Texas and westward of the Rice's Whale Core Area identified in the 2020 Biological Opinion (Expanded Rice's Whale Area).[1] If implemented, these restrictions would greatly reduce the ability of oil and gas vessels to transit through this area, which would include all vessels transiting to deepwater, drilling and production platforms. Transit through this area would essentially be halted during certain sea state conditions as well as at night. These restrictions only apply to oil and natural gas industry vessels and not to other vessels transiting the area.

These transit restrictions would essentially reduce the capacity of the existing offshore oil and gas supply fleet, as the journey between shore and platforms would be extended. This reduction in transport capacity would reduce the ability to support exploration, drilling, development, and production operations, reducing the industry's ability to explore for, develop and produce oil and natural gas. Given the Jones Act requirement that vessels transporting equipment from US ports to offshore be Jones Act compliant (US built, flagged, and crewed), overcoming these restrictions would take a significant amount of time, as well as putting strain on Gulf Coast ports, and the limited pool of US mariners.

For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel transit requirements for offshore oil and gas (the Base Case), and a scenario examining the potential impacts of implementation of the transit restrictions described above and the subsequent reduction in the availability of vessels used in the supply of offshore energy projects on these offshore energy activities. (The Vessel Transit Restrictions Case). To develop the Vessel Transit Restrictions Case, forecast demand for supply vessels based on historical activity and vessel demand was calculated. Using data from NMFS's "Opinion on the Federally Regulated Oil and Gas Program activities in the Gulf of Mexico" released in 2020, an estimate of the number of vessels trips and the length of these trips was calculated.[2] An estimate average length of the restricted area was then calculated, which was

[1] These restrictions are reflected in Notice to Lessees No. 2023-G-01, which this report assumes will be implemented under the "Vessel Transit Restrictions Case." Similar restrictions are also reflected in lease stipulations applicable to Lease Sale 261 (which have been preliminarily enjoined by a federal court).

[2] Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, National Marine Fisheries Service

overlayed with data provided by Oceanweather Inc on visibility based on significant wave heights and visibility, and data on monthly sunrise and sunset times to estimate the share of a supply vessel's trip that would be restricted under the Vessel Transit Restrictions Case. These data were then utilized to estimate the reduction of the Gulf of Mexico oil and natural gas supply vessel capacity due to these restrictions. The report assumes that the supply vessel fleet (and thus its capacity would grow over time) will reduce the impact of the restrictions.

Energy and Industrial Advisory Partners (EIAP) was commissioned by The American Petroleum Institute (API) to develop a report forecasting activity levels, spending, oil, and natural gas production, supported employment, GDP, and Government Revenues in these scenarios. The scenarios developed in this report are based solely upon government and other publicly available data, Oceanweather Inc's analysis, and EIAP's expertise and analysis.

The Economic Impacts of the Gulf of Mexico oil and natural gas industry

The Gulf of Mexico oil and natural gas industry supports significant national employment, gross domestic product, and state and Federal Government revenues. To quantify the potential effects of a change in offshore supply vessel availability, this study forecasted a Base Case activity level for U.S. offshore oil and natural gas activity to provide a basis of comparison with potential activity levels and economic impacts under the Vessel Transit Restrictions Case. The study forecasted key activity indicators, including the number of projects executed, oil and natural gas production, and spending based on projected activity levels. These activity and spending forecasts drive the projected employment, GDP, and government revenue forecasts presented in this report.

- In 2023, Gulf of Mexico oil and natural gas production is projected to be nearly 2.4 million barrels of oil equivalent per day. Oil and natural gas production from the Gulf of Mexico is projected to average just under 2.6 million barrels of oil equivalent per day over the 2023 to 2040 forecast period. In 2040 at the end of the forecast period, oil and natural gas production is projected to be slightly over 2.1 million barrels of oil equivalent per day.
- In 2023, Gulf of Mexico oil and natural gas industry spending is projected at around $33.9 billion. Gulf of Mexico offshore oil and natural gas industry spending is projected to average just over $28.9 billion per year over the 2023 to 2040 forecast period.
- In 2023, the offshore oil and natural gas industry is projected to support an estimated 412 thousand jobs in the United States, compared to just over 354 thousand jobs on average across the 2023-2040 forecast period.
- In 2023, the Gulf of Mexico offshore oil and natural gas industry is projected to support an estimated $34.3 billion of U.S. gross domestic product. The industry is projected to contribute an average of just over $29.6 billion of GDP per year over the 2023 to 2040 forecast period.

- In 2023, government revenues due to the Gulf of Mexico oil and natural gas industry are projected to reach nearly $6.1 billion. Government revenues derived from oil and natural gas activities in the Gulf of Mexico (excluding personal and corporate income taxes and property taxes) are projected to average just over $7.3 billion per year over the 2023 to 2040 forecast period.
- The Gulf of Mexico oil and natural gas producing states are projected to receive $375 million of revenues due to revenue sharing under GOMESA in 2023, which is consistent across the forecast period due to caps on state distributions. Contributions to the LWCF from GOMESA and non-GOMESA offshore sources are projected to just over $1.1 billion in 2023, which is consistent with the average across the 2023-2040 forecast period.

Impact of Oil and Natural Gas Industry Vessel Restrictions

Restricting the ability of offshore oil and natural gas supply vessels to transit across the Expanded Rice's Whales Area would likely drastically reduce the capacity of the vessels required to support exploration, development, and production of offshore oil and natural gas projects. This change would likely have a severely negative immediate impact on Gulf of Mexico oil and natural gas development, spending, supported employment and GDP, and government revenues. The Vessel Transit Restrictions Case compares activity levels (project executions, spending, oil, and natural gas production), economic impacts, and government revenues to the Base Case scenario. This study assumes that no other major policy or regulatory changes impacting the Gulf of Mexico oil and natural gas industry would be enacted.

- In the Vessel Transit Restrictions Case, average combined oil and natural gas production across the forecast period is projected to decline from around 2.6 million barrels of oil equivalent per day on average to just under 2 million barrels of oil equivalent per day (about a 24 percent decline).
- In the Vessel Transit Restrictions Case, Gulf of Mexico oil and natural gas industry spending is projected to decline to just over $24.8 billion on average compared to just over $28.9 billion in the Base Case, a 14 percent reduction. In 2024, spending is projected to be reduced by approximately $ 6.8 billion, a 19 percent reduction.
- In the Vessel Transit Restrictions Case, average employment supported by the Gulf of Mexico oil and natural gas industry is projected to decline to just under 310 thousand jobs nationally compared to about 354 thousand jobs each year in the Base Case, a 13 percent decline. In the Vessel Transit Restrictions Case, average yearly contributions to GDP by the Gulf of Mexico oil and natural gas industry are projected at just over $25.9 billion, around a 13 percent reduction compared to around $29.9 billion in the Base Case.
- In the Vessel Transit Restrictions Case, government revenues due to the Gulf of Mexico oil and natural gas industry are projected to average around $5.7 billion annually, a 22 percent reduction from the over $7.4 billion per year projected in the Base Case.

- Contributions to the Land and Water Conservation Fund (LWCF) are projected to average around $1.09 billion per year in the Vessel Transit Restrictions Case, compared to just above $1.13 billion per year in the base case over the forecast period.

Study Limitations

Given the large degree of volatility and uncertainty in energy markets and the global economy, the assumptions and forecasts contained in this report are based on reasonable readings of conditions when this report was developed. Uncertainty around commodity pricing and global economic conditions may significantly affect the forecast contained in this report. EIAP makes no representations as to the impacts of the potential policy environment addressed in this report. These and other policies could impose significantly greater engineering, operational, cost, and other burdens on the energy industry and regulators. The report's projections of the effects of this potential scenario on engineering, operations, and costs are an independent, good faith view derived from reasonable assumptions based on these potential scenarios and the authors' expertise and experience. Energy and Industrial Advisory Partners provided this independent study while expressly disclaiming any warranty, liability, or responsibility for the completeness, accuracy, use, or fitness to any person or party for any reason.

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Introduction

Purpose of the Report

As the economy continues to struggle with inflation, and with energy accounting for a material part of inflation, the continued need for domestic oil and natural gas production is clear. Offshore oil and natural gas production, which is a key part of domestic production, is also a significant source of employment, gross domestic product, and government revenues.

Following a lawsuit filed against the National Marine Fisheries Service (NMFS) relating to various marine species, NMFS entered into a settlement with the plaintiffs calling for the implementation of new restrictions applicable to the transit of oil and gas vessels between the 100 to 400 m isobath across the northern Gulf of Mexico on the Outer Continental Shelf (OCS), eastward from the Mexican border with Texas and westward of the Rice's Whale Core Area identified in the 2020 Biological Opinion (Expanded Rice's Whale Area).[3] If implemented, these restrictions would greatly reduce the ability of oil and gas vessels to transit through this area, which would include all vessels transiting to deepwater, drilling and production platforms. Transit through this area would essentially be halted during certain sea state conditions as well as at night. These restrictions only apply to oil and natural gas industry vessels and not to other vessels transiting the area.

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For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel transit requirements for offshore oil and gas (the Base Case), and a scenario examining the potential impacts of implementation of the transit restrictions described above and the subsequent reduction in the availability of vessels used in the supply of offshore energy projects on these offshore energy activities. (The Vessel Transit Restrictions Case). To develop the Vessel Transit Restrictions Case, forecast demand for supply vessels based on historical activity and vessel demand was calculated. Using data from NMFS's "Opinion on the Federally Regulated Oil and Gas Program activities in the Gulf of Mexico" released in 2020, an estimate of the number of vessels trips and the length of these

[3] These restrictions are reflected in Notice to Lessees No. 2023-G-01, which this report assumes will be implemented under the "Vessel Transit Restrictions Case." Similar restrictions are also reflected in lease stipulations applicable to Lease Sale 261 (which have been preliminarily enjoined by a federal court).

trips was calculated.[4] An estimate average length of the restricted area was then calculated, which was overlayed with data provided by Oceanweather Inc on visibility based on significant wave heights and visibility, and data on monthly sunrise and sunset times to estimate the share of a supply vessel's trip that would be restricted under the Vessel Transit Restrictions Case. These data were then utilized to estimate the reduction of the Gulf of Mexico oil and natural gas supply vessel capacity due to these restrictions. The report assumes that the supply vessel fleet (and thus its capacity would grow over time) will reduce the impact of the restrictions.

Energy and Industrial Advisory Partners (EIAP) was commissioned by The American Petroleum Institute (API) to develop a report forecasting activity levels, spending, oil, and natural gas production, supported employment, GDP, and Government Revenues in these scenarios. The scenarios developed in this report are based solely upon government and other publicly available data, Oceanweather Inc's analysis, and EIAP's expertise and analysis.

Report Structure

In this report, EIAP first outlines the study's methodology, including data development, the limitations of this study, and how the two scenarios in this report were developed. The following section discusses activity levels and the economic impacts of the Gulf of Mexico oil and natural gas industry. The next section outlines the potential impacts of the second scenario developed for the report, the Vessel Transit Restrictions Case on the Gulf of Mexico oil and natural gas industry and its economic impacts. The final section concludes. The study also includes appendices including a more detailed explanation of the report's methodology and data tables of the report's findings.

Excluded from Study

This paper has been limited in scope to assessing the potential impacts of the two scenarios developed for the report. Additional changes to regulations or policies outside of the changes assessed in this report would likely have a more significant effect than the impacts laid out in this report. The study also excludes potential domestic supply chain reductions due to reduced activity levels which could lead to reductions in the domestic economic impacts of the Gulf of Mexico oil and natural gas industry by, for example, reducing the growth of local content used in oil and natural gas industry. The impacts projected in this report would likely be more significant if these potential supply chain changes were included. This study also does not attempt to calculate the effects of these changes on the downstream oil and natural gas industry, or subsequent impacts on other industries (for example, due to reduced energy production) other than the impacts directly due to reduced activity in the Gulf of Mexico oil and natural gas sector.

Additionally, the projected government revenue impacts do not account for personal income taxes, corporate income taxes, or local property taxes. Due to the exclusion of these impacts, the economic

[4] Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, National Marine Fisheries Service

impacts presented in this study likely represent conservative projections of the potential impacts of the scenarios developed. Additionally, the impacts presented could be imprecise by as much as 10% or more due to the impacts of the studied scenarios and other factors.

About EIAP

Energy & Industrial Advisory Partners (EIAP) was founded to provide companies and their management teams, investors, and industry associations across the energy and industrial markets with economic and strategic consulting and M&A advisory services from seasoned advisors with significant industry experience. EIAP is a specialist M&A advisory and consulting firm that utilizes its deep industry experience and rigorous analytical methodologies to help stakeholders gain the insights they require to make more informed, data-driven decisions. For more information, please visit **eiapartners.com**

Methodology

Data Development

As part of the development of this report, a detailed review of the potential impacts of the transit restrictions described above for offshore oil and naturals gas vessels was conducted. This study is in no way exhaustive, especially considering the uncertainty around how the Gulf of Mexico oil and natural gas industry would respond to vessel transit restrictions. This report focuses on the potential operational effects of the proposed transit restrictions based on a reasonable reading of these proposals and considers the potential operational changes offshore energy companies and their suppliers could undertake to minimize the effects of these changes on their operations. As such, this analysis is inherently forward-looking and subject to significant changes based on the potential development and implementation of these policy changes by regulators such as the Bureau of Ocean Energy Management, the National Oceanic and Atmospheric Administration and the Coast Guard.

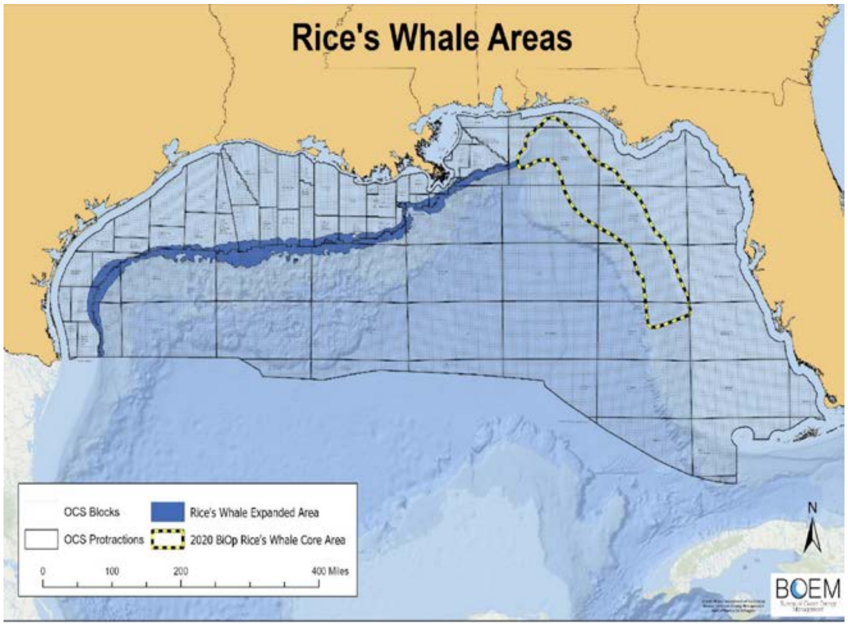
Limitations

Given the large degree of volatility and uncertainty in energy markets and the global economy, the assumptions and forecasts contained in this report are based on reasonable readings of conditions when this report was developed. Uncertainty around commodity pricing and global economic conditions may significantly affect the forecast contained in this report. EIAP makes no representations as to the impacts of the potential policy environment addressed in this report. These and other policies could impose significantly greater engineering, operational, cost, and other burdens on the energy industry and regulators. The report's projections of the effects of this potential scenario on engineering, operations, and costs are an independent, good faith view derived from reasonable assumptions based on these potential scenarios and the authors' expertise and experience. Energy and Industrial Advisory Partners provided this independent study while expressly disclaiming any warranty, liability, or responsibility for the completeness, accuracy, use, or fitness to any person or party for any reason.

Offshore Energy Vessels Transit Restrictions

Following a lawsuit filed against the National Marine Fisheries Service (NMFS) relating to various marine species, NMFS entered into a settlement with the plaintiffs calling for the implementation of new restrictions applicable to the transit of oil and gas vessels between the 100 to 400 m isobath across the northern Gulf of Mexico on the Outer Continental Shelf (OCS), eastward from the Mexican border with Texas and westward of the Rice's Whale Core Area identified in the 2020 Biological Opinion (Expanded Rice's Whale Area).[5] If implemented, these restrictions would greatly reduce the ability of oil and gas vessels to transit through this area, which would include all vessels transiting to deepwater, drilling and production platforms. Transit through this area would essentially be halted during certain sea state conditions as well as at night. These restrictions only apply to oil and natural gas industry vessels and not to other vessels transiting the area. (Figure 1)

Figure 1: Rice's Whale Areas



Source: Bureau of Ocean Energy Management

These transit restrictions would essentially reduce the capacity of the existing offshore oil and gas supply fleet, as the journey between shore and platforms would be extended. This reduction in transport capacity would reduce the ability to support exploration, drilling, development, and production operations, reducing the industry's ability to explore for, develop and produce oil and natural gas. Given

[5] These restrictions are reflected in Notice to Lessees No. 2023-G-01, which this report assumes will be implemented under the "Vessel Transit Restrictions Case." Similar restrictions are also reflected in lease stipulations applicable to Lease Sale 261 (which have been preliminarily enjoined by a federal court).

the Jones Act requirement that vessels transporting equipment from US ports to offshore be Jones Act compliant (US built, flagged, and crewed), overcoming these restrictions would take a significant amount of time, as well as putting strain on Gulf Coast ports, and the limited pool of US mariners.

The primary purpose of this report is to estimate the impact that restricting transit of offshore oil and gas vessels would have on vessel capacity availability and the subsequent impacts reduced vessel capacity would have on Gulf of Mexico exploration, project development and operations, and the impact reduced activity levels would be projected to have on the economy.

A large variety of vessels are required to support offshore oil and natural gas exploration, development, and operations. These vessels range from seismic vessels (which identify potential oil and natural gas deposits) and drilling rigs to a variety of installation vessels (such as pipe and cable lay vessels, heavy lifts vessels, and multipurpose support vessels). These transit restrictions would essentially reduce the capacity of the existing offshore oil and gas supply fleet, as the journey between shore and platforms would be extended. This reduction in transport capacity would reduce the ability to support exploration, drilling, development, and production operations, reducing the industry's ability to explore for, develop and produce oil and natural gas. Given the Jones Act requirement that vessels transporting equipment from US ports to offshore be Jones Act compliant (US built, flagged, and crewed), overcoming these restrictions would take a significant amount of time, as well as putting strain on Gulf Coast ports, and the limited pool of US mariners.

Given that the transit restrictions primarily impact vessel transiting to deepwater areas from ports, the largest potential impact of the restrictions are expected to be on supply vessels, which ferry supplies from shore to deepwater drilling rigs, platforms, and other vessels. The number of active vessels in the Gulf of Mexico and the projected needs for these vessels, as well as miles traveled, and number of trips was estimated to form the basis of this report's analysis. (Table 2)

Table 2: Historical Gulf of Mexico Supply Vessel Active Fleet, Trips, and Miles Traveled Estimates[6]

Vessel Trips	2017	2018	2019	2020	2021	2022
Service Vessels	580	597	580	564	537	575
Service Vessel Trips	81,394	83,779	81,394	79,148	75,359	80,692
Service Vessel Miles	5,879,017	6,051,333	5,879,017	5,716,837	5,443,158	5,828,335

Source: EIAP, National Marine Fisheries Service, BOEM, Army Corps of Engineers

For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel transit requirements for offshore oil and gas (the Base Case), and a scenario examining the potential impacts of implementation of the transit restrictions described above and the subsequent reduction in the availability of vessels used in the supply of offshore energy projects on these offshore energy activities (The Vessel Transit Restrictions Case). To develop the Vessel Transit Restrictions Case, forecast demand for supply vessels based on historical activity and vessel demand was

[6] The oil and gas industry's share of total vessel traffic based on Bureau of Ocean Energy Management and Army Corps of Engineers Data as presented in the "National Marine Fisheries Service Endangered Species Act Section 7 Biological Opinion", March 13th, 2020, Page 338 is between 9.23 and 19.28 percent.

calculated. Using data from the National Marine Fisheries Service's "Opinion on the Federally Regulated Oil and Gas Program activities in the Gulf of Mexico" released in 2020, an estimate of the number of vessels trips and the length of these trips was calculated.[7] An estimate average length of the restricted area was then calculated, which was overlayed with data provided by Oceanweather Inc on visibility based on significant wave heights and visibility, and data on monthly sunrise and sunset times to estimate the share of a supply vessel's trip which would be restricted by the proposed settlement. This data was then utilized to estimate the reduction of the Gulf of Mexico oil and natural gas supply vessel capacity due to the longer trip times for supply vessels due to these restrictions. The report assumes that the supply vessel fleet will grow (and thus its capacity would grow over time) reducing the impact of the proposed restrictions. (Table 3)

Table 3: Estimate of the Initial Impact of Vessel Transit Restrictions

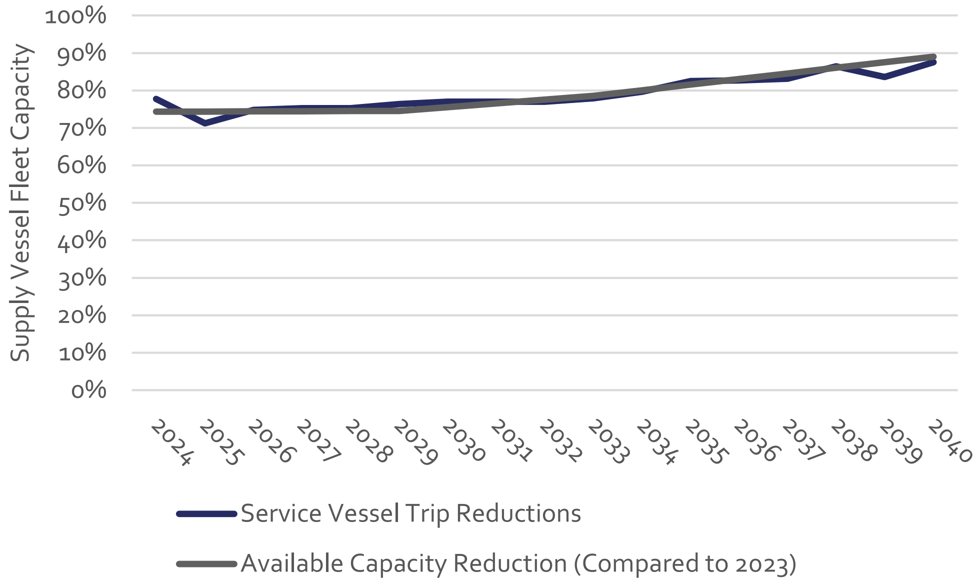
Input	Output
Estimated Length of Area (Miles)	25
Annual Supply Vessel Trips	83,020
Total KM Travelled	9,461,363
Total Miles Travelled	5,879,017
Average Trip Length	71
Rice Whale Area Share of Trip	35.3%
Average Share of Time Outside Weather/Daylight Window	72.7%
Estimated Transit Time Increase	25.7%

Source: Energy and Industrial Advisory Partners

The study assumes that the Gulf of Mexico offshore oil and natural gas industry will take actions over time to reduce the impact of the vessel transit restrictions, by for example ordering additional vessels. These reductions are expected to require time and thus be gradual due to restrictions on domestic shipbuilding capacity, port capacity, and available US mariners. (Figure 2)

[7] Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, National Marine Fisheries Service

Figure 2: Estimate of Reductions in Supply Capacity Overtime



Source: Energy and Industrial Advisory Partners

As the available fleet of supply vessels increases, the vessel transit restrictions impact on offshore oil and naturals gas activity are expected to decline. As such, reductions in spending, employment, GDP, oil and natural gas production and government revenues will also decline. However, lagging indicators such as production and government revenues are projected to continue to be materially below base case levels for most of the forecast period.

Scenario Development

The study's data development was undertaken by developing a model that accounts for all major parts of the offshore oil and natural gas exploration and production lifecycle. The major sections of the offshore oil and natural gas model are: an Activity Model that assesses near term project activity, OCS reserves and production; and the likely project development and drilling activity necessary to meet production targets; a spending model derived from the activities required to develop and operate offshore oil and natural gas projects and reasonable assumptions around the spending levels typically associated with these activities; a government revenue model which uses forecast production levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and distributions and governmental polices to forecast potential government revenues; and an economic model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated economic activity including employment and gross domestic product.

The Base Case model for offshore oil and natural gas was initially developed based on forecast production and pricing levels based on the Energy Information Administration's (EIA) Annual Energy Outlook (AEO)

2023[8] for long-term prices and the EIA's Short-Term Energy Outlook[9] for the near term (2023 and 2024) prices. The Base Case does not consider any potential impacts of the current proposed five- year Leasing Program if the leasing schedule varied from assumptions in AEO 2023. Modifications to near-term pricing and production levels were made based on current market conditions. Although these forecasts were utilized to develop the Base Case model, due to differences in modeling techniques, especially the project-based model developed in this report, the report's forecast production levels vary modestly from those provided in the EIA's forecasts.

Following the creation of the Base Case forecast, the potential effects of the additional scenario (reduced supply vessels capacity due to transit restrictions for Gulf of Mexico oil and natural gas vessels, the "Vessel Transit Restrictions Case") was considered. Amongst other factors, how this scenario would impact new project development of both underway and future projects and existing producing projects were examined. Given the projected reduced carrying capacity of the Gulf of Mexico oil and natural gas industry supply fleet, activity levels were reduced to align supply vessel requirements with the projected available supply vessel fleet. Existing producing platforms were given priority for supply vessels due to typically lower production cost of these projects (as capital spending has already taken place), thus the primary impact is projected on new well drilling and capital projects. As the carrying capacity of the fleet grows due to projected new building of vessels, the impacts on project development and drilling (as well as spending, employment, and GDP) are projected to decline over time.

Gulf of Mexico Oil and Natural Gas Economic Impacts

The Gulf of Mexico oil and natural gas industry supports significant employment, gross domestic product, and state and federal government revenues. To quantify the potential effects on offshore oil and natural gas vessel transit restrictions, this study developed a Base Case activity level for Gulf of Mexico oil and natural gas activity to compare activity levels and subsequent impacts of the transit restrictions described above. The study forecasted key activity indicators, including the number of wells drilled, projects executed, oil and natural gas production, and spending based on projected activity levels. These activity and spending forecasts drive the projected employment, GDP, and government revenue forecasts presented in this report.

Projects

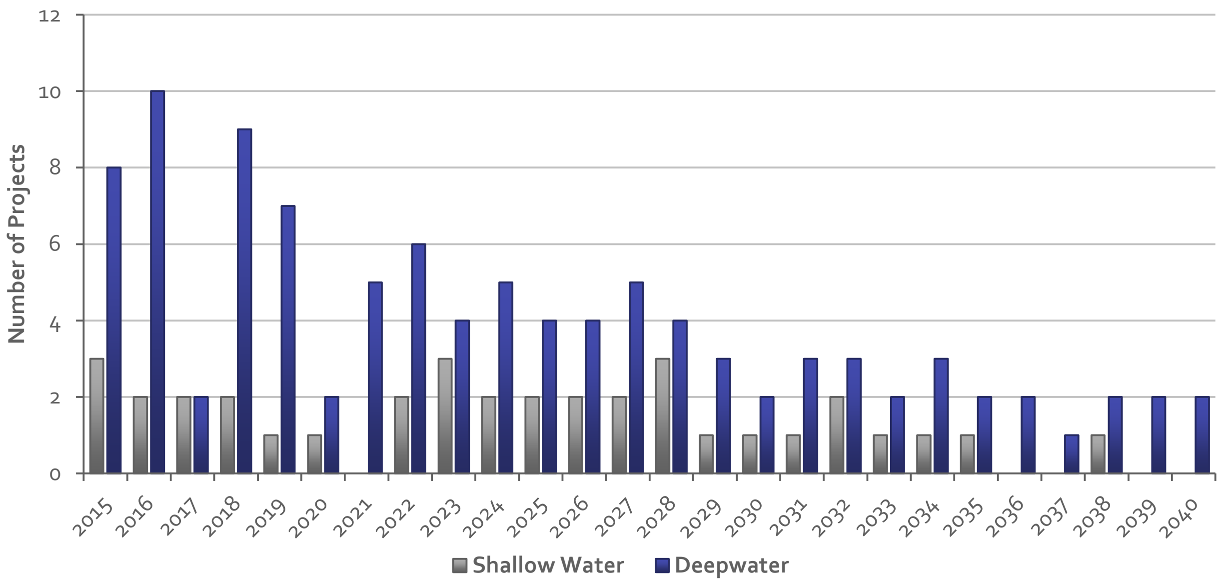
The development of new Gulf of Mexico oil and natural gas projects is the primary source of industry capital spending, supports national employment and GDP, and is one of the key drivers of Gulf of Mexico oil and natural gas production. In the Base Case, project development is projected to remain steady over

[8] Annual Energy Outlook 2023, Energy Information Administration

[9] Short Term Energy Outlook, August 8th, 2023, Energy Information Administration

the near term, before slowly declining, in line with the EIA's projection of falling oil and natural gas production from the Gulf of Mexico. (Figure 3)

Figure 3: Projected Base Case Guld of Mexico Offshore Oil and Natural Gas Project Startups by Year



Source: Energy and Industrial Advisory Partners

Production

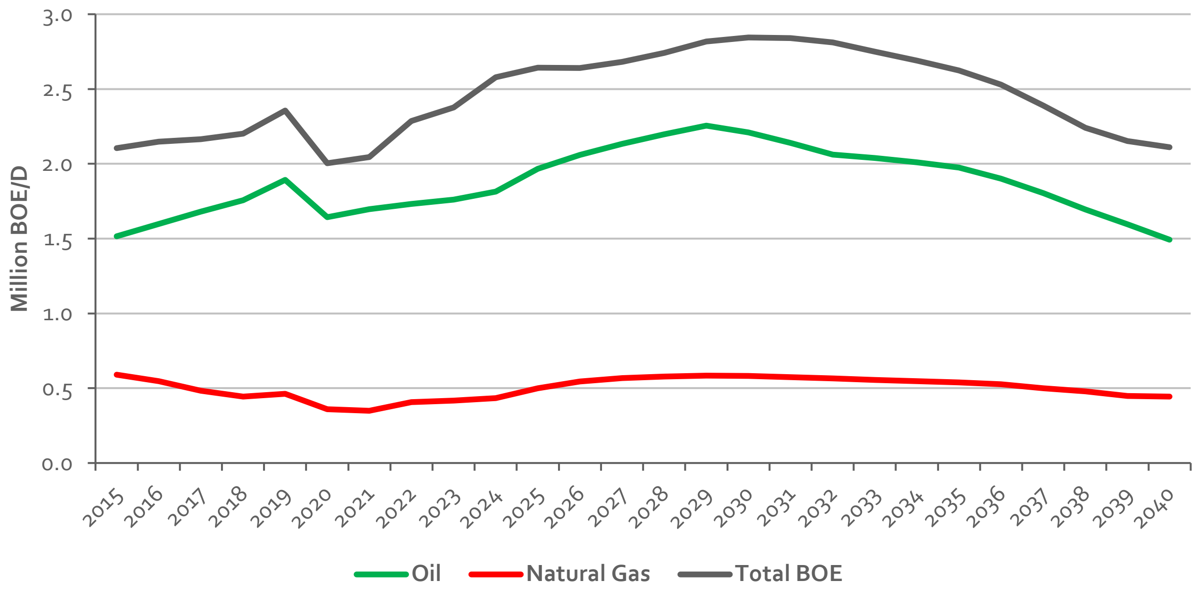
The decline rate of existing producing wells and new project developments are the main determinants of Gulf of Mexico oil and natural gas production. Production is influenced by several factors, including reservoir productivity, oil, and natural gas production ratios, well counts, and operational choices by operators. To prepare the production forecast, the Energy Information Administration's (EIA) production forecasts from the "Annual Energy Outlook 2023"[10]and the EIA's Short Term Energy Outlook[11] were utilized as the primary indicator of forecast production levels. The Base Case production forecast was developed to be relatively in line with the EIA's long-term forecast. The production forecast in this report differs from this forecast due to the project-based methodology used to develop forecasts for the report. To develop the production forecast for this report, project developments (in addition to the existing production base) were modeled utilizing indicators such as the water depth of the project, the number of projected producing wells, projected per well production levels, assumptions on peak production years, and decline rate assumptions.

This study forecasts that combined Gulf of Mexico oil and natural gas production in 2023 will be nearly 2.4 million barrels of oil equivalent per day, with oil and other liquids accounting for around 74 percent of production and natural gas accounting for 26 percent of production. On average, across the 2023-2040

[10] Annual Energy Outlook 2023, Energy Information Administration
[11] Short Term Energy Outlook, August 8th, 2023, Energy Information Administration

forecast period oil and natural gas production is projected at just under 2.6 million barrels of oil equivalent per day. At the end of the forecast period in 2040, the Gulf of Mexico is projected to produce just over 2.1 million barrels of oil equivalent per day. (Figure 4)

Figure 4: Projected Base Case Gulf of Mexico oil and natural gas Production (BOE/D)



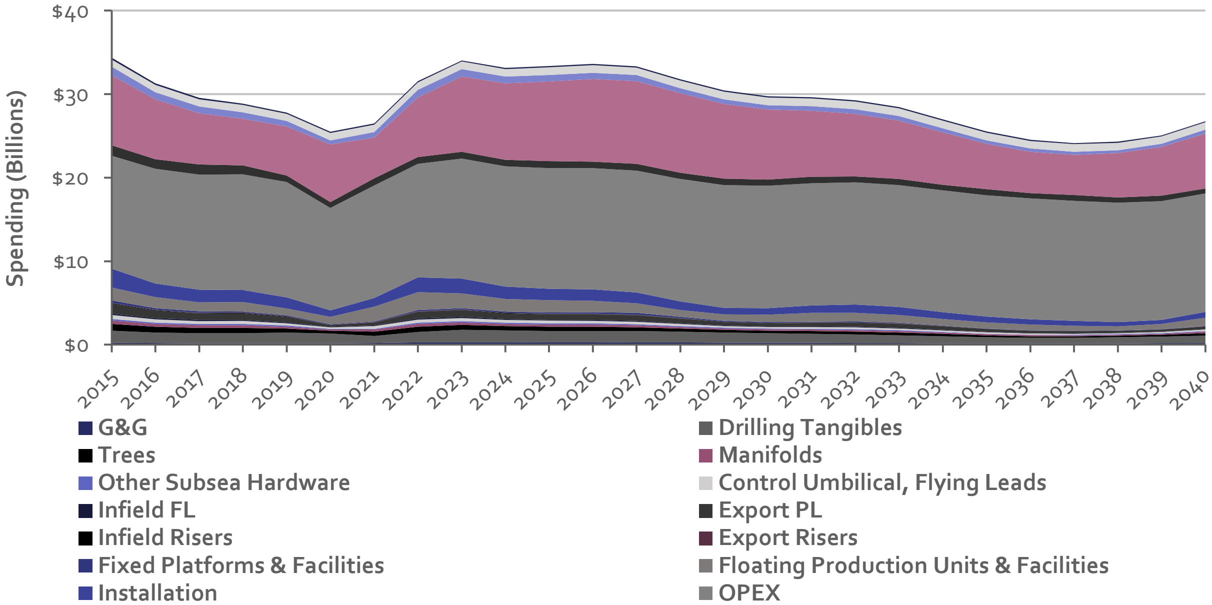
Source: Energy and Industrial Advisory Partners

Spending

Offshore oil and natural gas exploration, development, and operations require significant capital and operational investment. Investment spans activities including geological and geophysical surveys, drilling, engineering, surface and subsea production equipment procurement, installation, operational expenditures, and decommissioning. For this study, spending was modeled in 19 categories, encompassing the full range of activities required to identify, explore for, develop, operate, and decommission offshore oil and natural gas projects.

In the Base Case scenario developed for this report, offshore oil and natural gas spending is projected at around $33.9 billion in 2023. Across the 2023-2040 forecast period, spending is projected to average just over $28.9 billion. (Figure 5)

Figure 5: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Spending

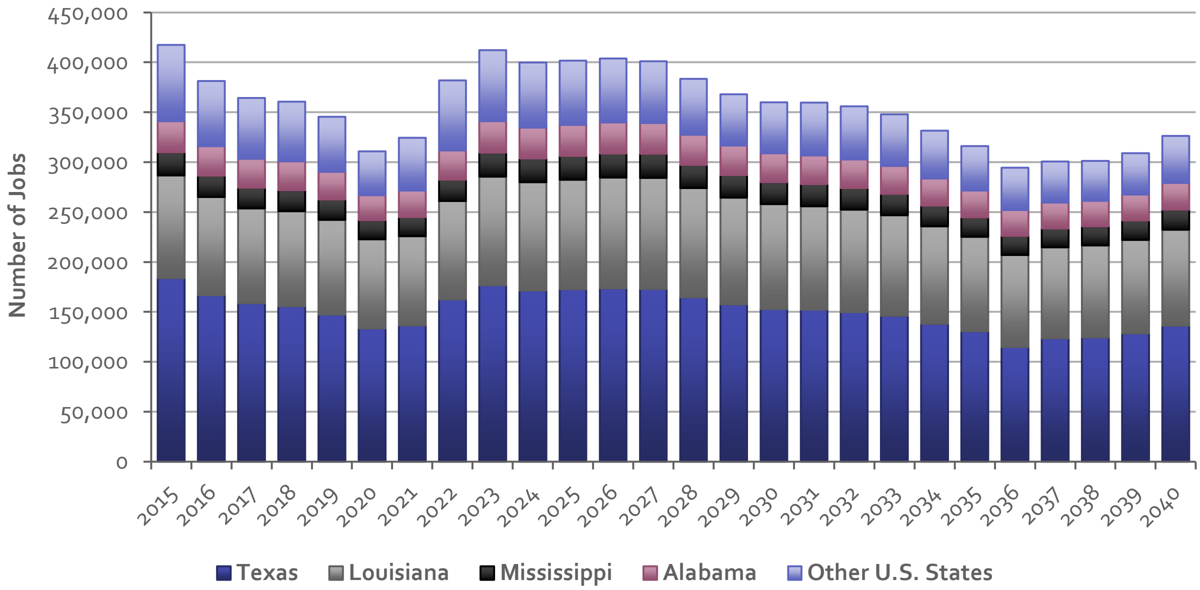


Source: Energy and Industrial Advisory Partners

Employment

The Gulf of Mexico offshore oil and natural gas industry has supported significant levels of employment in the U.S. for decades. While the most significant employment impacts of the industry take place in the Gulf Coast states, almost, if not all, states see employment supported due to the Gulf of Mexico offshore oil and natural gas industry. The Gulf of Mexico offshore oil and natural gas industry directly supports many highly paid jobs, especially blue-collar jobs. The industry also supports significant employment through the industry's supply chain (indirect jobs) and due to increased spending by workers (induced jobs). In 2023, an estimated 412 thousand jobs are projected to be supported by Gulf of Mexico offshore oil and natural gas industry activity. From 2023 to 2040, an average of around 354 thousand jobs are projected to be supported by the Gulf of Mexico offshore oil and natural gas industry. (Figure 6)

Figure 6: Projected Base Case Gulf of Mexico Oil and Natural Gas Supported Employment

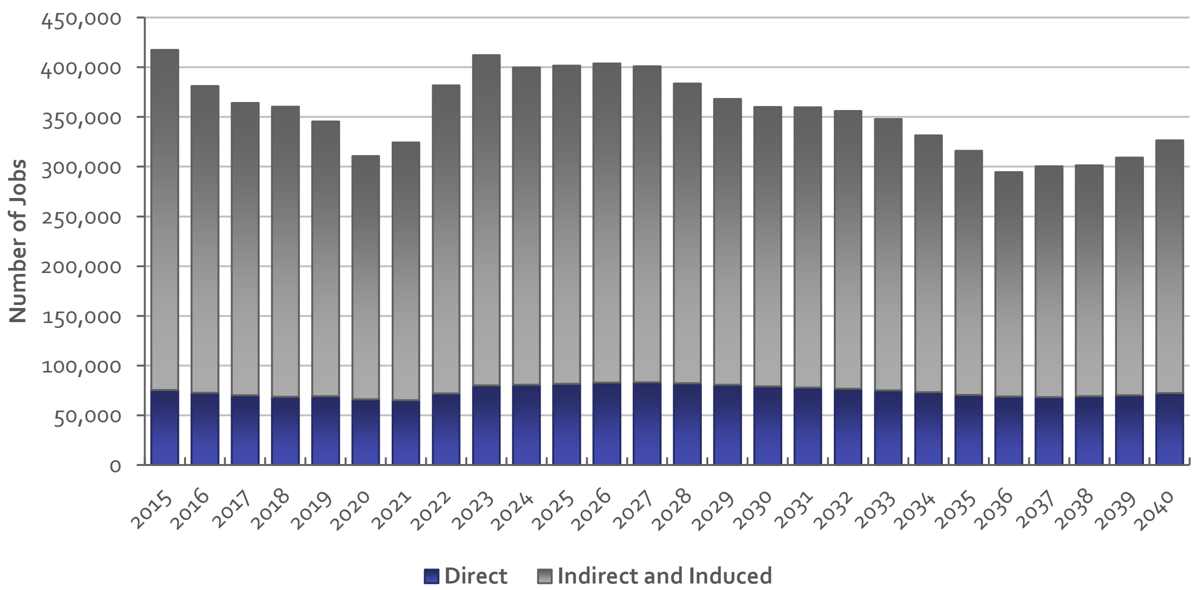


Source: Energy and Industrial Advisory Partners

The most significant employment impacts are projected to be in the Gulf Coast states. An average of about 149 thousand jobs were projected to be supported in Texas across the 2023-2040 forecast period, with just above 101 thousand jobs supported in Louisiana, over 28 thousand jobs supported in Alabama, just over 21 thousand jobs supported in Mississippi, and over 52 thousand jobs supported in other U.S. states.

The Gulf of Mexico offshore oil and natural gas industry supports employment through direct employment by the industry, indirectly through its suppliers and through induced employment due to increased worker spending. Indirect employment occurs through the industry's purchases of goods and services, while induced employment is due to the impact of higher income in the economy. Direct employment by oil and natural gas companies and their suppliers due to Gulf of Mexico oil and natural gas industry activity in 2023 is projected to be just under 80 thousand jobs. Across the 2023 to 2040 forecast period, direct employment is projected to average just over 76 thousand jobs yearly. Indirect and induced employment due to the Gulf of Mexico oil and natural gas industry is projected to be around 332 thousand jobs in 2023. Across the 2023 to 2040 forecast period, supported indirect and induced employment is projected to average just under 278 thousand jobs each year. (Figure 7)

Figure 7: Projected Base Case Gulf of Mexico Oil and Natural Gas Direct vs. Indirect and Induced Supported Employment

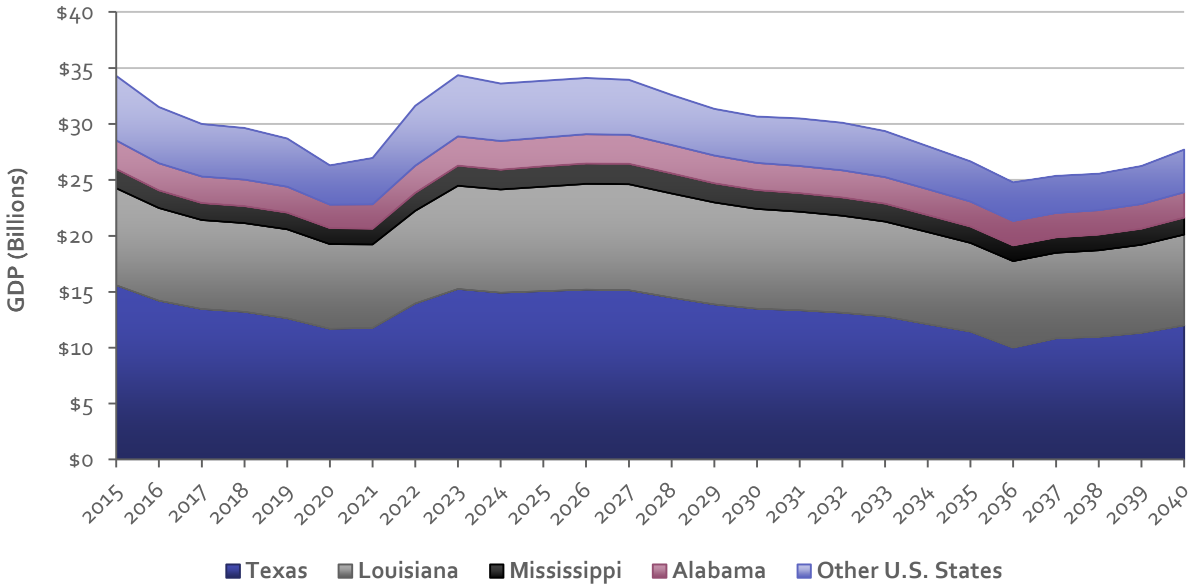


Source: Energy and Industrial Advisory Partners

GDP

Gulf of Mexico oil and natural gas industry activity supports significant levels of gross domestic product nationally. In 2023, the industry is projected to support just under $34.4 billion of U.S. GDP. Over the forecast period from 2023 to 2040, contributions to GDP are projected to average just over $29.9 billion per year. (Figure 8)

Figure 8: Projected Base Case Gulf of Mexico Oil and Natural Gas Contributions to GDP



Source: Energy and Industrial Advisory Partners

Government Revenues

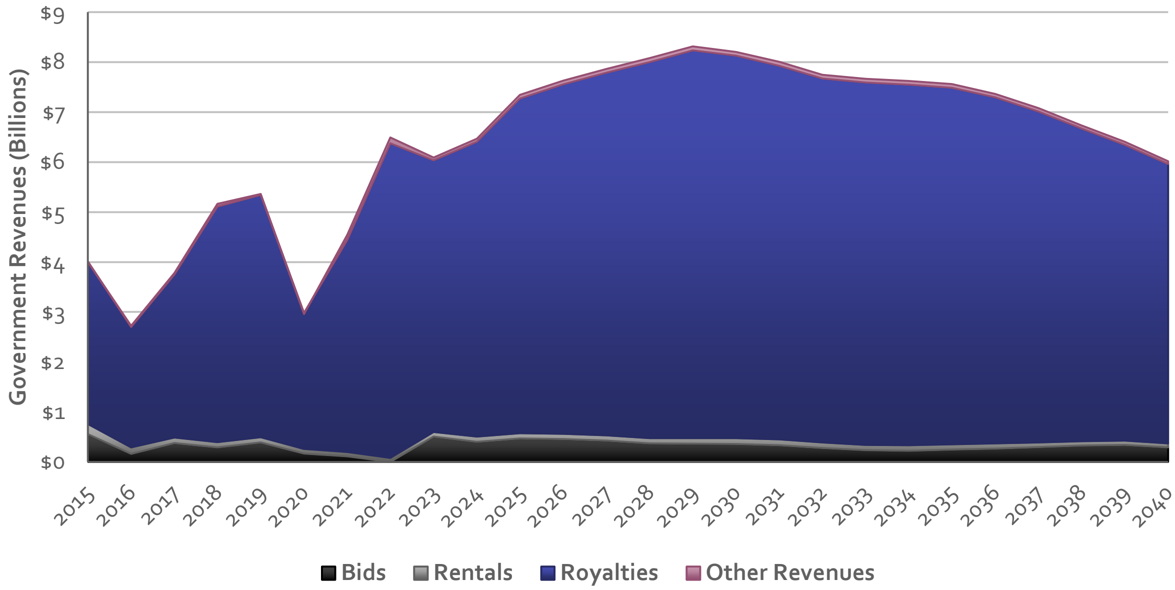
Gulf of Mexico offshore oil and natural gas activity's contributions to government revenues are primarily derived from three main revenue streams; royalties paid on produced oil and natural gas, bonus bids paid to acquire blocks in lease sales, and rents paid for blocks leased by operators. Several policies impact royalties and lease payments received by the Federal Government, including royalty relief for certain blocks depending on production rates, differing rent, and royalty regimes for fields in different water depths, and blocks leased at different times. Additionally, the value of oil and natural gas produced in the Gulf of Mexico differs from commonly published indicators such as West Texas Intermediate (WTI) crude due to transportation costs, long-term sales contracts, and differentials due to product quality and location. To calculate government revenues due to offshore oil and natural gas activities, data from the Office of Natural Resource Revenue[12] (ONRR) as well as oil and natural gas price projections from the Energy Information Administration's Annual Energy Outlook 2023[13] and Short-Term Energy Outlook[14] were utilized as the basis of the forecast. Data on disbursements to states are available as fiscal year data, so for the purposes of this report, fiscal year data was utilized as a stand-in for calendar year data.

In 2023, government revenues due to Gulf of Mexico oil and natural gas activities are projected to reach nearly $6.1 billion. On average, across the 2023 to 2040 forecast period, government revenues due to Gulf of Mexico oil and natural gas activities (excluding personal and corporate income taxes and property taxes) are projected to average just over $7.3 billion annually. The largest source of government revenues

[12] Natural Resources Revenue Data, Office of Natural Resource Revenue, U.S. Department of the Interior
[13] Annual Energy Outlook 2023, Energy Information Administration
[14] Short Term Energy Outlook, August 8th, 2023, Energy Information Administration

from Gulf of Mexico offshore oil and natural gas activities is from royalties paid on produced oil and natural gas. Across the 2023 to 2040 forecast period, average royalty revenues are projected at over $6.8 billion per year. Bid revenues are projected to average about $342 million per year across the forecast period, rental revenues are projected to average just below $103 million per year, and other revenues are projected to average nearly $70 million per year. (Figure 9)

Figure 9: Projected Base Case Gulf of Mexico Oil and Natural Gas Government Revenues by Type[15]

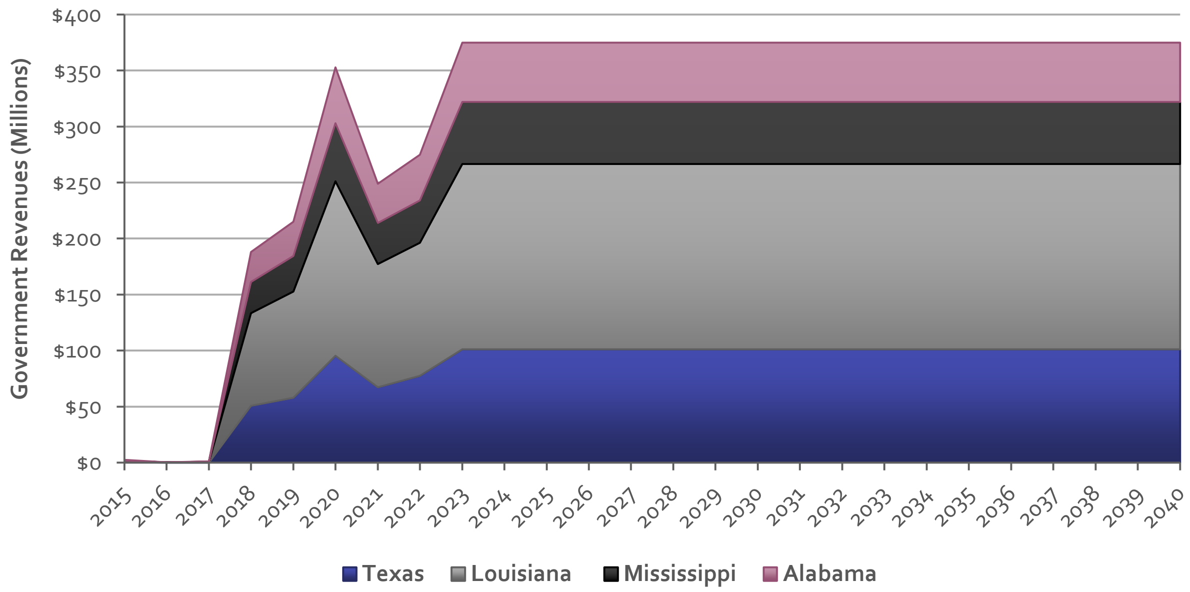


Source: Energy and Industrial Advisory Partners

Congress passed the OCS Energy Security Act (GOMESA) in 2006, which created revenue-sharing provisions for the four Gulf oil and natural gas producing states (Louisiana, Texas, Mississippi, and Alabama) and their coastal political subdivisions. Revenue sharing was enacted in two phases beginning in 2007 and 2017, respectively, with revenue sharing caps of $375 million for fiscal years 2017–2019, $487.5 million for fiscal years 2020 and 2021, and $375 million for fiscal years 2022–2055. Total projected Federal Government revenues, actual fiscal year distribution data from the ONRR, and analysis of the growth of revenue sharing and the revenue sharing caps were utilized to develop the revenue sharing forecasts in this report. In 2023, the Gulf of Mexico oil and natural gas producing states are projected to receive around $375 million due to revenue sharing, with revenue projected to remain flat throughout the forecast period due to the revenue sharing cap. (Figure 10)

[15] No bid revenue was received in 2022 as no Gulf of Mexico lease sales were held that year. Lease sale 259 was held on March 29, 2023.

Figure 10: Projected Base Case Gulf of Mexico Oil and Natural Gas Government Revenues by State



Source: Energy and Industrial Advisory Partners

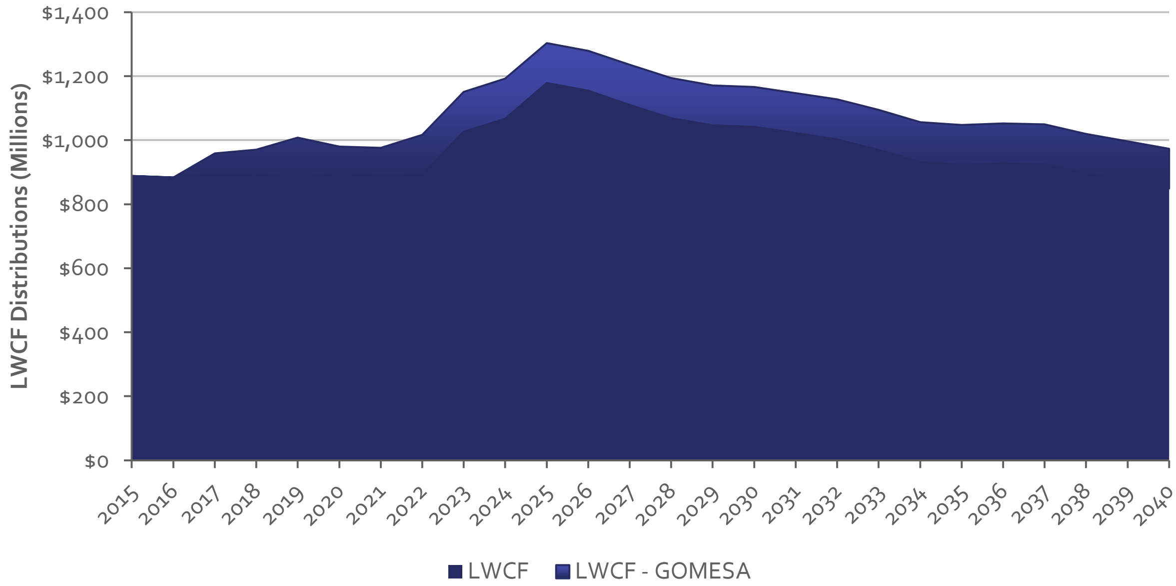
Based on historical distributions, this study projects that Louisiana will see the largest annual distributions due to GOMESA, with distributions averaging around $165million over the 2023-2040 forecast period. Texas is projected to receive the second-highest average distributions, at over $101million per year. Mississippi and Alabama are projected to receive distributions that average around $55 and $53 million annually.

In addition to provisions for revenue sharing with the OCS producing States, GOMESA also included a provision for distributions to the Land and Water Conservation Fund (LWCF). The LWCF "Supports the protection of federal public lands and waters – including national parks, forests, wildlife refuges, and recreation areas – and voluntary conservation on private land. LWCF investments secure public access, improve recreational opportunities, and preserve ecosystem benefits for local communities."[16] In addition to funding from GOMESA, the LWCF also receives significant additional funding due to offshore oil and natural gas activities.

GOMESA distributions to the LWCF are capped at $125 million per year as part of a total cap with state distributions of $500 million. This study projects that distributions to the LWCF due to GOMESA revenue sharing will remain at or around the $125 million cap level for the 2023-2040 forecast period. Non-GOMESA LWCF contributions are projected to average just over $1 billion per year. (Figure 11)

[16] Land and Water Conservation Fund, U.S. Department of the Interior

Figure 11: Projected Base Case LWCF Distributions



Source: Energy and Industrial Advisory Partners

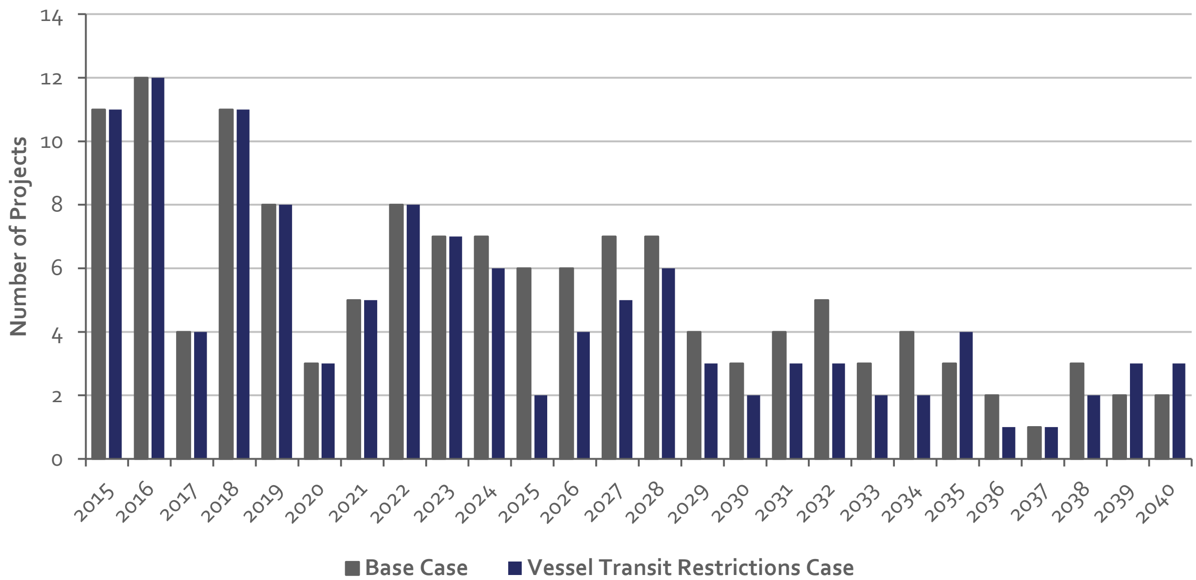
Vessel Transit Restrictions Case Impacts

A reduction in the available capacity to transport equipment and goods to drilling rigs, projects under development, and production platforms would likely have an immediate, long-lasting, negative impact on Gulf of Mexico oil and natural gas project development, spending, supported employment and GDP, and government revenues. For the purposes of this report, a "Vessel Transit Restrictions Case" was developed to compare activity levels (project executions, spending, oil, and natural gas production), economic impacts, and government revenues to the Base Case Scenario. This scenario assumes that beginning in 2024, the transit restrictions on oil and gas vessels in the Proposed Lease Sale 261 Stipulation Language are implemented. This scenario also assumes no other major policy or regulatory changes impacting the Gulf of Mexico oil and natural gas industry would be enacted.

Projects

Development of new offshore oil and natural gas projects in the Gulf of Mexico is a key indicator for capital and operational spending, supported employment, oil and natural gas production, and government revenues due to Gulf of Mexico offshore oil and natural gas activity. Under the Vessel Transit Restrictions Case, project development activity is projected to be reduced as soon as 2024, as the vessel capacity to support drilling rigs and construction vessels required for project development are immediately reduced. Over the 2023-2040 forecast period, new project startups are projected to decline by 22 percent, from 76 to 59. (Figure 12)

Figure 12: Projected Base Case vs. Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Project Startups by Year



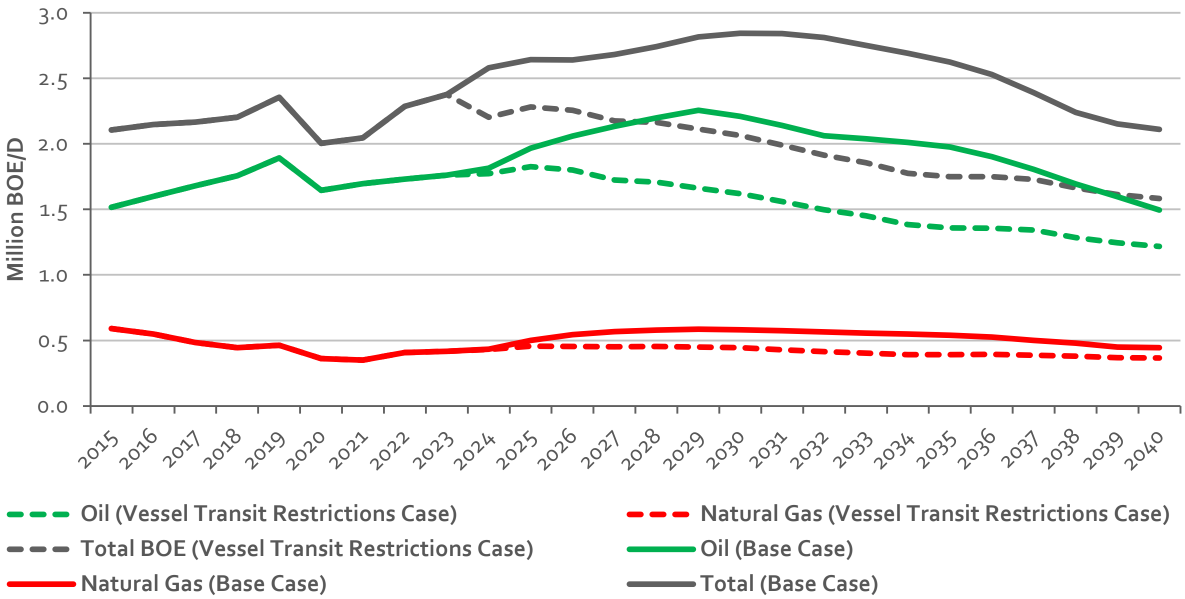
Source: Energy and Industrial Advisory Partners

Production

To develop the production forecasts for this report, project development, in addition to the existing production base was modeled utilizing key indicators such as the water depth of a project, the projected number of producing wells, per well production estimates, and assumptions on peak production years, and decline rates. The Vessel Transit Restrictions Case modeled the impact of reduced and delayed project development due to the proposed vessel restrictions on production.

The average production from 2023 to 2040 in the Base Case is around 2.6 million barrels of oil equivalent per day. The average production in the Vessel Transit Restrictions Case over the same time period is slightly around 2.0 million barrels of oil equivalent per day, a 24 percent reduction. In 2040, production is projected to be just under 1.6 million barrels of oil equivalent per day lower than the base case, around a 25 percent reduction. (Figure 13)

Figure 13: Projected Base Case vs. Vessel Transit Restrictions Case Gulf of Mexico oil and natural gas Production (BOE/D)

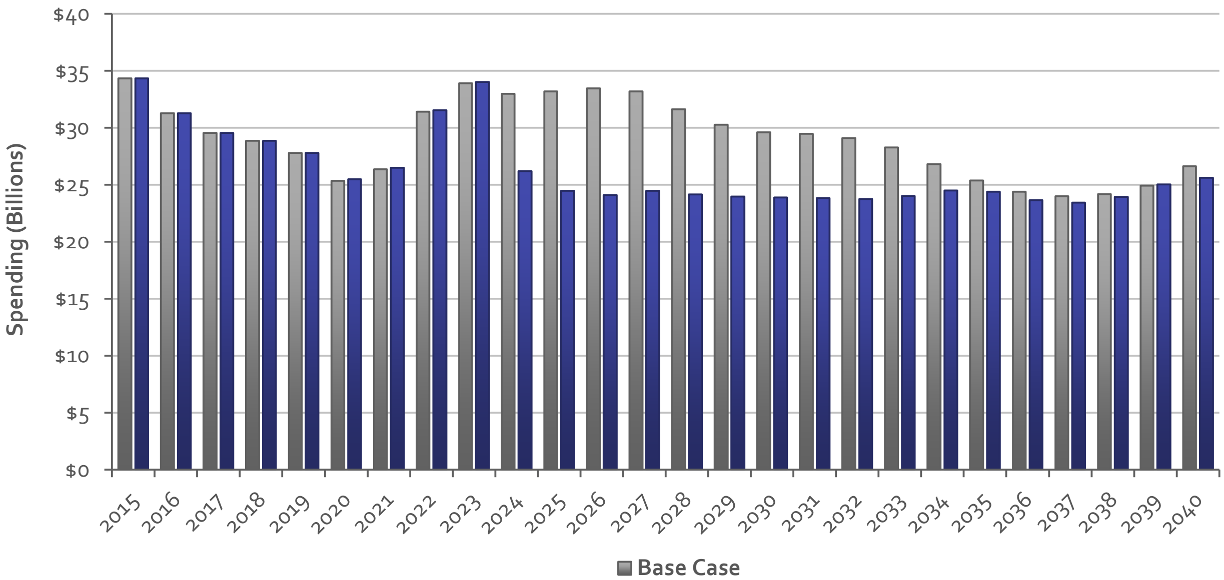


Source: Energy and Industrial Advisory Partners

Spending

In the Vessel Transit Restrictions Case, spending is projected at just under $24.9 billion per year on average from 2023-2040, a 14 percent reduction from the just over $28.9 billion in the Base Case (Figure 14)

Figure 14: Projected Base Case vs. Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Spending



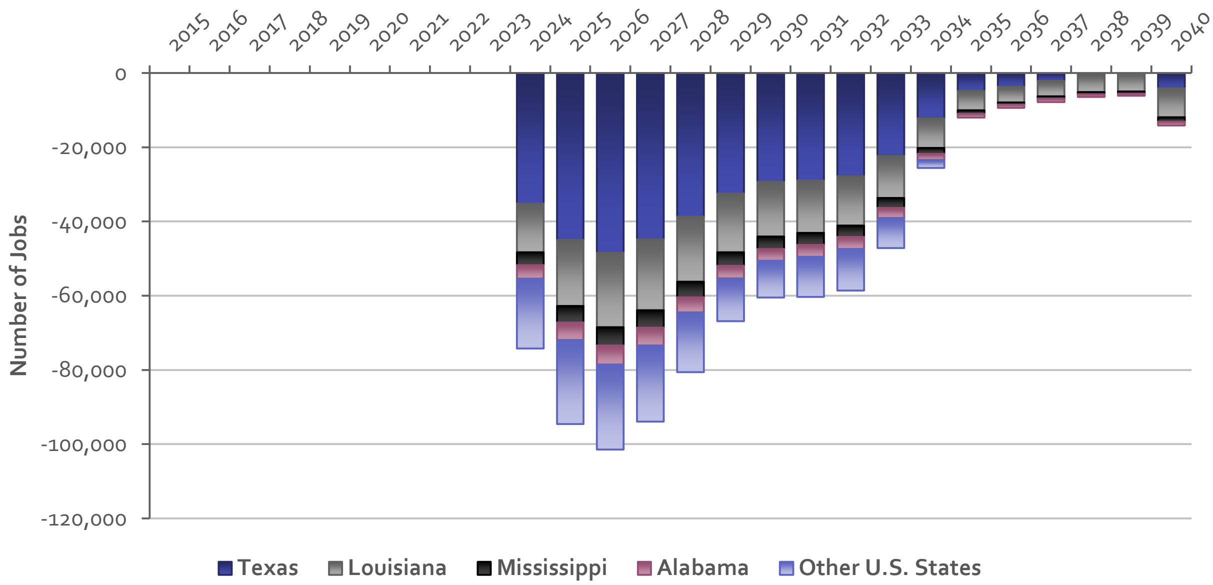
Source: Energy and Industrial Advisory Partners

Employment

In the Base Case, during the 2023 to 2040 forecast period, this study project average annual employment of around 354 thousand nationally will be supported by Gulf of Mexico oil and natural gas activity. In the Vessel Transit Restrictions Case, average employment is projected to decline to just under 310 thousand jobs supported annually (a 13 percent reduction).

In the Vessel Transit Restrictions Case, Texas' average annual supported employment across the forecast period is projected to decline from just above 149 thousand jobs to just over 128 thousand jobs (a 14 percent decline. Louisiana's average supported employment is projected at just over 91 thousand jobs in the Vessel Transit Restrictions Case, compared to about 102 thousand jobs in the Base Case, an 11 percent reduction. Alabama is projected to see average annual supported employment decline from over 28 thousand jobs to about 26 thousand jobs, a 9 percent decline. Mississippi is projected to see average annual supported employment decline from about 21 thousand jobs to slightly over 19 thousand jobs, an 11 percent decline. The rest of the U.S. is projected to see average annual supported employment decline from over 52 thousand jobs to just over 45 thousand jobs, a 14 percent decline. (Figure 15)

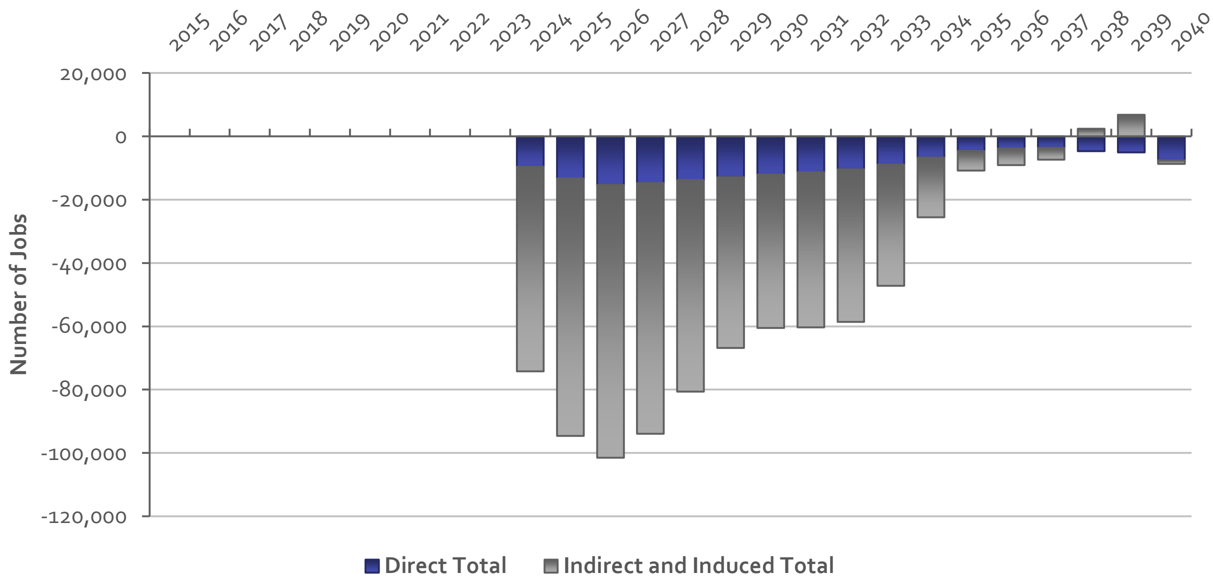
Figure 15: Projected Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Supported Employment Reductions



Source: Energy and Industrial Advisory Partners

The Gulf of Mexico oil and natural gas industry supports employment through direct employment by the industry, indirect employment by its suppliers, and induced employment due to increased spending by workers. Across the 2023 to 2040 forecast period, direct employment is projected to average around 76 thousand jobs each year in the Base Case. In the Vessel Transit Restrictions Case, average direct employment across the forecast period is projected at just under 68 thousand jobs, a slightly below 11 percent decrease. Across the 2023 to 2040 forecast period, supported indirect and induced employment in the Vessel Transit Restrictions Case is projected at around 242 thousand jobs on average, compared to around 278 thousand jobs in the Base Case, a nearly 13 percent decline. (Figure 16)

Figure 16: Projected Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Direct and Indirect and Induced Supported Employment Reductions

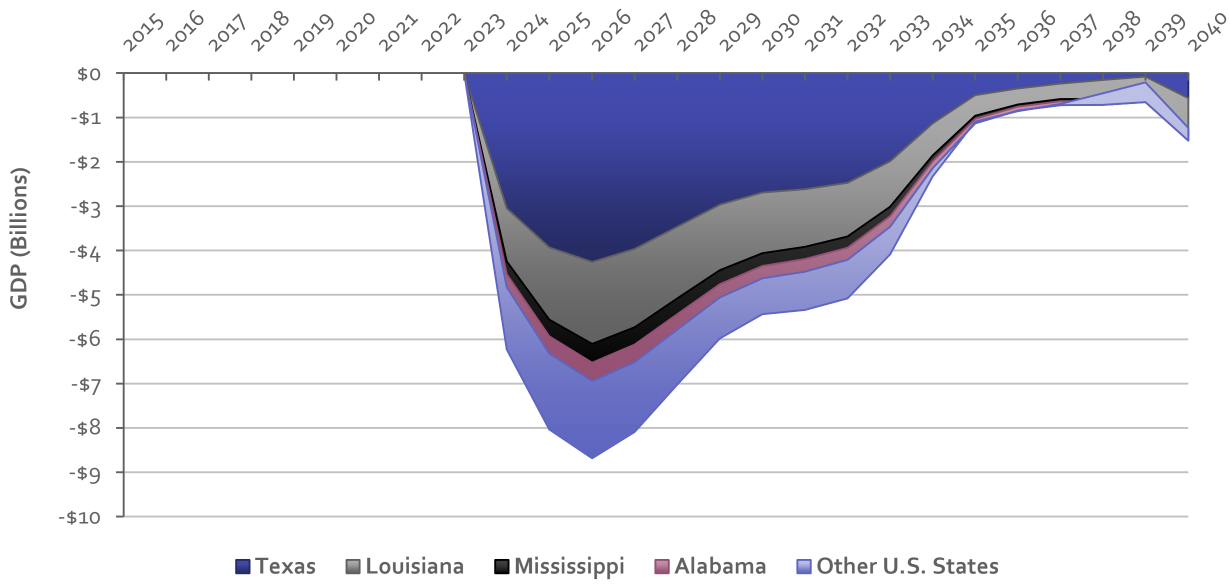


Source: Energy and Industrial Advisory Partners

GDP

The Gulf of Mexico oil and natural gas industry supports significant gross domestic product (GDP) levels in the Gulf Coast states' economies and the national economy through its spending. On average, the Gulf of Mexico offshore oil and natural gas industry is projected to contribute just over $ 29.9 billion to the national GDP annually over the forecast period in the Base Case. In the Vessel Transit Restrictions Case, annual contributions to GDP are projected to average over $25.9 billion, and around 13 percent reduction. (Figure 17)

Figure 17: Projected Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Contributions to GDP Reductions



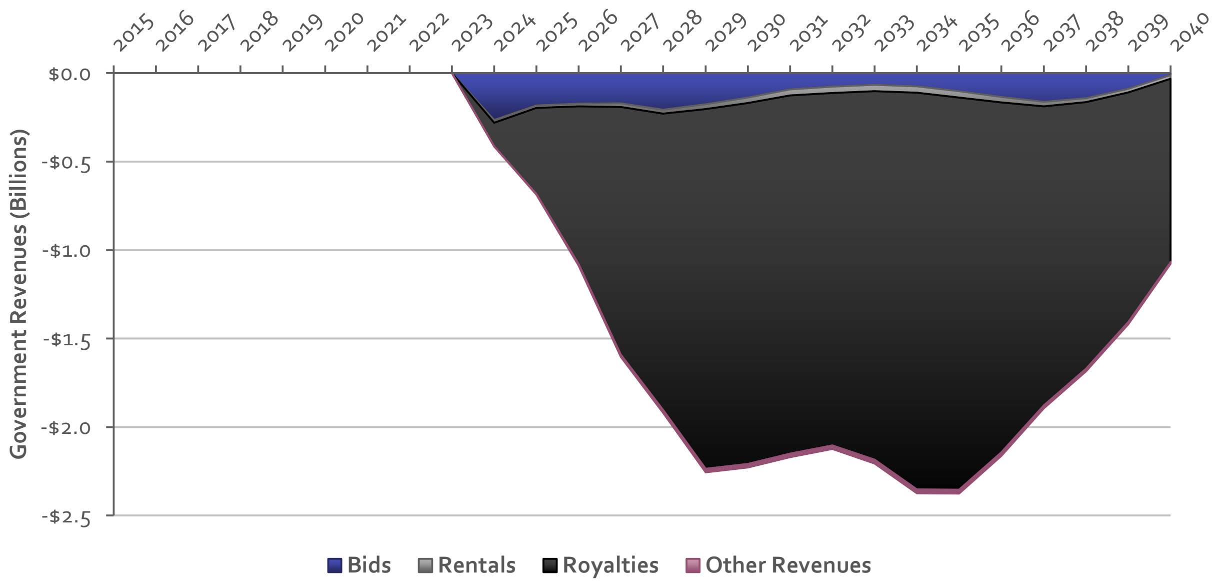
Source: Energy and Industrial Advisory Partners

Government Revenues

In the Base Case developed for this report, average annual government revenues across the 2023 to 2040 forecast period due to Gulf of Mexico offshore oil and natural gas activities (excluding personal and corporate income taxes and property taxes) are projected at over $7.3 billion per year. In the Vessel Transit Restrictions Case, revenues are projected at an average of around $ 5.7 billion annually, a 22 percent reduction.

Across the 2023 to 2040 forecast period, average royalty revenues are projected to be reduced from slightly over $6.8 billion in the Base Case to just over $5.3 billion per year in the Vessel Transit Restrictions Case, a 22 percent reduction. Bid revenues are projected to decline from an average of about $342 million per year in the Base Case to just below $216 million per year in the Vessel Transit Restrictions Case, a 37 percent reduction. Rental revenues are projected to decline from around $102 million per year on average in the Base Case to just above $78 million, a 24 percent reduction. Other revenues are projected to decline to around $54 million per year on average in the Vessel Transit Restrictions Case compared to just over $69 million, a 22 percent reduction from the Base Case. (Figure 18)

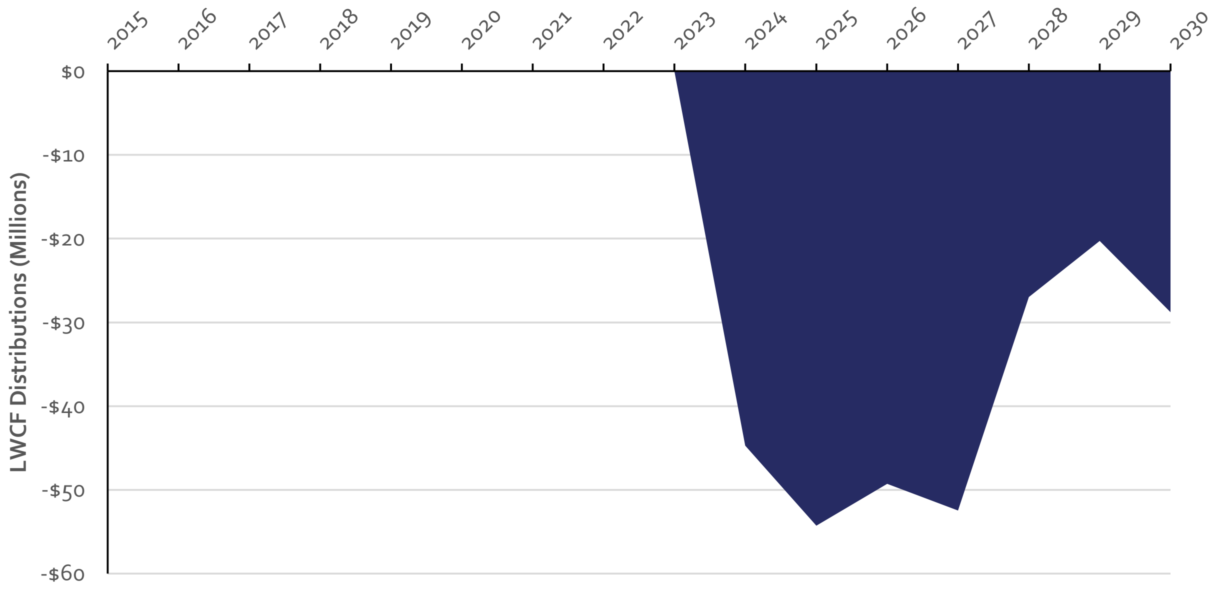
Figure 18: Projected Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural Gas Government Revenue Reductions by Type



Source: Energy and Industrial Advisory Partners

In the Vessel Transit Restrictions Case, distributions to states due to GOMESA are projected to be relatively in line with distributions in the Base Case due to the cap on distributions to states. If this cap were removed or increased, distributions to states would likely be reduced. Distributions to the LWCF due to GOMESA are also projected to be relatively in line with those in the Base Case. Non-GOMESA distributions to the LWCF due to offshore activities are projected to average just over $963 million compared to around $1 billion in the Base Case, a 4 percent reduction. (Figure 19)

Figure 19: Projected Vessel Transit Restrictions Case LWCF Distribution Reductions



Source: Energy and Industrial Advisory Partners

Conclusions

The Gulf of Mexico offshore oil and natural gas industry plays a major role in domestic energy production, and is expected to continue for decades to come, despite the evolving energy landscape. The offshore oil and natural gas industry relies on a wide variety of supplies to explore for new resources, drill exploration and production wells, develop new projects, and to conduct production operations. These supplies very greatly, from pipe, to chemicals, to drilling mud, food, fuel, and thousands of other commodities and pieces of equipment. Significantly restricting the movement of the vessels that transport these things is projected to have a major impact on the industry's ability to supply the necessary materials to conduct offshore oil and natural gas development. This reduction in activity is projected to lead to reduced industry spending, supported employment and GDP, government revenues, and oil and natural gas production. (Table 4)

Table 4: Key Findings

		Vessel Transit Restrictions Case Impacts		
Economic Impact	**Base Case Average (2023-2040)**	**Maximum Year Impact**	**Average Impact (2023-2040)**	**Cumulative Impact (2023-2040)**
Capital Investment and Spending ($ Billions)	$29.0	-$9.4	-$4.1	-$74.0
Employment	354,053	-101,469	-44,466	N/A
Contributions to GDP ($ Billions)	$29.9	-$8.7	-$3.9	-$70.9
Government Revenues ($ Billions)	$7.3	-$2.4	-$1.6	-$29.7
Oil and Natural Gas Production (MMBOED)	2.58	-0.92	-0.62	-4.1 Billion Barrells

Source: Energy and Industrial Advisory Partners

Appendices

Methodology

Overall Methodology

As part of the development of this report, a detailed review of the potential impacts of a change to offshore energy construction vessel crewing requirements was to take place was conducted. This study is not exhaustive, especially considering the uncertainty around how the Gulf of Mexico oil and natural gas industry would respond to these changes and a subsequent reduction in offshore energy vessel availability. This report focuses on the potential operational effects of these changes based on a reasonable reading of these proposals and considers the potential operational changes energy companies could undertake to minimize the effects of these changes on their operations. As such, this analysis is inherently forward-looking and subject to significant changes based on the potential development and implementation of policy changes by Congress, the executive branch, and regulators such as the Department of Homeland Security and the Coast Guard.

Scenario Development

The study's data development was undertaken by first developing a model that accounts for all major parts of the offshore oil and natural gas exploration and production lifecycle. The major sections of the offshore oil and natural gas model are: an Activity Model that assesses near term project activity, OCS reserves and production; and the likely project development and drilling activity necessary to meet production targets; a spending model derived from the activities required to develop and operate offshore oil and natural gas projects and reasonable assumptions around the spending levels typically associated with these activities; a government revenue model which uses forecast production levels and other relevant forecasts (leasing, block rentals, etc.), forecast commodity pricing, historical data on actual government revenues and distributions and governmental policies to forecast potential government revenues; and an Economic Model which utilizes the projected spending and government revenue levels, as well as assumptions about the nature of spending and its geographic distribution to forecast associated supported economic activity including employment and gross domestic product.

The Base Case model for offshore oil and natural gas was initially developed based on forecast production and pricing levels based on the Energy Information Administration's (EIA) Annual Energy Outlook 2023[17] for long-term prices and the EIA's Short-Term Energy Outlook[18] for the near term (2023 and 2024) prices. However, modifications to near-term pricing and production levels were made based on current market conditions. Although these forecasts were utilized to develop the Base Case model, due to differences in

[17] Annual Energy Outlook 2023, Energy Information Administration

[18] Short Term Energy Outlook, August 8th, 2023, Energy Information Administration

modeling techniques, especially the project-based model developed in this report, the report's forecast production levels vary from those provided in the EIA's forecasts.

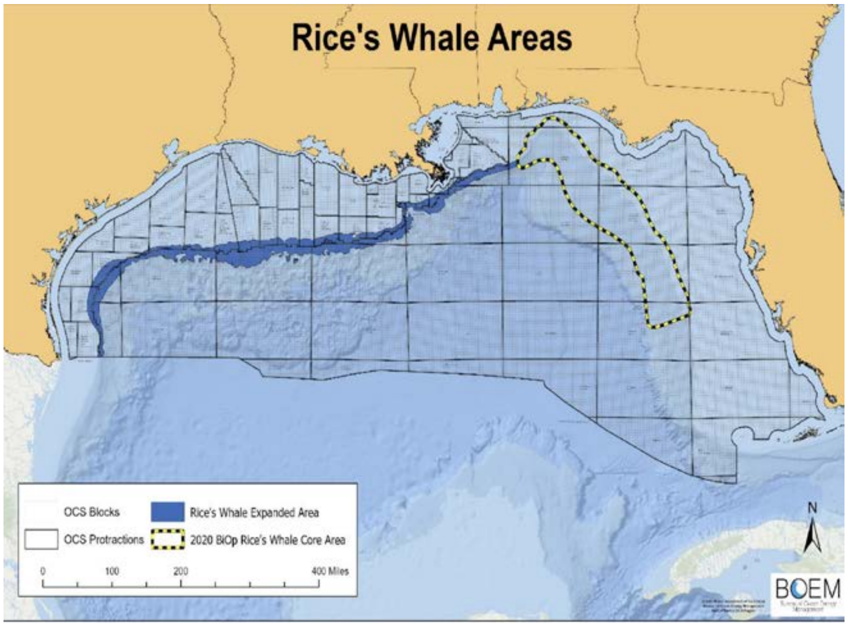
Following the creation of the Base Case forecast, the potential effects of the additional scenario (reduced vessel availability due to attempted changes in crewing requirements for offshore energy vessels, the "Vessel Transit Restrictions Case") was considered. Amongst other factors, how this scenario would impact new project development of both underway and future projects and existing producing projects were examined.

Offshore Energy Vessels Transit Restrictions

Following a lawsuit filed against the National Marine Fisheries Service (NMFS) relating to various marine species, NMFS entered into a settlement with the plaintiffs calling for the implementation of new restrictions applicable to the transit of oil and gas vessels between the 100 to 400 m isobath across the northern Gulf of Mexico on the Outer Continental Shelf (OCS), eastward from the Mexican border with Texas and westward of the Rice's Whale Core Area identified in the 2020 Biological Opinion (Expanded Rice's Whale Area).[19] If implemented, these restrictions would greatly reduce the ability of oil and gas vessels to transit through this area, which would include all vessels transiting to deepwater, drilling and production platforms. Transit through this area would essentially be halted during certain sea state conditions as well as at night. These restrictions only apply to oil and natural gas industry vessels and not to other vessels transiting the area. (Figure 20)

[19] These restrictions are reflected in Notice to Lessees No. 2023-G-01, which this report assumes will be implemented under the "Vessel Transit Restrictions Case." Similar restrictions are also reflected in lease stipulations applicable to Lease Sale 261 (which have been preliminarily enjoined by a federal court).

Figure 20: Rice's Whale Areas



Source: Bureau of Ocean Energy Management

These transit restrictions would essentially reduce the capacity of the existing offshore oil and gas supply fleet, as the journey between shore and platforms would be extended. This reduction in transport capacity would reduce the ability to support exploration, drilling, development, and production operations, reducing the industry's ability to explore for, develop and produce oil and natural gas. Given the Jones Act requirement that vessels transporting equipment from US ports to offshore be Jones Act compliant (US built, flagged, and crewed), overcoming these restrictions would take a significant amount of time, as well as putting strain on Gulf Coast ports, and the limited pool of US mariners.

The primary purpose of this report is to estimate the impact that restricting transit of offshore oil and gas vessels would have on vessel capacity availability and the subsequent impacts reduced vessel capacity would have on Gulf of Mexico exploration, project development and operations, and the impact reduced activity levels would be projected to have on the economy.

A large variety of vessels are required to support offshore oil and natural gas exploration, development, and operations. These vessels range from seismic vessels (which identify potential oil and natural gas deposits) and drilling rigs to a variety of installation vessels (such as pipe and cable lay vessels, heavy lifts vessels, and multipurpose support vessels). These transit restrictions would essentially reduce the capacity of the existing offshore oil and gas supply fleet, as the journey between shore and platforms would be extended. This reduction in transport capacity would reduce the ability to support exploration, drilling, development, and production operations, reducing the industry's ability to explore for, develop and produce oil and natural gas. Given the Jones Act requirement that vessels transporting equipment from US ports to offshore be Jones Act compliant (US built, flagged, and crewed), overcoming these restrictions would take a significant amount of time, as well as putting strain on Gulf Coast ports, and the limited pool of US mariners.

Given that the transit restrictions primarily impact vessel transiting to deepwater areas from ports, the largest potential impact of the restrictions are expected to be on supply vessels, which ferry supplies from shore to deepwater drilling rigs, platforms, and other vessels. The number of active vessels in the Gulf of Mexico and the projected needs for these vessels, as well as miles traveled, and number of trips was estimated to form the basis of this report's analysis. (Table 5)

Table 5: Historical Gulf of Mexico Supply Vessel Active Fleet, Trips, and Miles Traveled Estimates[20]

Vessel Trips	2017	2018	2019	2020	2021	2022
Service Vessels	580	597	580	564	537	575
Service Vessel Trips	81,394	83,779	81,394	79,148	75,359	80,692
Service Vessel Miles	5,879,017	6,051,333	5,879,017	5,716,837	5,443,158	5,828,335

Source: EIAP, National Marine Fisheries Service, BOEM, Army Corps of Engineers

For the purposes of this report, two scenarios were developed, a scenario based on a continuation of current policies as it relates to vessel transit requirements for offshore oil and gas (the Base Case), and a scenario examining the potential impacts of implementation of the transit restrictions described above and the subsequent reduction in the availability of vessels used in the supply of offshore energy projects on these offshore energy activities (The Vessel Transit Restrictions Case). To develop the Vessel Transit Restrictions Case, forecast demand for supply vessels based on historical activity and vessel demand was calculated. Using data from the National Marine Fisheries Service's "Opinion on the Federally Regulated Oil and Gas Program activities in the Gulf of Mexico" released in 2020, an estimate of the number of vessels trips and the length of these trips was calculated.[21] An estimate average length of the restricted area was then calculated, which was overlayed with data provided by Oceanweather Inc on visibility based on significant wave heights and visibility, and data on monthly sunrise and sunset times to estimate the share of a supply vessel's trip which would be restricted by the proposed settlement. This data was then utilized to estimate the reduction of the Gulf of Mexico oil and natural gas supply vessel capacity due to the longer trip times for supply vessels due to these restrictions. The report assumes that the supply vessel fleet will grow (and thus its capacity would grow over time) reducing the impact of the proposed restrictions. (Table 6)

[20] The oil and gas industry's share of total vessel traffic based on Bureau of Ocean Energy Management and Army Corps of Engineers Data as presented in the "National Marine Fisheries Service Endangered Species Act Section 7 Biological Opinion", March 13th, 2020, Page 338 is between 9.23 and 19.28 percent.

[21] Biological Opinion on the Federally Regulated Oil and Gas Program Activities in the Gulf of Mexico, National Marine Fisheries Service

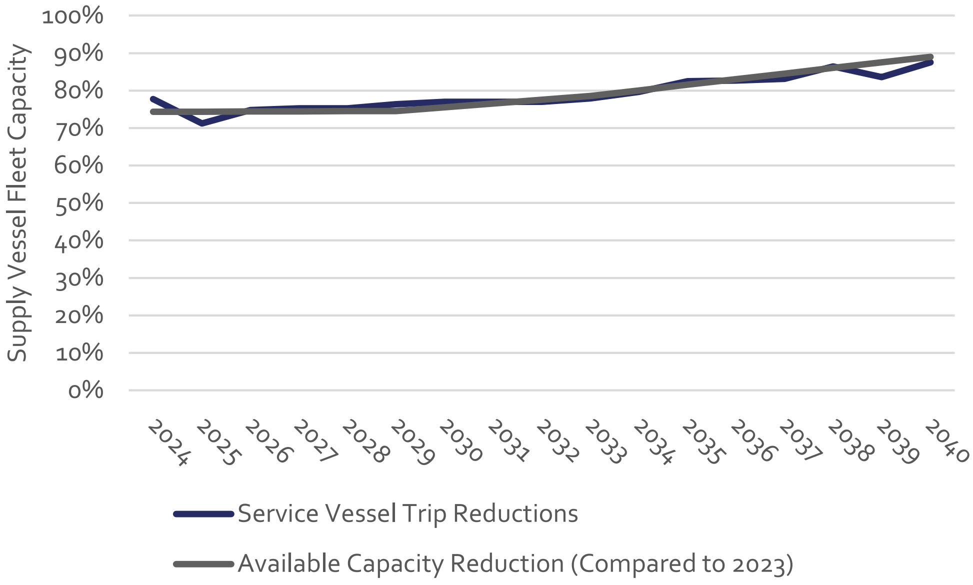
Table 6: Estimate of the Initial Impact of Vessel Transit Restrictions

Input	Output
Estimated Length of Area (Miles)	25
Annual Supply Vessel Trips	83,020
Total KM Travelled	9,461,363
Total Miles Travelled	5,879,017
Average Trip Length	71
Rice Whale Area Share of Trip	35.3%
Average Share of Time Outside Weather/Daylight Window	72.7%
Estimated Transit Time Increase	25.7%

Source: Energy and Industrial Advisory Partners

The study assumes that the Gulf of Mexico offshore oil and natural gas industry will take actions over time to reduce the impact of the vessel transit restrictions, by for example ordering additional vessels. These reductions are expected to require time and thus be gradual due to restrictions on domestic shipbuilding capacity, port capacity, and available US mariners. (Figure 21)

Figure 21: Estimate of Reductions in Supply Capacity Overtime



Source: Energy and Industrial Advisory Partners

As the available fleet of supply vessels increases, the vessel transit restrictions impact on offshore oil and naturals gas activity are expected to decline. As such, reductions in spending, employment, GDP, oil and natural gas production and government revenues will also decline. However, lagging indicators such as production and government revenues are projected to continue to be materially below base case levels for most of the forecast period.

Project and Activity Methodology

When developing this study to forecast activity levels, near-term and longer-term projects not currently under development were considered. Near-term project activity forecasts are based on actual projects operators have stated development plans for or, in some cases, reasonable forecasts for other potential projects when no development decisions have taken place. For long-term activity, project forecasts are based primarily on projected production levels, with project development activity to meet projected production forecasts.

For the Vessel Transit Restrictions Case, the project and activity forecasts presented in the Base Case were used as a baseline for activity levels. For each case, a reasonable reading of this potential scenario's impacts on activity levels was then developed based on the forecast included in this report for offshore energy vessel availability.

Spending Methodology

The spending analysis developed for this report attempts to account for the totality of capital and operational spending associated with offshore oil and natural gas development throughout a project's lifecycle.

Spending for each oil and gas project is divided into nineteen categories. Each category accounts for one general activity type required to find, develop, operate, or abandon an offshore energy project. Costs for each category were developed based on general project sizes (and the associated activity levels and equipment requirements), water depths, and other factors. The distribution of spending overtime for each category for different project sizes and water depths was then developed.

After the overall spending forecast for Gulf of Mexico oil and natural gas activity was developed, spending was allocated to individual states and international suppliers. Domestic spending is allocated based on a category-by-category analysis of supply chains and Bureau of Economic Analysis data to provide state-specific spending allocations. Spending with international suppliers is not analyzed further and accounts for no economic impacts in the report. Oil and natural gas spending distributions are constant throughout the scenarios presented in this report. It is possible that reduced activity levels may lead to changes in supply chains and thus spending distributions.

Economic Methodology

The Bureau of Economic Analysis' RIMS II input-output multipliers were used to develop this report's employment and gross domestic product analysis. These multipliers provide state-level employment and gross domestic product estimates based on industry-specific spending levels. For this report, economic activity was also divided into direct (directly related to industries involved in the offshore energy supply chain) and indirect and induced (industries not directly involved in the offshore energy supply chain and economic activity due to increased wages), employment and gross domestic product.

The following RIMS industry categories were used in the development of the report to account for spending by the Gulf of Mexico oil and natural gas industry (all RIMS categories were used in the output of data):

- Mining and oil and gas field machinery manufacturing
- Steel product manufacturing from purchased steel
- Fabricated metal product manufacturing
- Construction
- Drilling oil and gas wells
- Architectural, engineering, and related services
- Support activities for oil and gas operations
- Natural gas distribution
- Mechanical power transmission equipment manufacturing
- Laminated plastics plate, sheet (except packaging), and shape manufacturing
- Cut stone and stone product manufacturing
- Spring and wire product manufacturing
- Power, distribution, and specialty transformer manufacturing
- Communication and energy wire and cable manufacturing
- Water transportation

Government Revenue Methodology

Government revenues due to offshore oil and natural gas activity are primarily derived from three main revenue streams, royalties paid on produced oil and natural gas, bonus bids paid to acquire blocks in lease sales, and rents for blocks leased by operators. Several policies impact royalty and lease payments received by the Federal Government, including royalty relief for certain blocks depending on production levels and differing rent and royalty regimes for fields in different water depths and blocks leased at different times. Additionally, the value of oil and natural gas produced in the OCS may differ from major indicators such as West Texas Intermediate (WTI) crude due to transportation costs, long-term sales contracts, and differentials due to product quality and location. Data from the Office of Natural Resource Revenue[22] (ONRR) and oil and natural gas price projections from the Energy Information Administration's Annual Energy Outlook 2022[23] and Short-Term Energy Outlook[24] were utilized to calculate government revenues due to offshore oil and natural gas activities. In some cases (especially regarding disbursements to states), calendar year data was unavailable. In these cases, fiscal year data was utilized as a stand-in for calendar year data. Lease sale bid and rental revenues were calculated

[22] U.S. Department of the Interior, Natural Resources Revenue Data, https://revenuedata.doi.gov/
[23] Annual Energy Outlook 2023, Energy Information Administration
[24] Short Term Energy Outlook, August 8th, 2023, Energy Information Administration

through the simulation of yearly lease sales based on the return to a regular leasing schedule in 2025. The number of leases acquired and retained was modeled on the oil price forecasts used to develop the report and historical bid numbers and levels correlated with activity levels.

In 2006 Congress passed the OCS Energy Security Act (GOMESA), which created revenue-sharing provisions for the four Gulf oil and natural gas producing states (Alabama, Louisiana, Mississippi, and Texas) and their coastal political subdivisions. Revenue sharing was enacted in two phases beginning in 2007 and 2017, respectively, with revenue sharing caps of $375 million for fiscal years 2017–2019, $487.5 million for 2020 and 2021, and $375 million for 2022–2055 enacted. Total projected Federal Government revenues, actual revenue distribution data from the ONRR, analysis of the growth of revenue sharing based on eligible leases, and the revenue sharing caps were considered to develop the revenue sharing forecasts in this report.

In addition to provisions for revenue sharing with the OCS producing States, GOMESA also included a provision for distributions to the Land and Water Conservation Fund (LWCF). The LWCF "supports the protection of federal public lands and waters – including national parks, forests, wildlife refuges, and recreation areas – and voluntary conservation on private land. LWCF investments secure public access, improve recreational opportunities, and preserve ecosystem benefits for local communities."[25] LWCF distribution forecasts are based on total projected Federal Government revenues, actual distribution data from the ONRR, and analysis of revenue sharing growth based on eligible leases and revenue sharing caps.

[25] Land and Water Conservation Fund, U.S. Department of the Interior

Data Tables by Case

Gulf of Mexico Oil and Natural Gas Industry Economic Impacts

Table 7: Projected Base Case Gulf of Mexico Oil and Natural Gas Production (BOE/D)

	2015	2016	2017	2018	2019	2020	2021
Oil	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167	1,644,083	1,696,200
Natural Gas	589,930	548,251	484,225	445,142	463,627	360,395	349,089
Total BOE	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794	2,004,478	2,045,289

	2022	2023	2024	2025	2026	2027	2028
Oil	1,731,000	1,760,644	1,814,451	1,966,106	2,059,685	2,133,750	2,196,910
Natural Gas	406,905	417,301	433,645	499,410	544,480	567,060	578,649
Total BOE	2,285,001	2,376,292	2,578,902	2,641,590	2,639,863	2,682,304	2,740,273

	2029	2030	2031	2032	2033	2034	2035
Oil	2,254,803	2,209,216	2,140,401	2,062,071	2,037,863	2,010,061	1,975,380
Natural Gas	584,845	581,944	573,657	565,022	556,344	547,806	539,867
Total BOE	2,816,463	2,843,792	2,840,252	2,810,918	2,749,717	2,690,149	2,622,987

	2036	2037	2038	2039	2040
Oil	1,900,758	1,804,243	1,693,638	1,596,184	1,493,654
Natural Gas	526,550	500,453	479,556	448,625	445,005
Total BOE	2,528,454	2,389,014	2,239,661	2,151,546	2,110,466

Source: Energy and Industrial Advisory Partners

Table 8: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions

	2015	2016	2017	2018	2019	2020	2021
G&G	$215	$189	$167	$160	$156	$176	$192
Drilling Tangibles	$1,448	$1,265	$1,227	$1,211	$1,310	$1,159	$863
Trees	$805	$680	$611	$627	$451	$328	$506
Manifolds	$425	$358	$321	$328	$237	$167	$261
Other Subsea Hardware	$168	$145	$143	$143	$130	$81	$90
Control Umbilical, Flying Leads	$495	$412	$366	$373	$268	$182	$308
Infield FL	$166	$127	$114	$119	$102	$44	$68
Export PL	$1,162	$892	$781	$782	$658	$223	$358
Infield Risers	$85	$66	$60	$61	$53	$22	$33
Export Risers	$44	$33	$29	$30	$25	$8	$14
Fixed Platforms & Facilities	$270	$204	$166	$135	$114	$76	$88
Floating Production Units & Facilities	$1,558	$1,320	$1,082	$1,155	$825	$880	$1,760
Installation	$2,269	$1,640	$1,527	$1,439	$1,328	$752	$1,038
OPEX	$13,502	$13,721	$13,783	$13,816	$13,829	$12,276	$13,474
Decommissioning CAPEX	$1,257	$1,150	$1,212	$1,100	$773	$696	$858
Drilling	$8,363	$7,157	$6,112	$5,560	$5,847	$6,892	$4,882
Engineering CAPEX	$1,063	$874	$808	$792	$663	$506	$679
Engineering OPEX	$844	$858	$861	$863	$864	$877	$886
Natural Gas Processing and Transportation	$199	$189	$172	$163	$157	$144	$124
Total	$34,338	$31,281	$29,542	$28,857	$27,789	$25,344	$26,359

Source: Energy and Industrial Advisory Partners

Table 8: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2022	2023	2024	2025	2026	2027	2028
G&G	$252	$275	$284	$292	$291	$282	$267
Drilling Tangibles	$1,286	$1,525	$1,417	$1,361	$1,354	$1,352	$1,297
Trees	$619	$575	$519	$506	$502	$456	$366
Manifolds	$323	$301	$272	$265	$263	$240	$194
Other Subsea Hardware	$143	$151	$137	$134	$136	$134	$118
Control Umbilical, Flying Leads	$395	$367	$327	$317	$315	$287	$228
Infield FL	$127	$126	$105	$98	$98	$96	$78
Export PL	$776	$811	$693	$645	$656	$665	$561
Infield Risers	$61	$61	$52	$49	$49	$48	$40
Export Risers	$31	$32	$27	$25	$25	$25	$21
Fixed Platforms & Facilities	$147	$154	$147	$170	$212	$211	$155
Floating Production Units & Facilities	$2,145	$1,760	$1,503	$1,467	$1,357	$1,173	$807
Installation	$1,769	$1,793	$1,479	$1,368	$1,364	$1,275	$1,067
OPEX	$13,591	$14,334	$14,405	$14,450	$14,525	$14,589	$14,659
Decommissioning CAPEX	$785	$827	$754	$827	$757	$803	$733
Drilling	$7,152	$9,012	$9,174	$9,550	$9,894	$9,921	$9,519
Engineering CAPEX	$917	$902	$792	$773	$756	$720	$603
Engineering OPEX	$894	$896	$900	$903	$908	$912	$916
Natural Gas Processing and Transportation	$131	$127	$135	$141	$145	$148	$152
Total	$31,412	$33,901	$32,987	$33,199	$33,463	$33,190	$31,628

Source: Energy and Industrial Advisory Partners

Table 8: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2029	2030	2031	2032	2033	2034	2035
G&G	$251	$236	$222	$206	$186	$165	$151
Drilling Tangibles	$1,214	$1,132	$1,065	$1,015	$949	$855	$737
Trees	$309	$312	$339	$349	$328	$284	$238
Manifolds	$163	$165	$179	$185	$174	$151	$125
Other Subsea Hardware	$99	$93	$95	$98	$94	$84	$71
Control Umbilical, Flying Leads	$191	$196	$216	$225	$211	$182	$152
Infield FL	$58	$55	$62	$69	$68	$60	$49
Export PL	$419	$381	$432	$483	$480	$426	$344
Infield Risers	$30	$28	$32	$35	$34	$31	$25
Export Risers	$16	$15	$17	$19	$19	$17	$14
Fixed Platforms & Facilities	$99	$86	$98	$96	$76	$50	$38
Floating Production Units & Facilities	$788	$880	$1,063	$1,045	$953	$770	$733
Installation	$783	$788	$866	$972	$929	$825	$680
OPEX	$14,677	$14,673	$14,651	$14,645	$14,613	$14,584	$14,535
Decommissioning CAPEX	$781	$710	$758	$688	$736	$667	$715
Drilling	$8,953	$8,398	$7,901	$7,495	$6,981	$6,282	$5,441
Engineering CAPEX	$532	$522	$561	$564	$538	$468	$420
Engineering OPEX	$917	$917	$916	$915	$913	$912	$908
Natural Gas Processing and Transportation	$156	$159	$160	$158	$155	$152	$148
Total	$30,278	$29,589	$29,474	$29,104	$28,282	$26,812	$25,375

Source: Energy and Industrial Advisory Partners

Table 8: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2036	2037	2038	2039	2040
G&G	$150	$158	$176	$193	$208
Drilling Tangibles	$664	$648	$714	$776	$876
Trees	$213	$203	$201	$226	$301
Manifolds	$111	$106	$106	$120	$159
Other Subsea Hardware	$62	$60	$61	$64	$76
Control Umbilical, Flying Leads	$136	$127	$123	$139	$191
Infield FL	$44	$42	$38	$35	$45
Export PL	$287	$261	$242	$245	$322
Infield Risers	$22	$20	$19	$19	$24
Export Risers	$11	$10	$9	$9	$13
Fixed Platforms & Facilities	$44	$50	$38	$25	$38
Floating Production Units & Facilities	$678	$587	$458	$623	$990
Installation	$628	$589	$535	$500	$677
OPEX	$14,463	$14,354	$14,274	$14,210	$14,176
Decommissioning CAPEX	$646	$694	$626	$676	$608
Drilling	$4,943	$4,830	$5,323	$5,804	$6,567
Engineering CAPEX	$381	$366	$342	$375	$467
Engineering OPEX	$904	$897	$892	$888	$886
Natural Gas Processing and Transportation	$142	$135	$129	$123	$121
Total	$24,386	$24,002	$24,177	$24,928	$26,622

Source: Energy and Industrial Advisory Partners

Table 9: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Supported Employment (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021
Texas	183,868	166,737	158,715	155,767	147,462	133,381	136,682
Louisiana	102,936	98,247	94,932	95,089	94,621	89,432	89,175
Mississippi	23,024	21,524	20,740	20,926	20,415	19,110	19,116
Alabama	31,413	29,595	28,870	29,053	28,011	25,157	26,508
Other U.S. States	76,183	65,041	60,861	59,631	54,989	43,624	52,990
Total	417,424	381,144	364,119	360,465	345,498	310,703	324,472

	2022	2023	2024	2025	2026	2027	2028
Texas	162,509	176,720	171,397	172,677	173,615	172,903	164,651
Louisiana	98,453	108,914	108,640	109,864	111,042	111,307	109,391
Mississippi	21,545	23,872	23,548	23,789	23,968	23,984	23,318
Alabama	29,384	31,580	30,904	31,056	31,144	31,130	30,213
Other U.S. States	69,845	70,935	65,312	64,309	63,926	61,813	55,878
Total	381,735	412,021	399,802	401,695	403,695	401,137	383,451

	2029	2030	2031	2032	2033	2034	2035
Texas	157,438	152,802	152,179	149,840	146,127	138,149	130,689
Louisiana	107,061	105,026	103,753	102,442	100,620	97,657	94,407
Mississippi	22,674	22,166	21,988	21,692	21,294	20,505	19,734
Alabama	29,453	28,952	28,974	28,730	28,360	27,455	26,677
Other U.S. States	51,427	51,109	52,847	53,352	51,559	47,771	44,509
Total	368,052	360,056	359,742	356,057	347,960	331,537	316,016

	2036	2037	2038	2039	2040
Texas	114,868	123,572	124,523	128,598	136,219
Louisiana	92,032	91,145	92,027	93,470	96,173
Mississippi	19,121	18,954	19,088	19,477	20,172
Alabama	25,978	25,771	25,694	26,065	26,807
Other U.S. States	42,443	41,135	39,994	41,418	46,998
Total	294,441	300,577	301,326	309,028	326,369

Source: Energy and Industrial Advisory Partners

Table 10: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Direct vs. Indirect and Induced Supported Employment (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021
Direct	75,446	72,786	70,085	68,677	69,356	66,074	65,276
Indirect and Induced	341,978	308,358	294,034	291,788	276,142	244,629	259,196
Total	417,424	381,144	364,119	360,465	345,498	310,703	324,472

	2022	2023	2024	2025	2026	2027	2028
Direct	72,155	79,995	80,610	81,791	82,999	83,292	82,368
Indirect and Induced	309,581	332,026	319,192	319,905	320,695	317,845	301,083
Total	381,735	412,021	399,802	401,695	403,695	401,137	383,451

	2029	2030	2031	2032	2033	2034	2035
Direct	80,833	79,306	77,915	76,795	75,250	73,171	70,644
Indirect and Induced	287,219	280,750	281,827	279,261	272,710	258,366	245,372
Total	368,052	360,056	359,742	356,057	347,960	331,537	316,016

	2036	2037	2038	2039	2040
Direct	68,919	68,219	69,214	70,288	72,305
Indirect and Induced	225,522	232,357	232,112	238,741	254,064
Total	294,441	300,577	301,326	309,028	326,369

Source: Energy and Industrial Advisory Partners

Table 11: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Contributions to GDP $ Millions

	2015	2016	2017	2018	2019	2020	2021
Texas	$15,587	$14,208	$13,469	$13,196	$12,638	$11,677	$11,769
Louisiana	$8,675	$8,268	$7,950	$7,929	$7,933	$7,576	$7,453
Mississippi	$1,702	$1,586	$1,515	$1,525	$1,504	$1,436	$1,399
Alabama	$2,562	$2,432	$2,368	$2,381	$2,323	$2,109	$2,198
Other U.S. States	$5,768	$5,017	$4,693	$4,609	$4,291	$3,497	$4,138
Total	$34,294	$31,511	$29,994	$29,640	$28,690	$26,296	$26,957

	2022	2023	2024	2025	2026	2027	2028
Texas	$13,950	$15,263	$14,915	$15,063	$15,191	$15,132	$14,475
Louisiana	$8,286	$9,215	$9,220	$9,338	$9,457	$9,480	$9,320
Mississippi	$1,599	$1,791	$1,775	$1,797	$1,817	$1,818	$1,769
Alabama	$2,426	$2,617	$2,578	$2,593	$2,607	$2,607	$2,542
Other U.S. States	$5,355	$5,473	$5,110	$5,063	$5,044	$4,895	$4,469
Total	$31,616	$34,359	$33,597	$33,855	$34,115	$33,931	$32,574

	2029	2030	2031	2032	2033	2034	2035
Texas	$13,872	$13,472	$13,359	$13,136	$12,782	$12,103	$11,440
Louisiana	$9,112	$8,927	$8,794	$8,670	$8,496	$8,232	$7,931
Mississippi	$1,716	$1,674	$1,653	$1,627	$1,590	$1,527	$1,461
Alabama	$2,483	$2,443	$2,437	$2,416	$2,381	$2,311	$2,244
Other U.S. States	$4,172	$4,140	$4,249	$4,258	$4,112	$3,825	$3,583
Total	$31,356	$30,658	$30,491	$30,106	$29,361	$27,998	$26,659

	2036	2037	2038	2039	2040
Texas	$10,013	$10,829	$10,960	$11,319	$11,992
Louisiana	$7,722	$7,642	$7,741	$7,876	$8,128
Mississippi	$1,412	$1,398	$1,416	$1,450	$1,510
Alabama	$2,190	$2,170	$2,171	$2,200	$2,263
Other U.S. States	$3,425	$3,325	$3,257	$3,385	$3,805
Total	$24,763	$25,363	$25,546	$26,230	$27,697

Source: Energy and Industrial Advisory Partners

Table 12: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Government Revenues by Type $ Millions

	2015	2016	2017	2018	2019	2020	2021
Bids	$556	$158	$374	$291	$387	$165	$112
Rentals	$201	$133	$111	$103	$107	$94	$83
Royalties	$3,251	$2,408	$3,262	$4,715	$4,852	$2,716	$4,250
Other Revenues	-$8	$25	$33	$54	$15	-$14	$104
Total	$4,000	$2,723	$3,780	$5,163	$5,361	$2,961	$4,549

	2022	2023	2024	2025	2026	2027	2028
Bids	$0	$504	$402	$466	$454	$426	$367
Rentals	$78	$95	$103	$105	$105	$107	$109
Royalties	$6,299	$5,437	$5,902	$6,704	$7,000	$7,257	$7,526
Other Revenues	$115	$55	$60	$68	$71	$74	$77
Total	$6,492	$6,091	$6,467	$7,344	$7,631	$7,864	$8,079

	2029	2030	2031	2032	2033	2034	2035
Bids	$361	$359	$335	$276	$232	$223	$247
Rentals	$112	$113	$113	$112	$110	$107	$105
Royalties	$7,764	$7,657	$7,481	$7,288	$7,253	$7,219	$7,137
Other Revenues	$79	$78	$76	$74	$74	$74	$73
Total	$8,316	$8,207	$8,005	$7,750	$7,668	$7,623	$7,561

	2036	2037	2038	2039	2040
Bids	$266	$294	$327	$337	$287
Rentals	$101	$95	$89	$86	$84
Royalties	$6,930	$6,624	$6,258	$5,923	$5,592
Other Revenues	$71	$68	$64	$60	$57
Total	$7,368	$7,080	$6,738	$6,406	$6,020

Source: Energy and Industrial Advisory Partners

Table 13: Projected Base Case Gulf of Mexico Offshore Oil and Natural Gas Government Revenues by State $ Millions

	2015	2016	2017	2018	2019	2020	2021
Texas	$0.29	$0.04	$0.12	$50.62	$57.89	$95.28	$67.38
Louisiana	$0.82	$0.10	$0.32	$82.84	$94.73	$155.72	$109.95
Mississippi	$0.67	$0.08	$0.25	$27.75	$31.72	$51.91	$36.52
Alabama	$0.67	$0.09	$0.26	$26.78	$30.60	$50.05	$35.05
Total	$2.44	$0.31	$0.96	$187.99	$214.94	$352.96	$375.00

	2022	2023	2024	2025	2026	2027	2028
Texas	$77.31	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23
Louisiana	$118.88	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44
Mississippi	$37.81	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16
Alabama	$40.89	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17
Total	$274.89	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00

	2029	2030	2031	2032	2033	2034	2035
Texas	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23	$101.23
Louisiana	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44	$165.44
Mississippi	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16	$55.16
Alabama	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17	$53.17
Total	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00	$375.00

	2036	2037	2038	2039	2040
Texas	$101.23	$101.23	$101.23	$101.23	$101.23
Louisiana	$165.44	$165.44	$165.44	$165.44	$165.44
Mississippi	$55.16	$55.16	$55.16	$55.16	$55.16
Alabama	$53.17	$53.17	$53.17	$53.17	$53.17
Total	$375.00	$375.00	$375.00	$375.00	$375.00

Source: Energy and Industrial Advisory Partners

Table 14: Projected Base Case LWCF Distributions $ Millions

	2015	2016	2017	2018	2019	2020	2021
LWCF	$0.89	$0.88	$0.89	$0.89	$0.88	$0.90	$0.89
LWCF - GOMESA	$0.00	$0.00	$0.07	$0.08	$0.13	$0.08	$0.09
Total	$0.89	$0.88	$0.96	$0.97	$1.01	$0.98	$0.98

	2022	2023	2024	2025	2026	2027	2028
LWCF	$0.89	$1.03	$1.07	$1.18	$1.15	$1.11	$1.07
LWCF - GOMESA	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13
Total	$1.02	$1.15	$1.19	$1.30	$1.28	$1.24	$1.19

	2029	2030	2031	2032	2033	2034	2035
LWCF	$1.05	$1.04	$1.02	$1.00	$0.97	$0.93	$0.92
LWCF - GOMESA	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13	$0.13
Total	$1.17	$1.17	$1.15	$1.13	$1.09	$1.06	$1.05

	2036	2037	2038	2039	2040
LWCF	$0.93	$0.92	$0.89	$0.87	$0.85
LWCF - GOMESA	$0.13	$0.13	$0.13	$0.13	$0.13
Total	$1.05	$1.05	$1.02	$1.00	$0.97

Source: Energy and Industrial Advisory Partners

Vessel Transit Restrictions Case Impacts

Table 15: Projected Base Case vs. Vessel Transit Restrictions Case Gulf of Mexico Oil and Natural gas Production (BOE/D)

	2015	2016	2017	2018	2019	2020	2021
Oil (Vessel Transit Restrictions Case)	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167	1,644,083	1,696,200
Oil (Base Case)	1,514,583	1,598,583	1,680,500	1,757,167	1,892,167	1,644,083	1,696,200
Natural Gas (Vessel Transit Restrictions Case)	589,930	548,251	484,225	445,142	463,627	360,395	349,089
Natural Gas (Base Case)	589,930	548,251	484,225	445,142	463,627	360,395	349,089
Total BOE (Vessel Transit Restrictions Case)	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794	2,004,478	2,045,289
Total BOE (Base Case)	2,104,513	2,146,834	2,164,725	2,202,309	2,355,794	2,004,478	2,045,289

	2022	2023	2024	2025	2026	2027	2028
Oil (Vessel Transit Restrictions Case)	1,731,000	1,760,644	1,772,801	1,825,240	1,800,860	1,723,091	1,708,209
Oil (Base Case)	1,731,000	1,760,644	1,814,451	1,966,106	2,059,685	2,133,750	2,196,910
Natural Gas (Vessel Transit Restrictions Case)	406,905	417,301	429,970	456,377	453,937	452,248	454,450
Natural Gas (Base Case)	406,905	417,301	433,645	499,410	544,480	567,060	578,649
Total BOE (Vessel Transit Restrictions Case)	2,285,001	2,376,292	2,202,770	2,281,617	2,254,797	2,175,339	2,162,659
Total BOE (Base Case)	2,285,001	2,376,292	2,578,902	2,641,590	2,639,863	2,682,304	2,740,273

	2029	2030	2031	2032	2033	2034	2035
Oil (Vessel Transit Restrictions Case)	1,662,317	1,618,874	1,559,655	1,497,876	1,451,712	1,384,377	1,359,101
Oil (Base Case)	2,254,803	2,209,216	2,140,401	2,062,071	2,037,863	2,010,061	1,975,380
Natural Gas (Vessel Transit Restrictions Case)	450,214	443,667	429,467	414,762	403,277	390,272	390,683
Natural Gas (Base Case)	584,845	581,944	573,657	565,022	556,344	547,806	539,867
Total BOE (Vessel Transit Restrictions Case)	2,112,531	2,062,541	1,989,122	1,912,638	1,854,990	1,774,648	1,749,784
Total BOE (Base Case)	2,816,463	2,843,792	2,840,252	2,810,918	2,749,717	2,690,149	2,622,987

	2036	2037	2038	2039	2040
Oil (Vessel Transit Restrictions Case)	1,355,463	1,341,639	1,283,512	1,244,064	1,216,086
Oil (Base Case)	1,900,758	1,804,243	1,693,638	1,596,184	1,493,654
Natural Gas (Vessel Transit Restrictions Case)	394,585	387,150	379,944	367,432	366,982
Natural Gas (Base Case)	526,550	500,453	479,556	448,625	445,005
Total BOE (Vessel Transit Restrictions Case)	1,750,048	1,728,790	1,663,456	1,611,496	1,583,067
Total BOE (Base Case)	2,528,454	2,389,014	2,239,661	2,151,546	2,110,466

Source: Energy and Industrial Advisory Partners

Table 16: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions

	2015	2016	2017	2018	2019	2020	2021
G&G	$215	$189	$167	$160	$156	$176	$192
Drilling Tangibles	$1,448	$1,265	$1,227	$1,211	$1,310	$1,159	$863
Trees	$805	$680	$611	$627	$451	$328	$506
Manifolds	$425	$358	$321	$328	$237	$167	$261
Other Subsea Hardware	$168	$145	$143	$143	$130	$81	$90
Control Umbilical, Flying Leads	$495	$412	$366	$373	$268	$182	$308
Infield FL	$166	$127	$114	$119	$102	$44	$68
Export PL	$1,162	$892	$781	$782	$658	$223	$358
Infield Risers	$85	$66	$60	$61	$53	$22	$33
Export Risers	$44	$33	$29	$30	$25	$8	$14
Fixed Platforms & Facilities	$270	$204	$166	$135	$114	$76	$88
Floating Production Units & Facilities	$1,558	$1,320	$1,082	$1,155	$825	$880	$1,760
Installation	$2,269	$1,640	$1,527	$1,439	$1,328	$752	$1,038
OPEX	$13,502	$13,721	$13,783	$13,816	$13,829	$12,276	$13,474
Decommissioning CAPEX	$1,257	$1,150	$1,212	$1,100	$773	$696	$858
Drilling	$8,363	$7,157	$6,112	$5,560	$5,847	$6,892	$4,882
Engineering CAPEX	$1,063	$874	$808	$792	$663	$506	$679
Engineering OPEX	$844	$858	$861	$863	$864	$877	$886
Natural Gas Processing and Transportation	$199	$189	$172	$163	$157	$144	$124
Total	$34,338	$31,281	$29,542	$28,857	$27,789	$25,488	$26,483

Source: Energy and Industrial Advisory Partners

Table 16: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2022	2023	2024	2025	2026	2027	2028
G&G	$252	$275	$153	$145	$145	$147	$143
Drilling Tangibles	$1,286	$1,525	$923	$724	$652	$695	$693
Trees	$619	$575	$270	$230	$247	$245	$219
Manifolds	$323	$301	$142	$120	$129	$129	$116
Other Subsea Hardware	$143	$151	$82	$63	$63	$69	$63
Control Umbilical, Flying Leads	$395	$367	$167	$139	$148	$147	$133
Infield FL	$127	$126	$61	$42	$43	$47	$39
Export PL	$776	$811	$415	$290	$302	$339	$311
Infield Risers	$61	$61	$30	$21	$22	$24	$21
Export Risers	$31	$32	$16	$11	$11	$12	$11
Fixed Platforms & Facilities	$147	$154	$147	$170	$212	$211	$155
Floating Production Units & Facilities	$2,145	$1,760	$678	$495	$550	$403	$422
Installation	$1,769	$1,793	$814	$615	$559	$622	$501
OPEX	$13,591	$14,334	$14,363	$14,324	$14,315	$14,309	$14,337
Decommissioning CAPEX	$785	$827	$754	$827	$757	$803	$761
Drilling	$7,152	$9,012	$5,796	$4,953	$4,662	$4,984	$4,973
Engineering CAPEX	$917	$902	$480	$404	$397	$400	$369
Engineering OPEX	$894	$896	$898	$895	$895	$894	$896
Natural Gas Processing and Transportation	$131	$127	$135	$141	$145	$148	$152
Total	$31,543	$34,028	$26,188	$24,469	$24,108	$24,479	$24,162

Source: Energy and Industrial Advisory Partners

Table 16: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2029	2030	2031	2032	2033	2034	2035
G&G	$139	$136	$137	$140	$143	$145	$145
Drilling Tangibles	$661	$632	$617	$625	$644	$666	$665
Trees	$207	$211	$209	$211	$240	$265	$243
Manifolds	$111	$113	$111	$111	$125	$138	$127
Other Subsea Hardware	$59	$58	$59	$57	$60	$69	$70
Control Umbilical, Flying Leads	$131	$138	$138	$137	$154	$171	$161
Infield FL	$36	$39	$43	$42	$44	$53	$57
Export PL	$294	$305	$327	$301	$298	$340	$354
Infield Risers	$20	$21	$22	$21	$22	$26	$27
Export Risers	$11	$12	$13	$12	$12	$14	$15
Fixed Platforms & Facilities	$99	$86	$98	$96	$76	$50	$38
Floating Production Units & Facilities	$513	$697	$733	$788	$880	$1,008	$953
Installation	$487	$531	$609	$612	$657	$762	$807
OPEX	$14,285	$14,225	$14,119	$14,043	$13,927	$13,842	$13,695
Decommissioning CAPEX	$837	$767	$787	$716	$764	$754	$801
Drilling	$4,798	$4,634	$4,528	$4,562	$4,684	$4,864	$4,904
Engineering CAPEX	$372	$387	$403	$401	$428	$464	$463
Engineering OPEX	$893	$889	$882	$878	$870	$865	$856
Natural Gas Processing and Transportation	$156	$159	$160	$158	$155	$152	$148
Total	$23,952	$23,880	$23,835	$23,753	$24,026	$24,496	$24,382

Source: Energy and Industrial Advisory Partners

Table 16: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Spending $ Millions (Continued)

	2036	2037	2038	2039	2040
G&G	$146	$152	$157	$164	$170
Drilling Tangibles	$651	$654	$675	$724	$713
Trees	$211	$230	$288	$353	$404
Manifolds	$111	$122	$152	$186	$213
Other Subsea Hardware	$62	$59	$69	$82	$94
Control Umbilical, Flying Leads	$140	$149	$183	$226	$262
Infield FL	$47	$42	$49	$61	$77
Export PL	$306	$289	$347	$418	$514
Infield Risers	$22	$21	$25	$31	$39
Export Risers	$13	$11	$14	$17	$21
Fixed Platforms & Facilities	$44	$50	$38	$25	$38
Floating Production Units & Facilities	$770	$788	$935	$1,210	$1,430
Installation	$709	$612	$722	$889	$1,102
OPEX	$13,525	$13,346	$13,210	$13,118	$13,014
Decommissioning CAPEX	$791	$780	$771	$762	$753
Drilling	$4,846	$4,879	$5,030	$5,413	$5,345
Engineering CAPEX	$417	$411	$459	$534	$604
Engineering OPEX	$845	$834	$826	$820	$813
Natural Gas Processing and Transportation	$142	$135	$129	$123	$121
Total	$23,655	$23,430	$23,949	$25,034	$25,606

Source: Energy and Industrial Advisory Partners

Table 17: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Supported Employment Reductions (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021
Texas	183,868	166,737	158,715	155,767	147,462	133,381	136,682
Louisiana	102,936	98,247	94,932	95,089	94,621	89,432	89,175
Mississippi	23,024	21,524	20,740	20,926	20,415	19,110	19,116
Alabama	31,413	29,595	28,870	29,053	28,011	25,157	26,508
Other U.S. States	76,183	65,041	60,861	59,631	54,989	43,624	52,990
Total	**417,424**	**381,144**	**364,119**	**360,465**	**345,498**	**310,703**	**324,472**

	2022	2023	2024	2025	2026	2027	2028
Texas	162,509	176,720	136,265	127,744	125,262	128,129	125,949
Louisiana	98,453	108,914	95,438	92,059	90,919	92,131	91,864
Mississippi	21,545	23,872	20,145	19,316	19,021	19,338	19,181
Alabama	29,384	31,580	27,219	26,323	26,038	26,347	26,079
Other U.S. States	69,845	70,935	46,506	41,649	40,985	41,292	39,785
Total	**381,735**	**412,021**	**325,573**	**307,092**	**302,225**	**307,237**	**302,858**

	2029	2030	2031	2032	2033	2034	2035
Texas	125,025	123,466	123,255	122,050	123,801	125,988	125,870
Louisiana	91,171	90,283	89,616	89,149	89,242	89,648	89,175
Mississippi	19,070	18,856	18,767	18,623	18,733	18,890	18,839
Alabama	25,985	25,764	25,704	25,469	25,580	25,743	25,642
Other U.S. States	39,944	41,182	42,080	42,175	43,433	45,668	45,656
Total	**301,196**	**299,551**	**299,422**	**297,467**	**300,789**	**305,937**	**305,181**

	2036	2037	2038	2039	2040
Texas	111,171	121,476	124,222	129,453	132,126
Louisiana	87,818	86,985	87,188	88,470	88,323
Mississippi	18,489	18,321	18,476	18,893	19,003
Alabama	25,105	24,827	25,011	25,497	25,762
Other U.S. States	42,772	41,640	44,109	48,470	52,425
Total	**285,355**	**293,249**	**299,005**	**310,783**	**317,639**

Source: Energy and Industrial Advisory Partners

Table 18: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Direct and Indirect and Induced Supported Employment Reductions (Number of Jobs)

	2015	2016	2017	2018	2019	2020	2021
Direct	0	0	0	0	0	0	0
Indirect and Induced	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

	2022	2023	2024	2025	2026	2027	2028
Direct	0	0	-9,620	-13,297	-15,329	-14,756	-13,776
Indirect and Induced	0	0	-64,609	-81,307	-86,140	-79,143	-66,817
Total	0	0	-74,229	-94,603	-101,469	-93,900	-80,593

	2029	2030	2031	2032	2033	2034	2035
Direct	-12,902	-12,029	-11,309	-10,396	-8,946	-6,672	-4,605
Indirect and Induced	-53,954	-48,476	-49,011	-48,194	-38,225	-18,928	-6,230
Total	-66,856	-60,505	-60,320	-58,590	-47,171	-25,599	-10,835

	2036	2037	2038	2039	2040
Direct	-3,793	-3,649	-4,719	-5,048	-7,580
Indirect and Induced	-5,293	-3,679	2,399	6,803	-1,151
Total	-9,086	-7,328	-2,321	1,755	-8,730

Source: Energy and Industrial Advisory Partners

Table 19: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Contributions to GDP Reductions $ Millions

	2015	2016	2017	2018	2019	2020	2021
Texas	$0	$0	$0	$0	$0	$0	$0
Louisiana	$0	$0	$0	$0	$0	$0	$0
Mississippi	$0	$0	$0	$0	$0	$0	$0
Alabama	$0	$0	$0	$0	$0	$0	$0
Other U.S. States	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0

	2022	2023	2024	2025	2026	2027	2028
Texas	$0	$0	-$3,046	-$3,930	-$4,262	-$3,965	-$3,464
Louisiana	$0	$0	-$1,202	-$1,629	-$1,847	-$1,762	-$1,617
Mississippi	$0	$0	-$283	-$375	-$418	-$394	-$354
Alabama	$0	$0	-$298	-$388	-$423	-$399	-$350
Other U.S. States	$0	$0	-$1,401	-$1,710	-$1,733	-$1,572	-$1,234
Total	$0	$0	-$6,231	-$8,032	-$8,682	-$8,091	-$7,020

	2029	2030	2031	2032	2033	2034	2035
Texas	-$2,964	-$2,692	-$2,619	-$2,475	-$1,988	-$1,132	-$495
Louisiana	-$1,478	-$1,369	-$1,299	-$1,206	-$1,025	-$723	-$464
Mississippi	-$314	-$288	-$275	-$256	-$212	-$136	-$74
Alabama	-$303	-$280	-$282	-$277	-$237	-$156	-$101
Other U.S. States	-$928	-$806	-$865	-$862	-$628	-$185	$42
Total	-$5,986	-$5,435	-$5,339	-$5,077	-$4,090	-$2,332	-$1,093

	2036	2037	2038	2039	2040
Texas	-$345	-$234	-$152	-$77	-$567
Louisiana	-$365	-$350	-$432	-$453	-$727
Mississippi	-$51	-$47	-$53	-$53	-$108
Alabama	-$89	-$91	-$81	-$74	-$122
Other U.S. States	-$9	$23	$262	$447	$290
Total	-$858	-$699	-$457	-$209	-$1,234

Source: Energy and Industrial Advisory Partners

Table 20: Projected Vessel Transit Restrictions Case Gulf of Mexico Offshore Oil and Natural Gas Government Revenue Reductions by Type $ Millions

	2015	2016	2017	2018	2019	2020	2021
Bids	$0	$0	$0	$0	$0	$0	$0
Rentals	$0	$0	$0	$0	$0	$0	$0
Royalties	$0	$0	$0	$0	$0	$0	$0
Other Revenues	$0	$0	$0	$0	$0	$0	$0
Total	$0	$0	$0	$0	$0	$0	$0

	2022	2023	2024	2025	2026	2027	2028
Bids	$0	$0	-$266	-$182	-$173	-$171	-$207
Rentals	$0	$0	-$15	-$14	-$15	-$20	-$23
Royalties	$0	$0	-$132	-$484	-$890	-$1,399	-$1,672
Other Revenues	$0	$0	-$1	-$5	-$9	-$14	-$17
Total	$0	$0	-$414	-$686	-$1,087	-$1,605	-$1,919

	2029	2030	2031	2032	2033	2034	2035
Bids	-$176	-$138	-$92	-$76	-$66	-$75	-$103
Rentals	-$28	-$31	-$34	-$36	-$36	-$36	-$35
Royalties	-$2,031	-$2,038	-$2,024	-$1,992	-$2,082	-$2,240	-$2,215
Other Revenues	-$21	-$21	-$21	-$20	-$21	-$23	-$23
Total	-$2,256	-$2,228	-$2,171	-$2,124	-$2,206	-$2,374	-$2,375

	2036	2037	2038	2039	2040
Bids	-$135	-$162	-$141	-$88	-$11
Rentals	-$31	-$26	-$23	-$22	-$21
Royalties	-$1,977	-$1,689	-$1,505	-$1,296	-$1,036
Other Revenues	-$20	-$17	-$15	-$13	-$11
Total	-$2,163	-$1,895	-$1,685	-$1,419	-$1,079

Source: Energy and Industrial Advisory Partners

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