December 22, 2020

Danielle Blacklock
Director, Office of Aquaculture
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

RE: Comments on Request for Information on Designation of Aquaculture Opportunity Areas

Dear Ms. Blacklock,

The Natural Resources Defense Council (NRDC) submits the following comments regarding the proposed identification of Aquaculture Opportunity Areas (AOAs) in federal waters of the Gulf of Mexico, Southern California, and prospective future areas.[1] Our comments address the following: (1) our concerns that the full range of adverse impacts of offshore finfish aquaculture are currently unknown and further research and consultation are needed before designating AOAs; (2) our concerns about designating AOAs for offshore finfish aquaculture in marine protected areas and in important habitat areas for marine mammals; and (3) how NOAA must consult with affected state governments and coordinate the designation of AOAs and siting of offshore finfish facilities with state goals concerning marine aquaculture. Our comments are limited to finfish aquaculture.

I. NOAA Should Not Designate AOAs for Offshore Finfish Aquaculture Until the Impacts of this Industry on the Marine Environment are Better Understood

A. Questions 1 and 7

In question one, NOAA requested information on types of offshore aquaculture that the Gulf of Mexico and Southern California AOAs may or may not support. NOAA also requested information on the range of water depths and maximum distance from shore appropriate for aquaculture in these areas. In question seven, NOAA asked what regions of the country should be considered for future AOAs.

B. Comments on Questions 1 and 7

The scope and magnitude of direct, indirect, and cumulative adverse impacts resulting from the development of an offshore finfish aquaculture industry in federal waters are currently unknown and could be significant. There is even greater uncertainty surrounding these impacts in waters located four or more miles offshore, where few aquaculture facilities have been established.[2] NOAA aims to designate AOAs in locations "suitable for commercial aquaculture,"[3] but the suitability of proposed sites cannot be assessed without a better understanding of how finfish aquaculture will affect the marine environment and human coastal uses. NRDC therefore urges NOAA to facilitate additional scientific research and engage in expanded consultation with ocean stakeholders before designating AOAs for finfish aquaculture in the federal waters of the Gulf of Mexico and Southern California. For the same reasons, it is also premature to designate AOAs for offshore finfish aquaculture in other regions of the United States.

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[1] Notice; Request for Information on Aquaculture Opportunity Areas, 85 Fed. Reg. 67519 (Oct. 23, 2020).
[2] California Environmental Associates, *Offshore Finfish Aquaculture: Global Review and U.S. Prospects* (2018), at 12, https://www.ceaconsulting.com/wp-content/uploads/CEA-Offshore-Aquaculture-Report-2018.pdf.
[3] 85 Fed. Reg. 67519.

The following effects of offshore finfish aquaculture may have a significant impact on the marine environment and coastal activities. The scope and magnitude of these impacts require further research and consultation before NOAA designates AOAs.

- Water pollution stemming from a variety of sources, including fish waste, uneaten feed, and antibiotic and antiparasitic treatments.[4] The impacts of increased nitrogen and phosphorous from industrial-scale levels of fish waste would introduce a significant new source of nutrients into the marine environment, and the impacts on marine life have not been assessed. Nutrient pollution is especially concerning in the Gulf of Mexico, which already struggles with hypoxia and harmful algal blooms as a result of nutrient-rich water flows.[5]

- The spread of diseases, pathogens, and parasites from the cultivated fish population to wild fish stocks.[6]

- The impact of escaped cultivated fish on wild fish populations and fishing communities.[7] Escaped fish harm wild fish populations by out-competing them for food, spreading disease, and polluting wild gene pools.[8] These impacts also pose a threat to fishing communities, which depend on healthy wild fish stocks.

- Stronger currents and higher-energy waters offshore causing net pen damage. NOAA has proposed a maximum distance of 25 miles from shore for the Southern California AOA and no maximum distance from shore for the Gulf of Mexico AOA.[9] Conditions in the offshore environment increase likelihood of damage to aquaculture net pens and resulting fish escapes. Additionally, most of the open ocean finfish aquaculture worldwide to date has been conducted in waters within four miles from shore,[10] which lends greater uncertainty to the degree of challenges faced by aquaculture facilities operating beyond this distance.

- The risk of hurricanes and storms, particularly in the Gulf of Mexico, could also lead to net pen failure and subsequent fish escapes. Rough undercurrents generated by hurricanes can extend as deep as 300 feet (91 meters) below the surface, falling within the depth range of 50 to 150 meters that NOAA is considering for the Gulf of Mexico AOA.[11] Given the increasing

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[4] Jillian Fry, David Love & Gabriel Innes, *Ecosystem and Public Health Risks From Nearshore and Offshore Finfish Aquaculture*, Johns Hopkins Center for a Livable Future (revised Aug. 2018) at 9-10, https://clf.jhsph.edu/sites/default/files/2019-09/ecosystem-and-public-health-risks-from-nearshore-and-offshore-finfish-aquaculture.pdf; Rebecca R. Gentry et al., *Offshore aquaculture: Spatial planning principles for sustainable development*, 7 Ecology & Evolution 733, 735-36 (2016); Report of the Marine Aquaculture Task Force, *Sustainable Marine Aquaculture: Fulfilling the Promise: Managing the Risks* (Jan. 2007), ch. 6, https://www.whoi.edu/cms/files/mcarlowicz/2007/1/Sustainable_Marine_Aquaculture_final_1_02_07_17244.pdf

[5] NOAA, *Gulf of Mexico/Florida: Harmful Algal Blooms*, https://oceanservice.noaa.gov/hazards/hab/gulf-mexico.html#:~:text=One%20of%20the%20most%20well,and%20cause%20human%20respiratory%20illness (last accessed Dec. 16, 2020); Benjamin Murphy, *Understanding Florida's Red Tide*, Florida Sea Grant (Aug. 9, 2018), https://www.flseagrant.org/news/2018/08/understanding-the-florida-red-tide/.

[6] Fry, Love & Innes, *supra* note 4, at 6-9; Gentry et al., *supra* note 4, at 737.

[7] Tim Dempster et al., *Recapturing escaped fish from marine aquaculture is largely unsuccessful: alternatives to reduce the number of escapees in the wild*, 10 Reviews in Aquaculture 153 (2018); Fry, Love & Innes, *supra* note 4, at 5-6.

[8] *Id*.

[9] 85 Fed. Reg. at 67521.

[10] California Environmental Associates, *supra* note 2, at 12.

[11] 85 Fed. Reg. at 67521.

frequency and severity of hurricanes, the agency must consider whether the net pen facilities used in finfish aquaculture are capable of withstanding such storms, and must evaluate the reasonably foreseeable impact of net pen failure and subsequent escape of cultured fish into the wild.

- Pressure on wild fish stocks as a source of feed for cultivated fish.[12] Increased harvest of forage fish, such as sardines and anchovies, can stress the ability of these species to adequately provide for the nutritional needs of local wildlife.

- Pressure on wild fish stocks as a source of cultivated fish. Fish grown in aquaculture facilities are sometimes obtained by removing juvenile fish from naturally occurring populations, which can contribute to the overfishing of wild populations and impede the reproduction of wild stocks.[13]

- Attraction of marine mammals and other predators may cause injury and mortality.[14] The increased presence of predators around offshore finfish aquaculture facilities affects other wild marine organisms in the area. Marine wildlife, and particularly marine mammals, may become entangled on the mooring systems used to attach the aquaculture pens to the seafloor or through secondary entanglement on derelict fishing gear and trash that attaches to mooring ropes. (See Section III below for further discussion of vulnerable marine mammal populations that inhabit and transit through the areas identified for AOAs in the Gulf of Mexico and off Southern California).

- Injury, harassment, and displacement associated with marine mammal deterrents. Many aquaculture facilities have used deterrents to discourage predation and net pen destruction by marine mammals. Some marine mammal deterrents, particularly acoustic deterrents, can cause acoustic injury to both target and non-target marine mammals, particularly baleen whales for whom acoustic deterrents can interfere with communication, navigation, foraging, hunting and other important behaviors. The reasonably foreseeable use of marine mammal deterrents by offshore finfish aquaculture facilities must be analyzed for its impact on ambient underwater noise levels and subsequent impacts on marine mammals, as well as fish and invertebrates.

- Secondary impacts to wild fish stocks and marine mammals from shifted fishing pressure. Net pens can serve to aggregate wild fish stocks, and as a result, also further attract predators,

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[12] *See* Harold Upton & Eugene Buck, Congressional Research Service, CRS Report RL32694, *Open Ocean Aquaculture* (2010) at 11-12, http://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL32694.pdf.
[13] Michelle Allsopp et al., *Challenging the Aquaculture Industry on Sustainability*, Greenpeace (2008), https://www.greenpeace.org/usa/wp-content/uploads/legacy/Global/usa/report/2008/3/challenging-aquaculture.pdf; Marcos Garcia Rey et al., *Diving into the tuna ranching industry*, International Consortium of Investigative Journalists (March 16, 2012), https://www.icij.org/investigations/looting-the-seas/part-ii-diving-tuna-ranching-industry/; Seafood Watch, *Limit wild fish use as feed*, Monterey Bay Aquarium, https://www.seafoodwatch.org/seafood-basics/sustainable-solutions/limit-wild-fish-use-as-feed (last accessed Dec. 16, 2020).
[14] *See* Katie Rowley, *Bibliography: Aquaculture Interactions with Endangered Species*, NOAA Central Library (May 2020), sec. I, https://repository.library.noaa.gov/view/noaa/24250/noaa_24250_DS1.pdf?.

including marine mammals.[15] These dynamics could lead to new and perhaps harmful fisheries interactions. For example, aggregations of wild fish stocks, particularly those that are targeted by commercial or recreational fishermen, could shift fishing effort to within a close vicinity of the net pens used for offshore finfish aquaculture. One possible ecological implication is the potential for increased gear interactions and bycatch of marine mammals in areas adjacent to the net pens. Another implication could be the rate at which catch limits are met, and the subsequent impacts on fishing access to target wild fisheries, such as red snapper in the Gulf of Mexico. Commercial and recreational fishing are staples of the coastal economies of California and Gulf states. The fishing industry depends on the maintenance of healthy target fish stocks, protection of marine habitat, and protection of forage fish populations that also serve as important prey for other fish, mammals, and birds. NOAA should comprehensively assess the impacts of offshore finfish aquaculture on coastal fishing economies before designating AOAs.

- Increased magnitude of impacts from large offshore finfish aquaculture facilities and multiple aquaculture projects in one area. The probable scale of offshore finfish aquaculture heightens our concerns about the magnitude of direct, indirect, and cumulative impacts. NOAA expects that the first two AOAs will each support three to five aquaculture operations.[16] Additionally, the costs of operating offshore are higher than the costs of operating in coastal areas,[17] so offshore aquaculture facilities will need to be larger than coastal facilities to remain profitable.[18] The concentration of multiple facilities in one area and the larger size of each facility will exacerbate the risks identified above, increasing the magnitude of effects such as water pollution, predator attraction, and risk of fish escapes.

- Cumulative impacts of offshore finfish aquaculture in concert with other uses of AOA regions, including existing shellfish aquaculture, offshore wind energy, and military activity. Shellfish cultivation is an important industry along the Gulf of Mexico, and the Gulf region produces more shellfish than any other U.S. region.[19] Shellfish and algae aquaculture are fledgling industries in Southern California, with a small number of shellfish facilities in operation or proposed in the region.[20] The state of California is currently working on a plan

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[15] T. Dempster et al., *Coastal salmon farms attract large and persistent aggregations of wild fish: an ecosystem effect*, 385 Marine Ecology Progress Series 1 (2009).
[16] 85 Fed. Reg. at 67520.
[17] Ben Belton et al., *Farming fish in the sea will not nourish the world*, 11 Nature Communications, at 3 (2020).
[18] Bela H. Buck et al., *State of the Art and Challenges for Offshore Integrated Multi-Trophic Aquaculture (IMTA)*, 5:165 Frontiers in Marine Science (2018).
[19] Mississippi-Alabama Sea Grant Consortium, *The Gulf of Mexico Shellfish Initiative: Stakeholder Feedback* (2018), http://masgc.org/assets/uploads/publications/1397/18-015.pdf; NOAA Fisheries, *Marine Aquaculture in NOAA Fisheries' Southeast Region*, https://www.fisheries.noaa.gov/southeast/aquaculture/marine-aquaculture-noaa-fisheries-southeast-region#:~:text=Shellfish%20Aquaculture%20in%20the%20Gulf%20of%20Mexico&text=The%20Gulf%20states%20are%20an,other%20region%20in%20the%20nation (last updated June 22, 2020).
[20] *E.g.*, San Diego Bay Aquaculture, *About Us* (last accessed Oct. 12, 2020), https://sandiegobayaquaculture.com/; Carlsbad Aquafarm, *Welcome* (last accessed Oct. 12, 2020), https://carlsbadaquafarm.com/; USACE, Public Notice: Avalon Ocean Farm (Aquaculture) Application for Permit (March 13, 2020), https://www.spl.usace.army.mil/Portals/17/docs/publicnotices/SPL-2020-00039-TS%20Avalon%20Ocean%20Farm_PN.pdf?ver=2020-03-18-130535-037 (proposing a shellfish and kelp aquaculture facility 3.3 miles offshore Huntington Beach, CA); Ventura Port District, *Ventura Shellfish Enterprise: Draft Preliminary Operations Plan* (Sept. 2, 2020),

for approving future shellfish and algae aquaculture projects, and the California Ocean Protection Council (OPC) has stated a goal of promoting sustainable aquaculture.[21] NOAA should conduct a detailed analysis on the cumulative impacts of offshore finfish aquaculture with existing and reasonably foreseeable uses before designating AOAs in Southern California and the Gulf of Mexico.

Given the significant potential for adverse impacts to coastal communities, wildlife, and ecosystems, NOAA should facilitate additional research and expanded consultation with ocean stakeholders before designating AOAs for finfish aquaculture in the Gulf of Mexico, Southern California, and other regions.

II. NOAA Should Not Designate AOAs for Offshore Finfish Aquaculture Near Marine Protected Areas

A. Question 2

In question two, NOAA requested information on specific locations within federal waters of the Gulf of Mexico or Southern California that should be avoided for AOAs.[22]

B. Comments on Question 2

Although we urge NOAA not to select any AOAs for finfish aquaculture at this time, the agency should avoid state and federal marine protected areas (MPAs) off Southern California and the Gulf of Mexico if it moves forward with designating AOAs. MPAs span much of the Gulf Coast.[23] For example, the Breton National Wildlife Refuge off Louisiana provides important breeding, nesting, and wintering habitat for seabirds and shorebirds.[24]

State and federal MPAs are also found within the area under consideration in Southern California (up to 25 nautical miles from shore).[25] The Channel Islands National Marine Sanctuary begins approximately five nautical miles from shore and covers 1,110 square nautical miles.[26] This MPA protects important habitats, endangered species, and cultural resources.[27] The California state government has also established MPAs for the purpose of protecting marine life and habitat, which are threatened by coastal development, water pollution, and other human activities.[28] California's marine biological diversity is "important to public health and well-being, ecological health, and ocean-dependent industry."[29] There are

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http://venturashellfishenterprise.com/pdf/VSE%20Draft%20Ops%20Plan%20August%202020.pdf (proposing a mussel aquaculture facility 3.5 miles offshore, northwest of Ventura Harbor).

[21] California Ocean Protection Council, *Strategic Plan to Protect California's Coast 2020-2025* (2020), objective 4.2, at 27, https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20200226/OPC-2020-2025-Strategic-Plan-FINAL-20200228.pdf.

[22] 85 Fed. Reg. 67521.

[23] National Marine Protected Areas Center, *MPA Viewer* (mapping tool), https://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/mpaviewer/ (last accessed Dec. 21, 2020).

[24] U.S. Fish & Wildlife Service, *Breton National Wildlife Refuge*, https://www.fws.gov/refuge/Breton/about.html (last updated June 29, 2018).

[25] 85 Fed. Reg. 67521.

[26] 15 C.F.R. § 922.70.

[27] *Channel Islands National Marine Sanctuary*, NOAA, https://channelislands.noaa.gov/ (last accessed Dec. 21, 2020).

[28] Cal. Fish & Game Code § 2851(a), (c).

[29] *Id.* § 2851(b).

fifty state MPAs in Southern California, covering fifteen percent of the state waters south of Point Conception.[30]

Siting finfish aquaculture facilities near MPAs would undermine state and federal goals in establishing these areas. Water pollution, escaped fish, and other adverse effects will likely flow into MPA ecosystems from nearby aquaculture.[31] The extent to which pollution from net pens will reach coastal areas is not well understood,[32] and further research is needed to assess the full scope of impacts from finfish aquaculture to MPA biodiversity and habitat.[33] Due to this uncertainty, NOAA should not situate an AOA in federal waters off Southern California or the Gulf of Mexico unless it can demonstrate that MPAs will not be harmed by aquaculture effluents and other externalities.

III. NOAA Should Not Designate AOAs for Offshore Finfish Aquaculture in Important Marine Mammal Habitat Areas

A. Question 3

In question 3, NOAA requested information on specific locations within Federal waters of the Gulf of Mexico or Southern California where aquaculture gear may overlap with areas used by protected species such as marine mammals.

B. Comments on Question 3

The following important marine mammal habitat areas should be **excluded from consideration** as an AOA.

(1) Proposed critical habitat for the Gulf of Mexico Bryde's whale

The Gulf of Mexico Bryde's whale (*Balaenoptera edeni*) is one of the rarest whales on Earth, with an estimated population size of 26 to 44 individuals. The greatest threats to Gulf of Mexico Bryde's whales include habitat destruction, modification or curtailment of habitat range during energy exploration and development, oil spills, vessel collisions, and anthropogenic noise. Fishery interactions may also pose a threat.[34] The Gulf of Mexico Bryde's whale's limited distribution and small population size, along with associated risks such as demographic stochasticity, genetics, and stochastic and catastrophic events, increase its vulnerability.[35]

On April 15, 2019. The National Marine Fisheries Service (NMFS) published a final regulation pursuant to section 4(b)(6)(A) of the Endangered Species Act, listing the Gulf of Mexico whale as an endangered species.[36] Subsequently, a report was submitted to NMFS on April 6, 2020, proposing critical

[30] Cal. Dept. Fish & Wildlife, *Southern California Marine Protected Areas*, https://wildlife.ca.gov/Conservation/Marine/MPAs/Network/Southern-California (updated Jan. 1, 2019).
[31] *See* response to questions 1 and 7, *supra*.
[32] Buck, *supra* note 18.
[33] *See supra* Section I.
[34] Patricia E. Rosel et al., *Status Review of Bryde's Whales (*Balaenoptera edeni*) in the Gulf of Mexico under the Endangered Species Act*, U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SEFSC-692 (2016).
[35] *Id.*
[36] Final Rule, Endangered Status of the Gulf of Mexico Bryde's Whale, 84 Fed. Reg 15446 (Apr. 15, 2019) (to be codified at 50 C.F.R. § 224).

habitat for the Gulf of Mexico whale.[37] This proposed area includes: (i) "core" habitat, where Gulf of Mexico whales are most commonly observed; and (ii) an area outside core habitat that is essential to the survival and recovery of the species. These combined areas extend from 81° 53'W off southern Florida westward to the Mexican Exclusive Economic Zone, between the 100-m and 500-m isobaths (Figure 1). This proposed area encompasses the Biologically Important Area (BIA) designated between the 100-m and 300-m isobaths[38] and the subsequent extension out to the 400-m depth contour proposed by the 2016 Status Review.[39] Since the publication of the Status Review, there have been several additional observations that extend the known range of the Gulf of Mexico whale out to the 500-m isobath, including shipboard sightings (302 m and 309 m depth),[40] satellite-tag locations (408 m depth)[41], and calls recorded beyond the 300-m isobath.[42]

Several lines of evidence indicate that the critical habitat essential to the survival and recovery of the Gulf of Mexico whale should extend beyond De Soto Canyon and surrounding waters, to encompass waters between the 100-m and 500-m isobaths from south Florida to south Texas (Fig. 1). Support for this designation comes from multiple lines of evidence including aerial and shipboard surveys and opportunistic sightings,[43] passive acoustic recordings,[44] habitat-based density models, and historical records.[45]

The proposed critical habitat area also includes the De Soto and Mississippi Canyons, areas that have been identified as important habitat for the genetically and acoustically distinct stock of sperm whale (*Physeter macrocephalus*) that reside in the Gulf of Mexico.[46]

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[37] NRDC, *A report on designating critical habitat for the Gulf of Mexico Bryde's whale (*Balaenoptera edeni*) under the Endangered Species Act*, submitted by the Natural Resources Defense Council to NOAA Fisheries (April 6, 2020).
[38] Erin LaBrecque et al., *3. Biologically Important Areas for Cetaceans within U.S. Waters – Gulf of Mexico Region*, 41 Aquatic Mammals (special issue) 30 (2015).
[39] Rosel, et al., *supra* note 34.
[40] *Id*.
[41] Melissa S. Soldevilla et al., *Spatial distribution and dive behavior of Gulf of Mexico Bryde's whales: Potential risk of vessel strikes and fisheries interactions*, 32 Endangered Species Research 533 (2017).
[42] Aaron N. Rice et al., *Potential Bryde's whale (Balaenoptera edeni) calls recorded in the northern Gulf of Mexico*, 135 Journal of the Acoustical Society of America, 3066 (2014).
[43] Rosel et al., *supra* note 34.
[44] Rice et al., *supra* note 42; Ana Širović et al., *Bryde's whale calls recorded in the Gulf of Mexico*, 30 Marine Mammal Science 399 (2014).
[45] Randall R. Reeves et al., *Insights from whaling logbooks on whales, dolphins, and whaling in the Gulf of Mexico*, 29 Gulf of Mexico Science 41 (2011).
[46] Brianna Elliott, *Petition to designate critical habitat in the Gulf of Mexico for sperm whales (Physeter macrocephalus) under the U.S. Endangered Species Act*, submitted to U.S. Secretary of Commerce, acting through the National Oceanic and Atmospheric Administration and the National Marine Fisheries Service (Apr. 27, 2017); and references therein.

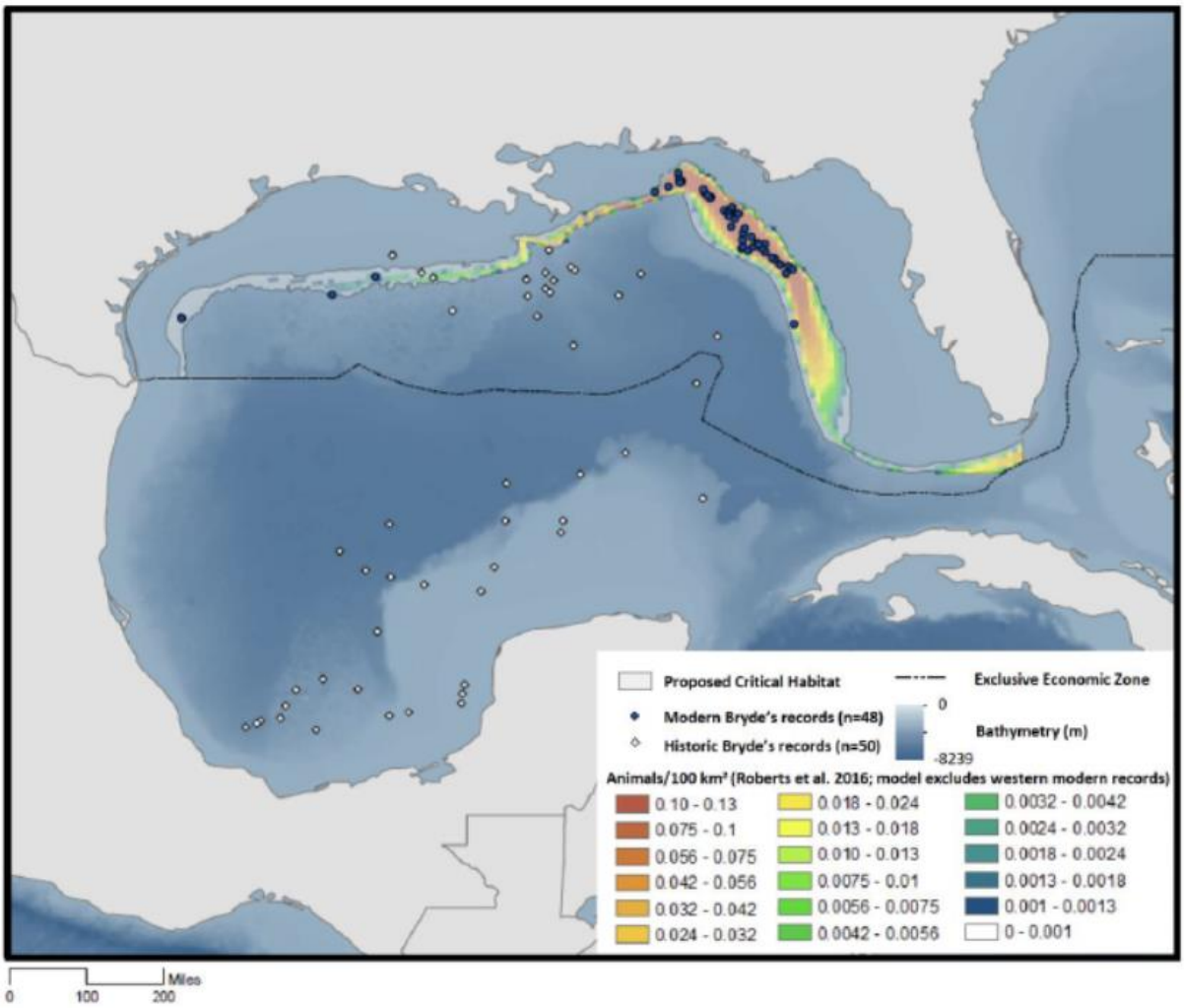

Figure 1. *Proposed Critical Habitat for the Gulf of Mexico whale, defined by the area between the 100-m and 500-m isobaths.*[47] *Contemporary (1992-2018) sightings are shown as blue circles (n=48), historical records (1791-1876) as white diamonds (n=50). Number of animals per 100 km*^{2} *based on the habitat density model developed by Roberts et al. (2016) is also shown.*[48] *Note that the Roberts et al. (2016) model does not include 26 of the 48 contemporary sightings recorded on the map, including the four westernmost sightings.*

(2) Gulf of Mexico BIAs for small and resident bottlenose dolphins

The coastal ecotype of bottlenose dolphin (*Tursiops truncatus*) comprises 32 small recognized stocks across the northern Gulf of Mexico, which generally reside in waters shoreward of the 20-m isobath.[49] Certain populations exhibit seasonal movements between the coastal waters of the Gulf and

[47] NRDC, *supra* note 37.
[48] Jason J. Roberts et al., *Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico*, 6 Scientific Reports 1 (2016).
[49] Gordon T. Waring et al. (eds.), *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2013*, NOAA Tech. Memo, NMFS-NE-228 (2014).

inshore bay, sound, and estuary habitat;[50] and some near-coastal bottlenose dolphin populations have been observed leaving the Mississippi Sound during the winter to temporarily reside outside of the barrier islands.[51]

Some of these dolphin communities have been afflicted with severe illness in the wake of the Deepwater Horizon spill and figured significantly in the nearly five-year unusual mortality event affecting the Gulf's bottlenose dolphins.[52] NMFS estimates that 38% of these populations are likely to have been killed in the recent Unusual Mortality Event (2010-2014), that 37% of their pregnancies were lost, and that 30% of them are suffering from adverse health effects.[53] Animals that are in poor health or are limited in range are more likely to remain in a disturbed area despite the biological costs.[54]

Eleven year-round BIAs that encompass habitat for the small, resident bottlenose dolphin stocks associated with the bays, sounds and estuaries of the northern Gulf of Mexico were identified by LaBrecque et al. (2015)[55] and should be excluded from consideration as AOAs (Fig. 2).

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[50] Carrie W. Hubard et al., *Seasonal abundance and site fidelity of bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound*, 30 Aquatic Mammals 299 (2004); M.D. Scott, R.S. Wells, & A.B. Irvine, *A long-term study of bottlenose dolphins on the west coast of Florida, in* Stephen Leatherwood & Randall R. Reeves (eds.), *The Bottlenose Dolphin* (2012).

[51] Hubard et al., *supra* note 50.

[52] Suzanne M. Lane et al., *Reproductive outcome and survival of common bottlenose dolphins sampled in Barataria Bay, Louisiana, USA, following the Deepwater Horizon oil spill*, 282 Royal Society Proceedings: Biological Science 1944 (2015); NOAA, *Cetacean Unusual Mortality Event in the Northern Gulf of Mexico (2010-2014)*, (accessed July 2017), http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico.htm.

[53] NOAA, *NRDA-funded marine mammal monitoring, presentation to the National Academy of Science, Effective Approaches for Monitoring and Assessing Gulf of Mexico Restoration Activities*, (Oct. 22, 2015); *see also*, Lane, et al., *supra* note 52.

[54] Colin M. Beale & Pat Monaghan, *Behavioral responses to human disturbance: A matter of choice?*, 68 Animal Behaviour, 1065 (2004); Lars Bejder et al., *Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance*, 20 Conservation Biology, 1791 (2006).

[55] LaBrecque et al., *supra* note 38.

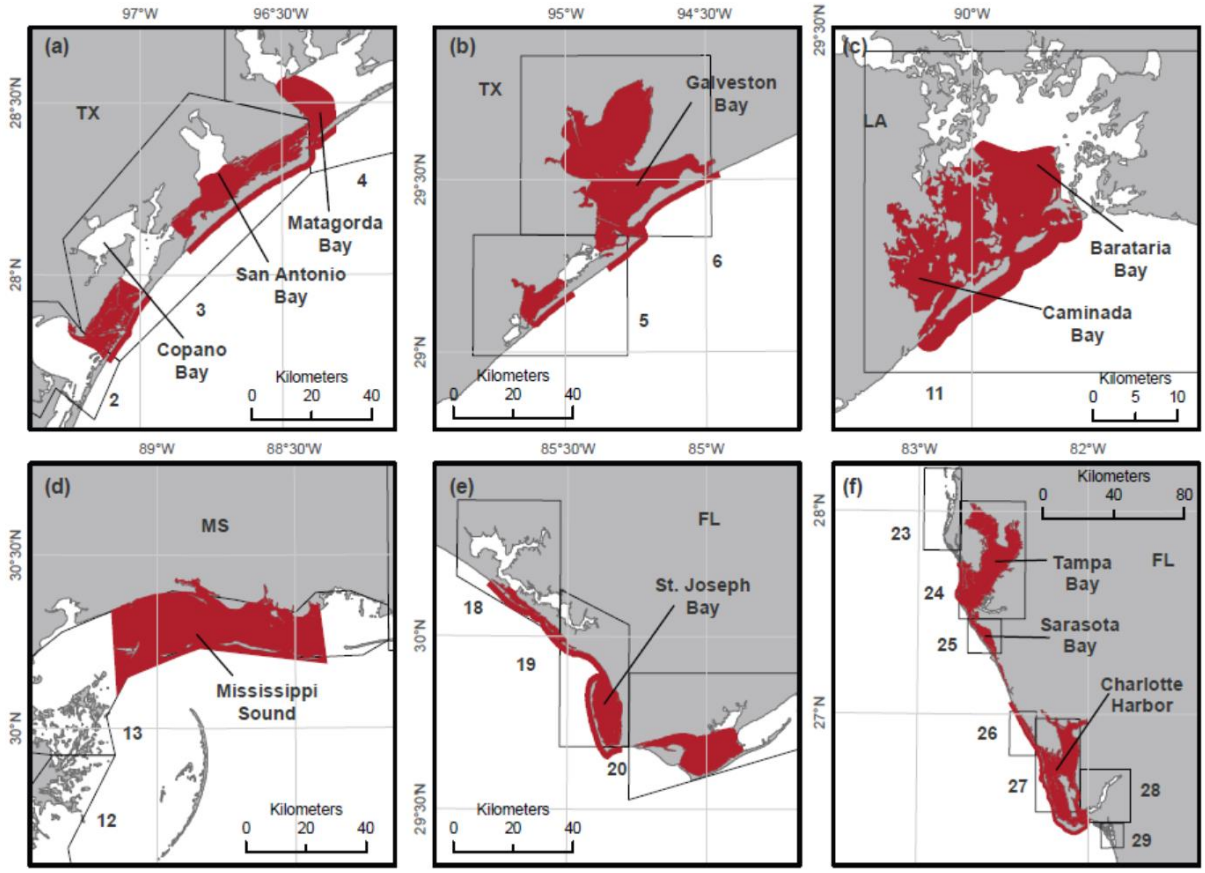

Figure 2*: The 11 BIAs for small, resident bottlenose dolphins in the northern Gulf of Mexico as described in LaBrecque et al. (2015): (a) Aransas Pass and Matagorda Bay–Espiritu Santo Bay, substantiated through photo-identification data, radio-tracking data, genetic analyses, and expert knowledge; (b) San Luis Pass and Galveston Bay, substantiated through photo-identification data and expert knowledge; (c) Caminada Bay and Southwest Barataria Bay; (d) Mississippi Sound, substantiated through photo-identification data and expert knowledge; (e) St. Joseph Bay and St. Vincent Sound and Apalachicola Bay, substantiated through photo-identification data, radio-tracking data (St. Joseph Bay), and expert knowledge; (f) Tampa Bay, Sarasota Bay and Little Sarasota Bay, and Lemon Bay/Charlotte Harbor/Pine Island Sound, substantiated through extensive photo-identification data, genetic analyses, and expert knowledge.*

(3) Southern California foraging BIAs for blue and humpback whales

South of Point Conception, foraging BIAs have been identified for blue whales (*Balaenoptera musculus*) and humpback whales (*Megaptera novaeangliae*).[56] The feeding BIAs were based on two considerations: (i) direct observation of feeding or surfacing patterns and associated species strongly suggestive of feeding (and in some cases documented with archival tag data); and (ii) presence of concentrations and repeat sightings of animals in multiple years in an area and a time of year where

[56] John Calambokidis et al., *4. Biologically Important Areas for Selected Cetaceans Within U.S. Waters – West Coast Region*, 41 Aquatic Mammals (special issue) 39 (2015).

feeding is known to occur. The area boundaries were based on expert judgment, outlining areas of high sighting concentrations from multiple years.[57]

Blue whales in the eastern North Pacific are listed as "threatened" under the ESA, and recent population estimates in the California Current across mark-recapture data sets range between ~1600 to 2000 individuals.[58] Blue whales have not yet recovered from the intensive whaling that decimated populations during the 1800s and early 1900s, and now face a myriad of contemporary anthropogenic threats, such as ship strikes, coastal development, pollution, military training activities, and noise from vessel traffic.[59] Due to their massive size and long-range migration patterns, blue whales have among the highest energetic demands of extant animal species.[60] Even short-term changes in behavior as a result of anthropogenic impacts can, when appraised cumulatively, lead to energetic consequences that may be significant under certain conditions.[61] In particular, disruption to foraging behavior or nursing of calves may result in an energetic net loss for the individual whale,[62] with possible ramifications on health and fitness, as well as calf survival.[63]

The six foraging BIAs identified for blue whales south of Point Conception should be excluded from consideration as AOAs: BIA #4: Point Conception/Arguello; BIA #5: Santa Barbara Channel and San Miguel; BIA #6 Santa Monica Bay to Long Beach; BIA #7: San Nicholas Island; BIA #8: Tanner-Cortez Bank; and BIA #9: San Diego (Fig. 3).[64]

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[57] *Id*.

[58] J. Calambokidis & J. Barlow, *Updated abundance estimates of blue and humpback whales off the US West Coast incorporating photo-identification from 2010 and 2011*, Final Report for contract AB-133F-10-RP-0106, Document PSRG-2013-13 presented to the Pacific Scientific Review Group (April 2013).

[59] Kate Lomac-MacNair & Mari Ann Smultea, *Blue whale (*Balaenoptera musculus*) behavior and group dynamics as observed from an aircraft off Southern California*, 3 Animal Behavior & Cognition 1 (2016).

[60] Jeremy A. Goldbogen et al., *Integrative approaches to the study of baleen whale diving behavior, feeding performance, and foraging ecology*, 63 BioScience, 90 (2012).

[61] A.S. Friedlaender et al., *Prey-mediated behavioral responses of feeding blue whales in controlled sound exposure experiments*, 26 Ecological Applications 1075 (2016).

[62] Christina Lockyer, *Growth and energy budgets of large baleen whales from Southern Hemisphere*, in J. G. Clark (ed.) *FAO fisheries series 5: Mammals in the seas, vol 3: General papers and large cetaceans*, at 379-487, Rome: Food and Agriculture Organization of the United Nations (1981); V. Hayssen, *Empirical and theoretical constraints on the evolution of lactation*, 76 Journal of Dairy Science, 3213 (1993); Olav T. Oftedal, *Lactation in whales and dolphins: Evidence of divergence between baleen- and toothed- species*, 2 Journal of Mammary Gland Biology & Neoplasia, 205 (1997); H. Whitehead & Janet Mann, *Female reproductive strategies of cetaceans*, in Janet Mann et al. (eds.), *Cetacean societies: Field studies of dolphins and whales* (at 219-246), Chicago IL; University of Chicago Press (2000); J.A. Goldbogen et al., *Mechanics, hydrodynamics and energetics of blue whale lunge feeding: efficiency dependence on krill density*, 214 Journal of Experimental Biology, 131 (2011); Mari Ann Smultea et al., *Cetacean mother-calf behavior observed from a small aircraft off Southern California*, 4 Animal Behavior & Cognition 1 (2017).

[63] John Weidenmann et al. *Exploring the effects of reductions in krill biomass in the Southern Ocean on blue whales using a state-dependent foraging model*, 222 Ecological Modeling, 3366 (2011); Rosalind M. Rolland et al., *Health of North Atlantic right whales* Eubalaena glacialis *over three decades: From individual health to demographic and population health trends*, 542 Marine Ecology Progress Series, 265 (2016); Smultea et al., *supra* note 62.

[64] Calambokidis et al., *supra* note 56.

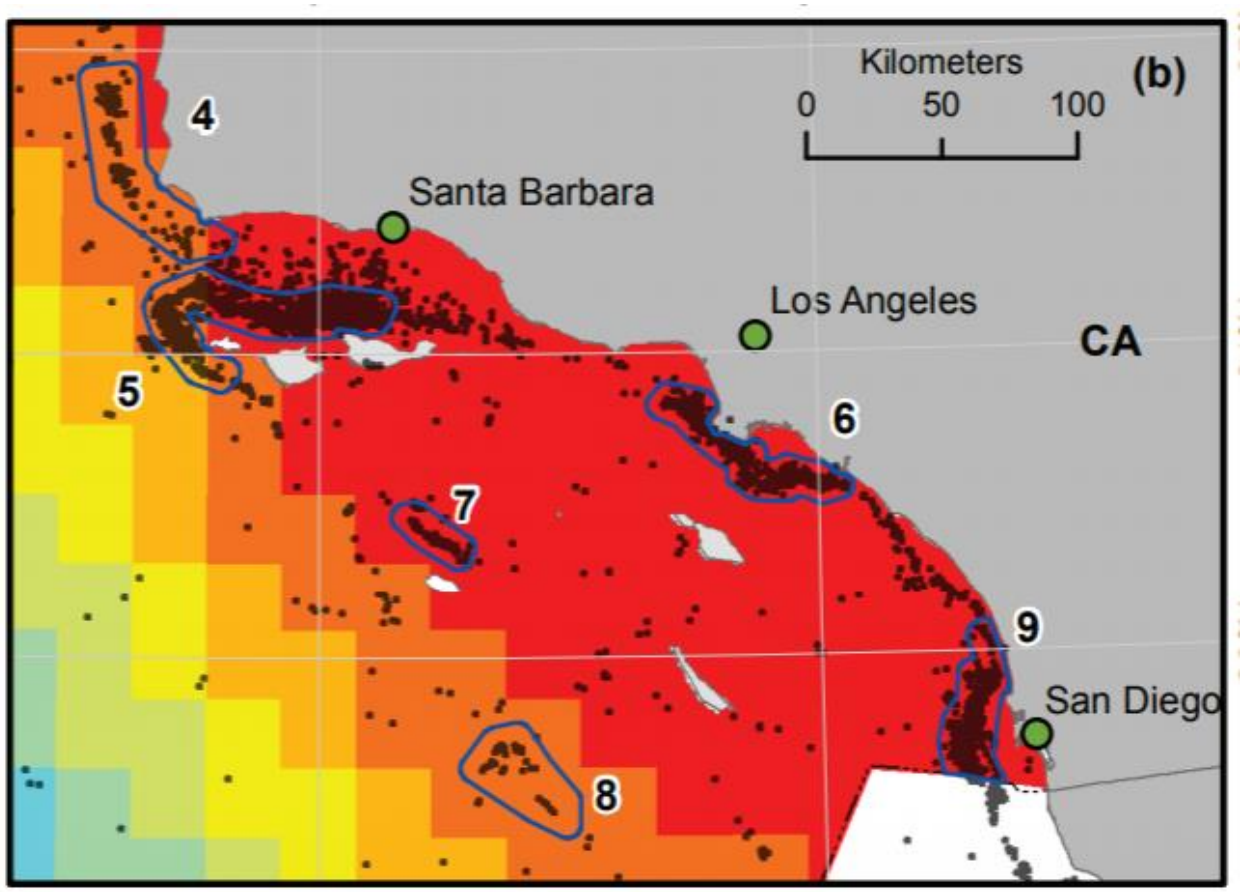

Figure 3*: The location of the six foraging BIAs identified for blue whales by Calambokidis et al. (2015).*

Humpback whales that feed in areas off Southern California tend to primarily migrate to wintering areas off Central America. This group of whales are genetically distinct from humpback whales that winter in other areas of the North Pacific and may comprise only a few hundred animals.

One foraging BIA has been identified for humpback whales south of Point Conception (the "Santa Barbara Channel—San Miguel" BIA)[65] and should be excluded from consideration as an AOA.

(4) Southern California migratory BIA for gray whales

The California (or Eastern North Pacific) gray whale (*Eschrichtius robustus*) is presently experiencing a major die-off. As of December 1, 2020, the total number of strandings across the whales' range since January 1, 2019 numbered 384 animals, exceeding those seen during the 1998-99 and 1999-2000 seasons, when 283 and 368 whales were reported.[66] Many of the necropsied whales were considered emaciated, and more than half of the animals observed in their calving lagoons, in Baja California, this year have shown signs of "skinniness,"[67] such as post-cranial depression and protruding scapulae. On

[65] *Id.*

[66] *Compare* NMFS, *Frequent Questions: 2019 gray whale Unusual Mortality Event along the west coast,* https://www.fisheries.noaa.gov/national/marine-life-distress/frequent-question-2019-gray-whale-unusual-mortality-event-along-west (last accessed Dec. 17, 2020) *with* F.M.D. Gulland et al., *Eastern North Pacific gray whale (*Eschrichtius robustus*) Unusual Mortality Event, 1999-2000*, NOAA Tech. Memo. NMFS-AFSC-150 (2005).

[67] NMFS, *supra* note 66.

May 31, 2019, NMFS deemed the die-off an "Unusual Mortality Event" pursuant to the Marine Mammal Protection Act (16 U.S.C. § 1421c), triggering an investigation. It is well established that animals already exposed to one stressor may be less capable of responding successfully to another, and that stressors can combine to produce adverse synergistic effects.[68] Here, disruption in gray whale behavior can act adversely with the inanition caused by lack of food, increasing the risk of stranding and lowering the risk of survival in compromised animals. Further, starving gray whales may travel into unexpected areas in search of food—a likely contributing cause of some of the ship-strikes observed in recently stranded animals.[69]

Gray whales migrate annually between winter breeding grounds in Baja California, Mexico, and summer feeding grounds in the North Pacific and Arctic.[70] The gray whale migration along the US West Coast takes places in three phases: a "Southbound Phase" where all age classes travel to the lagoons in Mexico generally within 10 km of the coast from October to March; a "Northbound Phase A" where adults and juveniles lead the beginning of the northbound migration generally within 8 km of the coast from late January to July; and "Northbound Phase B" where cow-calf pairs generally begin their northbound migration within 5 km of the coast from March to July. Migratory BIAs were designated to reflect these three phases of migration, with an additional buffer out to 47 km from the coast to capture animals migrating further offshore.[71]

In light of the current conservation status of the gray whale, no AOA should be considered within the migratory BIA as defined in Calambokidis et al. (2015). Protection of cow-calf pairs on their northbound migration is of particular concern.

(4) Identification of additional important habitat areas

In addition to excluding the above areas from consideration as AOAs, we note that there is now a process underway by NOAA to update the BIAs. New information on important habitat areas for marine mammals arising from this process, and other efforts, should be incorporated into future assessment of AOAs. In light of the current paucity of information available for the Gulf of Mexico, we also strongly recommend that additional efforts are undertaken to identify other important habitat areas across the Gulf region, using the full range of data and information available (*e.g.*, habitat-based density models, NOAA-recognized BIAs, survey data, etc.).

IV. NOAA Should Coordinate and Consult with Affected States in Developing, Siting, and Permitting Offshore Aquaculture

A. Question 12

In question 12, NOAA asked whether the agency should consider state waters as areas for future AOAs if states express an interest in developing offshore aquaculture.

B. Comments on Question 12

[68] Andrew J. Wright et al., *Anthropogenic noise as a stressor in animals: A multidisciplinary perspective*, 20 International Journal of Comparative Psychology 250 (2007).

[69] *See, e.g.*, The Marine Mammal Center, *The Marine Mammal Center confirms ship strike as cause of death for gray whale at San Francisco's Ocean Beach* (May 7, 2019) (press release containing necropsy results for recently stranded gray whales).

[70] Calambokidis et al., *supra* note 56.

[71] *Id*.

NRDC urges NOAA to conduct further research before designating AOAs for offshore finfish aquaculture. However, if NOAA proceeds with AOA designation, the agency should consult with affected state governments and coordinate its efforts with state policies on aquaculture and other coastal and marine uses.

When designating AOAs and siting aquaculture facilities, NOAA should coordinate with state interests in developing or restricting offshore aquaculture. For example, in California, the Ocean Protection Council (OPC) is currently developing a statewide aquaculture action plan for assessing and approving marine algae and shellfish aquaculture facilities in state waters, and NOAA should coordinate with this process.[72] The plan is scheduled for completion by 2023.[73] During a public meeting in September 2020, OPC Executive Director Mark Gold expressed concern about maintaining consistency between state and federal aquaculture development processes, stating a desire to "get shellfish…[and] algae right" before pursuing finfish aquaculture off the California coast.[74] Designating an AOA for offshore finfish aquaculture in federal waters off Southern California would interfere with California's ability to plan marine aquaculture in adjacent state waters.

Additionally, offshore finfish aquaculture in state or federal waters will affect other uses of state waters, such as fishing and recreation, which comprise significant portions of California and Gulf state economies.[75] Effluents from finfish aquaculture facilities may pollute state waters, net pens will likely attract predators and other wildlife to the area, and construction and operations vessels will increase traffic between aquaculture facilities and ports.[76] Impacts from finfish aquaculture may also impact state coastal conservation efforts. In California, Governor Gavin Newsom has issued an executive order avowing a goal of conserving thirty percent of California coastal waters by 2030.[77] Furthermore, as discussed in response to question 2 above, there are state MPAs off Southern California and in the Gulf of Mexico.[78] Finfish aquaculture may impair the ability of state governments to protect biodiversity, ecosystems, and marine life.

Coastal states have a strong interest in planning aquaculture and protecting economic and conservation uses of state waters. Thus, it is crucial that NOAA provides states with ample advance notice

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[72] California Ocean Protection Council, *Strategic Plan to Protect California's Coast 2020-2025* (2020), objective 4.2, at 27, https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20200226/OPC-2020-2025-Strategic-Plan-FINAL-20200228.pdf.
[73] *Id*.
[74] Comments of Mark Gold, Executive Director of OPC, during Ocean Protection Council meeting (Sept. 17, 2020), at 01:33:00-01:36:00, https://cal-span.org/unipage/index.php?site=cal-span&owner=COPC&date=2020-09-17.
[75] Andrew J. Ropicki et al., *The Importance of Gulf of Mexico Marine Dependent Industries and Measuring Sea Grant Programming Benefits on those Industries*, NOAA Sea Grant (April 2016) at 10, https://www.flseagrant.org/wp-content/uploads/GOMT16001__web.pdf; Eastern Research Group, Inc., *The National Significance of California's Ocean Economy*, NOAA Office for Coastal Management (2015), https://coast.noaa.gov/data/digitalcoast/pdf/california-ocean-economy.pdf.
[76] Fry, Love & Innes, *supra* note 4, at 9-10; Rowley, *supra* note 14, sec. I.
[77] California Executive Order N-82-20 (Oct. 7, 2020), https://www.gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-.pdf.
[78] Cal. Dept. Fish & Wildlife, *Southern California Marine Protected Areas*, https://wildlife.ca.gov/Conservation/Marine/MPAs/Network/Southern-California (updated Jan. 1, 2019); National Marine Protected Areas Center, *MPA Viewer* (mapping tool), https://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/mpaviewer/ (showing MPAs in the Gulf of Mexico).

and the opportunity to fully participate in the process of designating AOAs and siting offshore finfish aquaculture facilities.

Although our comments focus on finfish aquaculture, other forms of aquaculture may also cause some of the impacts discussed herein. In particular, our concerns about spatial conflicts, marine mammal and fish entanglement, and cumulative impacts of multiple activities in one region also apply to shellfish and algae aquaculture. NOAA should seriously examine the potential impacts of all forms of aquaculture before designating AOAs.

Thank you for considering these comments. Should you have any questions, we would be pleased to discuss our concerns in greater detail.

Sincerely,

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