MARINE MAMMAL COMMISSION

17 August 2017

Ms. Kelly Hammerle
National Program Manager
Bureau of Ocean Energy Management
45600 Woodland Road, Mailstop VAM-LD
Sterling, Virginia 20166

Dear Ms. Hammerle:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the Bureau of Ocean Energy Management's (BOEM) 3 July 2017 *Federal Register* notice requesting information and comments on the preparation of the 2019-2024 National Outer Continental Shelf (OCS) oil and gas leasing program (82 Fed. Reg. 30886). BOEM has initiated this process in response to Executive Order 13795 and Secretarial Order 3350.

Executive Order 13795 directs the Secretary of Commerce and the Secretary of the Interior to undertake immediately actions to encourage energy exploration and production in federal waters. Those actions include revising the schedule of proposed oil and gas lease sales to include annual lease sales in a number of OCS planning areas[1] and developing a streamlined approach for permitting privately funded seismic research and data collection through expedited consideration of incidental take authorization applications under the Marine Mammal Protection Act and seismic survey applications under the OCS Lands Act. Secretarial Order 3350 reiterates those and other actions called for in the Executive Order.

BOEM is initiating the process of developing a new five-year oil and gas leasing program only months after finalizing its current 2017-2022 leasing program. Much of the information compiled and evaluated by BOEM for the current program is still relevant for the subject action. The Commission submitted extensive comments and recommendations to BOEM at each stage of development of the current leasing program and associated programmatic environmental impact statement and commends BOEM for incorporating many of the Commission's comments and recommendations into the current 2017-2022 leasing program. BOEM also has made considerable investments in research and data collection in all OCS planning areas to address gaps in baseline data on marine mammal abundance and distribution, foraging behavior, habitat use, and impacts of oil and gas exploration and production.

In its development of the 2019-20124 leasing program, the Commission encourages BOEM to undertake a comprehensive analysis of the nation's energy needs and the relative costs and benefits of meeting those needs from a variety of renewable and non-renewable energy sources. That analysis should incorporate current import/export and supply/demand projections, as well as

[1] Including planning areas or portions of planning areas withdrawn from leasing by the previous administration.

commitments made at the U.S. state and global levels to pursue policies and actions to reduce greenhouse gas emissions. The Commission also urges BOEM to consider new information regarding the harmful effects of oil spills and seismic surveys. The Commission supports maintaining the current schedule of lease sales, with the exception of the proposed lease sale in Cook Inlet, and including the withdrawal areas that have been implemented by Congress and previous administrations. Finally, the Commission encourages BOEM to re-evaluate its methodology for estimating and using non-market values for protected species.

A balanced approach to energy leadership

The Commission believes that the administration's goal of maintaining the nation's position as a 'global energy leader' by fostering energy security and resilience can be achieved through a balanced approach to energy development[2], as required by Section 18(a) of the OCS Lands Act (43 U.S.C. 1344). Under that Act, actions taken to meet the nation's energy needs must consider the "economic, social, and environmental values of the renewable and nonrenewable resources contained in the [OCS], and the potential impact of oil and gas exploration on other resource values of the [OCS] and the marine, coastal, and human environments" (Section 18(a)(1)).

As noted in BOEM's Record of Decision[3] on the 2017-2022 Proposed Final Program, approximately 70 percent of the oil and gas resources that are economically recoverable and nearly one half of the estimated undiscovered technically recoverable oil and gas resources are already available for leasing under the current program. That analysis was based on oil prices at the time the Record of Decision was signed. Current oil prices remain relatively unchanged[4] and are expected to remain low through 2018[5].

The increasing precision and efficiencies in horizontal drilling and hydraulic fracturing have led to a significant increase in U.S. onshore production of crude oil and natural gas since 2010.[6] As a result, the United States is now exporting more natural gas than it is importing[7] and U.S. crude oil production is expected to reach record highs in 2018[8]. Persistent projections of low oil and gas prices and ample supply may continue to drive industry decisions on investments in energy development in 'frontier' areas. This was evidenced by BOEM's decision to cancel scheduled lease sales in the Arctic during the 2012-2017 leasing program due to market conditions and low industry interest[9].

It is clear from the policy declarations in Executive Order 13795 that the Administration's goal of fostering 'energy security and resilience for the benefit of the American people' is focused squarely on increasing energy production from the nation's non-renewable offshore oil, gas, and

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[2] Reference to 'energy development' here and throughout this letter refers to all stages of energy exploration, development, production, transportation, and decommissioning.
[3] https://www.boem.gov/2017-2022-Record-of-Decision/
[4] https://www.eia.gov/todayinenergy/prices.php
[5] https://www.eia.gov/todayinenergy/detail.php?id=29532
[6] http://www.eia.gov/todayinenergy/detail.cfm?id=15351&src=Natural-b2
[7] https://www.eia.gov/todayinenergy/detail.php?id=32392
[8] https://www.eia.gov/todayinenergy/detail.php?id=32192
[9] https://www.boem.gov/press10162015/

mineral resources. However, in other statements by Administration officials[10], a broad, 'all-of-the-above' energy portfolio has been promoted, which includes renewable energy sources such as offshore wind and hydrokinetic (i.e., wave and current) energy. BOEM has made considerable advances in recent years in leasing and permitting offshore renewable energy development activities in the Atlantic and Pacific planning areas. The recent construction of the first offshore wind energy facility in U.S. waters off Rhode Island represents a new, clean source of domestic energy to help meet our nation's energy demands while also providing new jobs and revenues. Renewable energy is transforming the electricity sector in the United States and worldwide by providing an increasingly flexible and cost-effective alternative to electricity generated from fossil fuels (Mai et al. 2012; Vieira and Huijbregts 2017).

Activities associated with site characterization, construction, and operation of offshore wind and other renewable energy facilities in OCS planning areas are not without risks to marine mammals and the marine environment (Bailey et al. 2014, Bergstrom et al. 2014, Copping et al. 2016, Crocker and Fratantonio 2016). However, those risks appear to be less severe and potentially of shorter duration than those associated with oil and gas development. In addition, the potential for an environmental and economic catastrophe resulting from renewable energy-related activities is orders of magnitude less than that which may result from an oil spill—as exemplified by the well-documented extensive and long-term damages to local communities and the marine environment from the 1989 *Exxon Valdez* oil spill in Prince William Sound, Alaska, and the 2010 Deepwater Horizon (DWH) oil spill in the Gulf of Mexico (Peterson et al. 2003, DWH Natural Resource Damage Assessment (NRDA) Trustees 2016, Short 2017).

The ultimate concern with promoting oil and gas development as the primary path to U.S. energy security is the long-term environmental, economic, and human health impacts caused by greenhouse gas emissions (GHG) from the continued extraction and burning of fossil fuels, including offshore oil and gas resources (Melillo et al. 2014). BOEM's assessment of climate impacts for the 2017-2022 Proposed Final Program, by its own admission, fell short of evaluating the social and environmental costs of GHG emissions. That assessment assumed that foreign sources of oil would substitute for a reduced supply from the OCS and that production and transport of the foreign oil would result in greater GHG emissions. In fact, U.S. consumption of petroleum has been decreasing in recent years and is expected to continue to decrease due, in part, to improvements in fuel economy[11]. Consumption of natural gas is expected to increase due to greater reliance on natural gas (as opposed to coal) for electricity production[12], with natural gas from domestic shale gas reserves expected to continue to meet that demand. BOEM estimated that 'full lifecycle' GHG emissions from past and projected U.S. offshore oil and gas production represent approximately nine percent of the U.S. carbon budget, and concluded that "America's GHG emissions will be little affected by leasing decisions" (Wolvovsky and Anderson 2016). The Commission questions that conclusion, because assumptions regarding increased foreign imports do not appear to account for decreasing demand for petroleum and the increased availability of domestically-produced natural gas

[10] Press Briefing with Department of Energy Secretary Rick Perry, 27 June 2017, https://www.whitehouse.gov/the-press-office/2017/06/27/press-briefing-secretary-energy-rick-perry-and-principal-deputy-press
[11] https://www.eia.gov/todayinenergy/detail.php?id=31332
[12] https://www.eia.gov/todayinenergy/detail.php?id=26912

from onshore sources. It also does not account for the apparent effectiveness of policies being adopted at the state level to encourage energy efficiency[13].

Therefore, the Commission recommends that BOEM update the information and validate the assumptions that will be used in the development of the 2019-2024 Draft Proposed Program to achieve a more balanced analysis of how to meet the nation's energy demands; that information should reflect current import/export and supply/demand projections for both renewable and non-renewable energy sources, as well as commitments made at the U.S. state and global levels to pursue policies and actions to reduce GHG emissions.

Risks to marine mammals from oil and gas development

The environmental risks to marine mammals from each stage of oil and gas development were summarized in the Commission's 31 July 2014 letter[14] on the BOEM request for information on the preparation of the 2017-2022 OCS oil and gas leasing program. There is little new scientific or other information to suggest that the risks of oil and gas exploration and production to marine mammals and the marine environment are less significant and, in fact, there is growing evidence to suggest that those risks are greater than previously considered. The Commission recommends that BOEM incorporate new information regarding the effects of oil spills and seismic surveys on marine mammals, including the information provided below, in its analysis of planning areas to include in the 2019-2024 leasing program.

Oil spills present a potentially fatal risk to marine mammals and to other organisms living in the marine and coastal environment. Although large oil spills are rare, they are difficult to contain and response efforts are largely ineffective, especially in icy waters. For highly-mobile, air-breathing species like marine mammals, the probability of exposure to oil, either at the surface or at depth, is high. Ingestion of oil can result in gastrointestinal inflammation, ulcers, bleeding, diarrhea, maldigestion, and ultimately death (Geraci and St. Aubin 1990). All marine mammals are at risk of exposure by ingestion, but that risk is greatest for animals with fur, including polar bears, sea otters, and seals that may ingest oil during grooming. Hypothermia also is a risk for those dependent on fur for thermoregulation. Inhalation of volatile organics from surface slicks can cause respiratory irritation, inflammation, or emphysema (Geraci and St. Aubin 1990). Common bottlenose dolphins exposed to oil and other hydrocarbons after the DWH oil spill were found to suffer from compromised immune systems, bacterial infections, lung disease, impaired stress response, and significantly-reduced reproductive success (Schwacke et al. 2013, Lane et al. 2015, Venn-Watson et al. 2015, De Guise et al. 2017). Further, an oil spill in Alaska has the potential to be devastating not only to marine mammal populations but also to the Alaska Native communities that depend on marine mammals and other marine wildlife for subsistence and cultural purposes.

Seismic surveys used in oil and gas exploration are known to disturb marine mammals. The sound produced by seismic airguns can cause changes in swimming or diving behavior, displacement from preferred habitats, changes in vocalization patterns, and possible ice-entrapment (Heide-Jørgensen et al. 2013, Blackwell et al. 2015, Robertson et al. 2015). For animals with high site fidelity, displacement from preferred habitats could affect foraging success and increase stress, with

[13] https://www.eia.gov/todayinenergy/detail.php?id=32332
[14] https://www.mmc.gov/wp-content/uploads/BOEM_OCS_5yearplan_073114.pdf

associated effects on survival and reproduction (Forney et al. 2017). Airgun pulses are among the many human-generated sounds that can interfere with the reception of biological signals important for communication, navigation, foraging, and social interaction (Erbe et al. 2015). Standard mitigation measures, such as ramping up before the sound source is fully powered, have been widely adopted by industry. However, questions remain regarding their effectiveness in minimizing exposure (Dunlop et al. 2016). In addition, the ability of observers to detect marine mammals within exclusion zones[15] established for mitigation is affected by sighting conditions (sea state, lighting) and availability of marine mammals at the surface (Leaper et al. 2015). Studies suggest that the use of a standard 500-m shut-down zone, at least in shallow-water environments, may be inadequate for preventing disturbance (Hermannsen et al. 2015)[16]. Sources of human-generated underwater sound are increasing, and the cumulative impact of various sound sources are not well understood or managed (Nowacek et al. 2015).

Planning areas to be included in the next five-year program

Marine mammals are found in each of the OCS planning areas. Oil and gas development in the planning areas may have more of an effect on some marine mammals than on others, depending on the species found in the area, their population status, sensitivities to human-caused sound or oil spills, impacts from other human activities, vulnerability to climate-induced habitat changes, availability of prey species, and our ability to respond to mishaps should they occur. The Commission's 31 July 2014 letter[17] provided detailed information regarding the major OCS planning areas, the status and vulnerability of marine mammals in each area, and recommendations for the inclusion of each area in the 2017-2022 leasing program. Much of that information is still valid, and the Commission's recommendations remain as follows.

Cook Inlet

The Commission remains concerned that expanded oil and gas leasing, when added to the existing baseline of other human activities in state and federal waters of Cook Inlet, will pose significant risks to the endangered resident beluga whale population and adversely affect important habitat areas. The Cook Inlet beluga whale population was recently designated a "Species in the Spotlight" by the National Marine Fisheries Service (NMFS)[18] and also was a focal area for the Commission's 2016 Small Grants Program[19]. Based on the continued precarious status of the Cook Inlet beluga whale population (Shelden et al. 2017) even after a cessation of hunting, the need to avoid any additional activity that may contribute to or that may worsen this whale population's well-documented and ongoing decline, and BOEM's low estimated oil and gas recovery potential in federal waters of Cook Inlet (BOEM 2016a), the Commission recommends that BOEM defer future lease sales in the Cook Inlet planning area (including the currently scheduled lease sale in 2021) until

[15] The exclusion zone is the area within a specified radius from the center of an airgun array in which mitigation measures (i.e., shut down or power down) are typically required to be implemented by seismic operators to minimize Level A harassment of marine mammals.
[16] BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) currently require standard shut-down zones of 500 m for all seismic surveys in the Gulf of Mexico (BOEM/BSEE Joint Notice to Lessees No. 2012-G02), although that requirement may change under MMPA incidental take regulations expected to be in place by 2019.
[17] https://www.mmc.gov/wp-content/uploads/BOEM_OCS_5yearplan_073114.pdf
[18] http://www.fisheries.noaa.gov/stories/2015/05/spotlight_cook_inlet_beluga_whale.html
[19] https://www.mmc.gov/grants-and-research-survey/grant-awards/2016-grant-awards/

the causes for the decline of the Cook Inlet beluga whale population are identified and addressed and progress in recovery of this species has been demonstrated.

The Arctic

Significant research investments have been made by BOEM, NMFS, the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the state of Alaska, the North Slope Borough, the oil and gas industry, and others to gather baseline information on the distribution and movements of marine mammals, to better characterize the large-scale physical and biological processes of the Beaufort and Chukchi Seas, and to monitor the changes occurring as seasonal sea ice declines and ocean temperatures increase. However, considerable uncertainty remains regarding how best to mitigate potential short-term, long-term, and cumulative impacts of oil and gas development and other human activities on marine mammals and Alaska coastal communities.

Marine mammals throughout Alaska are experiencing changes in abundance, distribution, habitat use, and overall health associated with changing weather patterns. For example, sightings of more temperate species (e.g., humpback, fin, and minke whales) have increased in Arctic waters in recent years (Clarke et al. 2014, 2017). Polar bears and walruses in the Chukchi Sea are increasingly hauling out on land as a result of the loss of sea ice (Jay et al. 2012, Rode et al. 2015), which is increasing interactions with, and disturbance by, people from coastal communities. For walruses, the use of land haulouts has led to elevated mortality, potentially having population-level effects (Udevitz et al. 2013). Harmful algal toxins, including domoic acid and saxitoxin, have been detected in 13 and 10 species, respectively, of marine mammals sampled in Alaska (Lefebvre et al. 2016), and scientists have observed an increase in alopecia associated with poor body condition in polar bears (Atwood et al. 2015). Changes in health and body condition are indicative of stress in Arctic marine mammal populations. Increased oil and gas activities are likely to exacerbate stress levels, with the potential for population-level effects. Importantly, there is evidence that changing climate conditions have made marine mammals less available to Alaska Native subsistence communities. The inability of Alaska Native hunters on St. Lawrence Island to harvest walruses in 2013 because of extreme ice and wind conditions caused a food shortage at that time, with the governor declaring an economic disaster[20]. Food security issues remain a concern for many Alaska Native communities (Inuit Circumpolar Council-Alaska 2016).

Industry's ability to respond to oil spills in icy conditions is still a matter of considerable uncertainty. Oil spill response capabilities in Alaska, and in the Arctic specifically, have been subject to intensive research, planning, and preparation[21] but have yet to be deemed sufficient (National Academy of Sciences 2014). Additionally, Executive Order 13795 has directed the Department of the Interior to review and, if appropriate, suspend, revise, or rescind regulations designed to "ensure the safe, effective, and responsible exploration of Arctic oil and gas resources, while protecting the marine, coastal, and human environments, and Alaska Natives' cultural traditions and access to subsistence resources" (81 Fed. Reg. 46478). Actions taken by BOEM or the Bureau of Safety and Environmental Enforcement (BSEE) to rescind the Arctic drilling regulations would only increase the likelihood of a potential oil spill and decrease the likelihood of an effective response.

[20] https://alaska-native-news.com/saint-lawrence-island-receives-economic-disaster-declaration-8671
[21] http://dec.alaska.gov/spar/ppr/plan.htm

As noted previously, the Department of the Interior cancelled scheduled lease sales in the Chukchi and Beaufort Sea planning areas in 2015, citing market conditions and low industry interest. In December 2016, the previous administration withdrew the Chukchi Sea planning area and portions of the Beaufort Sea planning area from oil and gas leasing for a time period without specific expiration[22]. Since then, all oil and gas leases in the Chukchi Sea have been relinquished. Given all these reasons, the Commission recommends that BOEM maintain the Presidential withdrawal of the Chukchi Sea and portions of the Beaufort Sea planning areas in Alaska for the 2019-2024 leasing program.

Other Alaska planning areas

In December 2014, the previous administration withdrew the North Aleutian Basin OCS planning area from oil and gas leasing for a time period without specific expiration[23]. That withdrawal was done in consideration of the importance of Bristol Bay and the North Aleutian Basin planning area to subsistence use by Alaska Natives, wildlife, wildlife habitat, and sustainable commercial and recreational fisheries. The North Aleutian Basin planning area includes designated critical habitat for the North Pacific right whale, one of the most endangered large whale species. For this reason, the Commission recommends that BOEM maintain the Presidential withdrawal of the North Aleutian Basin planning area in Alaska for the 2019-2024 leasing program.

Other Alaska OCS planning areas which BOEM has evaluated for resource potential but for which that potential appears to be very low (as compared to the Arctic planning areas) include Hope Basin, Norton Basin, Navarin Basin, St. George Basin, Gulf of Alaska, Shumagin, and Kodiak (BOEM 2016a). Based on the importance of marine mammal subsistence and cultural resources to Alaska Native communities and the relatively low estimated oil and gas recovery potential, the Commission recommends that BOEM and its partner agencies support the collection of additional baseline physical and biological data and indigenous knowledge on subsistence use patterns in the Hope Basin, Norton Basin, Navarin Basin, St. George Basin, Gulf of Alaska, Shumagin, and Kodiak planning areas to evaluate the resilience of those areas to oil and gas development and other human activities before proposing to include those areas in future leasing programs.

Atlantic

The Commission has a number of concerns regarding proposed offshore oil and gas development in the Atlantic. Information is lacking on the majority of marine mammal species/stocks in the Atlantic, particularly those that occur in deeper waters beyond the continental shelf. Better information is needed to assess their population status and vulnerability to various risk factors, including potential disturbance from oil and gas exploration (e.g., seismic surveys) and production, and to assess and detect changes over time that may be caused by oil and gas-related activities.

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[22] https://obamawhitehouse.archives.gov/the-press-office/2016/12/20/presidential-memorandum-withdrawal-certain-portions-united-states-arctic

[23] https://obamawhitehouse.archives.gov/the-press-office/2014/12/16/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con

Because the U.S. Atlantic coast includes a variety of marine mammal habitats and a multitude of species with varying distribution and movement patterns, the impact of exploration and production activities is highly dependent on the location and timing of those activities. Areas of particular concern for conservation of North Atlantic right whales include feeding areas in the North Atlantic planning area (from Chatham Harbor, Massachusetts, to Rye Harbor, Maine), calving areas in the South Atlantic planning area (from Cape Canaveral, Florida, to Cape Fear, North Carolina), and the migratory corridor in the mid-Atlantic planning area (from Cape Fear to Chatham Harbor) extending from the shore out to at least 66 km. Other areas with potentially high densities of marine mammals include the shelf break area off Cape Hatteras and nutrient-rich slope waters to the north (Roberts et al. 2016).

In December 2016, the previous administration withdrew portions of the North and Mid-Atlantic OCS planning areas, including major canyons and canyon complexes extending from Heezen Canyon off New England to Norfolk Canyon off the Chesapeake Bay, from oil and gas leasing for a time period without specific expiration[24]. Those canyons represent important habitats for marine mammals, including deep-diving beaked whales, sperm whales, and sei whales. In addition, the Gray's Reef and Florida Keys National Marine Sanctuaries were designated as National Marine Sanctuaries prior to 14 July 2008 and, as such, continue to be subject to Presidential withdrawal under the current administration[25]. Gray's Reef, in particular, is in designated critical habitat for the North Atlantic right whale. The Commission also understands that there is a lack of universal support at the state level for seismic testing and oil drilling in the Atlantic[26]. For these reasons, the Commission recommends that BOEM maintain the Presidential withdrawals of portions of the North, Mid-, and South Atlantic planning areas for the 2019-2024 leasing program. The Commission further recommends that BOEM work with its federal, state, industry, and academic partners to continue to collect physical and biological data that would provide a baseline for evaluating possible future impacts of oil and gas exploration and extraction activity and conduct targeted research on the potential effects of both oil and gas exploration and production on marine mammals in all three Atlantic planning areas before proposing to include any of those areas, or portions of those areas, in future leasing programs.

Gulf of Mexico

The Gulf of Mexico is the most productive OCS planning area for oil and gas production in the United States, and will likely remain so for many years to come. However, it is probably the least studied of all the OCS planning areas. The Commission has welcomed the opportunity provided by BOEM to participate on the Science Team to assist in the development of the Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPPS). A long-term and consistent investment in collecting the data needed to generate stock assessments and to evaluate the impacts of oil and gas development on marine mammals in the Gulf should ensure that leasing and development decisions are guided by the best available scientific information.

[24] https://obamawhitehouse.archives.gov/the-press-office/2016/12/20/presidential-memorandum-withdrawal-certain-areas-atlantic-coast-outer
[25] In accordance with Executive Order 13795.
[26] https://www.facingsouth.org/2017/07/offshore-drilling-virginias-governor-now-stands-alone-southeast

An area of particular concern for future leasing and oil and gas development is the Bryde's whale habitat, located in the northeastern-shelf edge of the DeSoto Canyon area off Florida in the northern Gulf. This area, along with other portions of the Eastern and Central planning areas, is currently subject to a moratorium on leasing until 30 June 2022, under the Gulf of Mexico Energy Security Act of 2006 (GOMESA; Public Law 109-432). Evidence from visual surveys and whale calls detected in nearly all months of the year suggests that Bryde's whales are present in this particular area of the northern Gulf year-round (Širović et al. 2013). At its annual meeting in May 2017, the International Whaling Commission's (IWC) Scientific Committee concluded that the Gulf of Mexico Bryde's whale population 'ranks as at least a new subspecies and possibly a species' and that it is 'critically endangered' (IWC, in press). It is not known to what extent this population of whales will be affected by oil and gas development activities, but baleen whales in general are more likely than other cetaceans to be affected by seismic surveys because of their sensitivity to low-frequency sounds (Southall et al. 2007). The Bryde's whales in the Gulf were significantly impacted by the DWH oil spill, with an estimated loss of 17 percent of the population (DWH NRDA Trustees 2016). Due to the small size of the Bryde's whale stock and its potential vulnerability to oil and gas exploration and production, the Commission recommends that BOEM continue to restrict leasing in the Eastern planning area through the entirety of the 2019-2024 leasing program.

Pacific

The most recent lease in the Pacific OCS planning areas was in 1984. The Pacific planning areas were subject to a series of Congressional moratoria and Presidential withdrawals that were in effect until 2008. In addition, portions of the Pacific planning areas designated as National Marine Sanctuaries prior to 14 July 2008 continue to be subject to Presidential withdrawal under the current administration[27]. Those sanctuaries provide tangible conservation benefits to a variety of marine life, including marine mammals, as noted in the Commission's 15 August 2017 letter[28] to the National Oceanic and Atmospheric Administration (NOAA) requesting input on a review of National Marine Sanctuaries and Marine National Monuments[29]. None of the Pacific planning areas were included in the current leasing program, and the Commission understands that there continues to be no support at the state level for future lease sales in the Pacific. The Commission therefore recommends that BOEM exclude all Pacific OCS planning areas from the 2019-2024 leasing program.

Environmental and social costs of energy development

As part of its evaluation of planning areas to include in a leasing program at the Draft Proposed Program stage, BOEM analyzes the net social value of each planning area (BOEM 2015). As explained in that document, the net social value of a planning area is the gross revenue of all undiscovered economically recoverable resources in that area minus the net environmental value (i.e., the environmental and social costs) of exploration, development, production, and transportation. The Commission questions some of the assumptions and analyses made by BOEM to estimate the net environmental value of the leasing program, as described in BOEM's Economic Analysis Methodology (BOEM 2016b) and other supplemental documents. For example—

[27] In accordance with Executive Order 13795.
[28] https://www.mmc.gov/wp-content/uploads/17-08-152c-Douros2c-E.O.-13795-Marine-Sanctuaries-Monuments-Review.pdf
[29] Also in accordance with Executive Order 13795.

- Section 1.3.3.2 Program Social Cost Categories: The analysis of recreational impacts is limited to loss of consumer surplus from an oil spill. It is possible that consumer surplus also is impacted by the increased activity and sound associated with seismic surveys, drilling, and additional vessel traffic. Similar impacts (particularly catch rates) might occur on commercial fisheries. In addition, impacts on property values are limited to visual disturbances to residential property owners, when there also could be impacts on tourism such as cetacean watching or charter boat operations.
- Section 3.3 Passive Use Values[30]: BOEM raised concerns about both the methodology and the 'resource-intensive' processes for non-market valuation in its analysis of social costs. Despite the challenges associated with non-market valuation, much progress has been made and these techniques have been used in a variety of U.S. government activities, including Natural Resource Damage Assessments under the Oil Pollution Act (Lipton et al. 2014, NOAA Science Advisory Board 2016). Although non-market valuation studies require investments of time and financial resources to conduct surveys and analyses, those investments are certainly in line with the resources that BOEM allocates to other environmental studies.

Some of the same challenges of estimating and using non-market values are experienced by NMFS economists and resource managers, and the Commission has reached out to them regarding BOEM's Economic Analysis Methodology. The Commission would welcome the opportunity to convene a discussion of methods used to estimate economic and social value of the OCS leasing program, and specifically the analysis and use of non-market values for protected species, with the science teams at BOEM and NMFS.

I trust these comments will be helpful. Please let me know if you have any questions.

Sincerely,

Rebecca J. Lent, Ph.D.
Executive Director

References

Atwood, T., E. Peacock, K. Burek-Huntington, V. Shearn-Bochsler, B. Bodenstein, K. Beckman, and G. Durner. 2015. Prevalence and spatio-temporal variation of an alopecia syndrome in polar bears (*Ursinus maritimus*) of the Southern Beaufort Sea. Journal of Wildlife Diseases 51(1):48-59.

[30] BOEM concludes this section by referencing incorrectly the valuation of oil and gas resources, when clearly the analysis was meant to apply to non-market resources, such as a protected marine mammal species: "These types of studies are most appropriate to conduct in situations where the resources under consideration are unique, where a set of defined changes to the resource can be easily identified, and where the resources are not typically bought and sold in markets."

Bailey, H., K.L. Brookes, and P.M. Thompson. 2014. Assessing environmental impacts of offshore wind farms: Lessons learned and recommendations for the future. Aquatic Biosystems 10:8, 13 pages.

Bergström, L., L. Kautsky, T. Malm, R. Rosenberg, M. Wahlberg, N.A. Capetillo, and D. Wilhelmsson. 2014. Effects of offshore wind farms on marine wildlife-a generalized impact assessment. Environmental Research Letters 9, 12 pages. doi:10.1088/1748-9326/9/3/034012

Blackwell, S.B. C.S. Nations, T.L. MacDonald, A.M. Thode, D. Mathias, K.H. Kim, C.R. Greene, Jr. and A.M. Macrander. 2015. Effects of airgun sounds on bowhead calling rates: evidence for two behavioral thresholds. PLoS ONE 10(6): e0125720. doi:10.1371/journal.pone.0125720

BOEM. 2015. 2017–2022 OCS Oil and Gas Leasing Draft Proposed Program, 298 pages.

BOEM. 2016a. Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016. BOEM Fact Sheet RED-2016-01, 8 pages.

BOEM. 2016b. Economic Analysis Methodology for the 2017–2022 OCS Oil and Gas Leasing Program, 71 pages.

Clarke, J.T., A.A. Brower, C.L. Christman, and M.C. Ferguson. 2014. Distribution and relative abundance of marine mammals in the northeastern Chukchi and western Beaufort Seas, 2013. Annual Report, OCS Study BOEM 2014-018. National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, Washington, 330 pages.

Clarke, J.T., A.A. Brower, M.C. Ferguson, and A.L. Willoughby. 2017. Distribution and relative abundance of marine mammals in the eastern Chukchi and western Beaufort Seas, 2015. Annual Report, OCS Study BOEM 2017-019. National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, Washington, 426 pages.

Copping, A., N. Sather, L. Hanna, J. Whiting, G. Zydlewski, G. Staines, A. Gill, I. Hutchison, A. O'Hagan, T. Simas, J. Bald, C. Sparling, J. Wood, and E. Masden. 2016. Annex IV 2016 State of the Science Report: Environmental Effects of Marine Renewable Energy Development Around the World, 199 pages.

Crocker, S.E., and F.D. Fratantonio. 2016. Characteristics of sounds emitted during high-resolution marine geophysical surveys. Technical Report NUWC-NPT 12,203 prepared by the Naval Undersea Warfare Center Division for BOEM and the U.S. Geological Survey. BOEM 2016-044, 259 pages.

De Guise, S., M. Levin, E. Gebhard, L. Jasperse, L.B. Hart, C.R. Smith, S. Venn-Watson, F. Townsend, R. Wells, B. Balmer, E. Zolman, T. Rowles, and L. Schwacke. 2017. Changes in immune functions in bottlenose dolphins in the northern Gulf of Mexico associated with the Deepwater Horizon oil spill. Endangered Species Research 33:291–303.

Dunlop, R.A., M.J. Noad, R.D. McCauley, E. Kniest, R. Slade, D. Paton, and D.H. Cato. 2016. Response of humpback whales (*Megaptera novaeangliae*) to ramp-up of a small experimental air gun array. Marine Pollution Bulletin 103:72–83.

DWH NRDA Trustees. 2016. Deepwater Horizon oil spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement.

Erbe, C., C. Reichmuth, K. Cunningham, K. Lucke, and R. Dooling. 2016. Communication masking in marine mammals: A review and research strategy. Marine Pollution Bulletin 103:15–38.

Forney, K.A., B.L. Southall, E. Slooten, S. Dawson, A.J. Read, R.W. Baird, and R.L. Brownell, Jr. 2017. Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity. Endangered Species Research 32:391–413.

Geraci, J.R., and D.J. St. Aubin (eds.). 1990. Sea Mammals and Oil: Confronting the Risks. Academic Press, New York, 282 pages.

Heide-Jørgensen, M.P., R.G. Hansen, K. Westdal, R.R. Reeves, and A. Mosbech. 2013. Narwhals and seismic exploration: Is seismic noise increasing the risk of ice entrapments? Biological Conservation 158:50–54.

Hermannsen, L., J. Tougaard, K. Beedholm, J. Nabe-Nielsen, and P.T. Madsen. 2015. Characteristics and propagation in shallow water with implications for effects on marine mammals. PLoS ONE 10(7): e0133436. doi:10.1371/journal.pone.0133436

IWC. In press. Annex G: Report of the Sub-committee on Other Northern Hemisphere Whale Stocks. Journal of Cetacean Research and Management 18 (Supplement).

Inuit Circumpolar Council-Alaska. 2016. Alaskan Inuit Food Security Conceptual Framework: How to assess the Arctic from an Inuit perspective. Technical Report. Anchorage, Alaska, 116 pages.

Jay, C.V., A.S. Fischbach, and A.A. Kochnev. 2012. Walrus areas of use in the Chukchi Sea during sparse sea ice cover. Marine Ecology Progress Series 468:1-13.

Lane, S.M., C.R. Smith, J. Mitchell, B.C. Balmer, K.P. Barry, T. McDonald, C.S. Mori, P.E. Rosel, T.K. Rowles, T.R. Speakman, F.I. Townsend, M.C. Tumlin, R.S. Wells, E.S. Zolman, and L.H. Schwacke. 2015. Reproductive outcome and survival of common bottlenose dolphins sampled in Barataria Bay, Louisiana, USA, following the Deepwater Horizon oil spill. Proceedings of the Royal Society B 282:20151944. doi:10.1098/rspb.2015.1944

Leaper, R., S. Calderan, and J. Cooke. 2015. A simulation framework to evaluate the efficiency of using visual observers to reduce the risk of injury from loud sound sources. Aquatic Mammals 41(4): 375–387.

Lefebvre, K.A., L. Quakenbush, E. Frame, K. Burek-Huntington, G. Sheffield, R. Stimmelmayr, A. Bryan, P. Kendrick, H. Ziel, T. Goldstein, J.A. Snyder, T. Gelatt, F. Gulland, B. Dickerson, and V. Gill. 2016. Prevalence of algal toxins in Alaskan marine mammals foraging in a changing arctic and subarctic environment. Harmful Algae 55:13–24.

Lipton, D., D.K. Lew, K. Wallmo, P. Wiley, and A. Dvarskas. The evolution of non-market valuation of U.S. coastal and marine resources. Journal of Ocean and Coastal Economics Volume 2014, Issue 1, Article 6. https://doi.org/10.15351/2373-8456.1011

Mai, T., D. Sandor, R. Wiser, and T. Schneider. 2012. Renewable Electricity Futures Study: Executive Summary. NREL/TP-6A20-52409-ES. National Renewable Energy Laboratory, Golden, Colorado.

Melillo, J.M., T.C. Richmond, and G.W. Yohe (eds.). 2014. Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program. 841 pages. doi:10.7930/J0Z31WJ2

National Academy of Sciences. 2014. Responding to Oil Spills in the U.S. Arctic Marine Environment. National Academies Press, Washington, D.C., 195 pages.

NOAA Science Advisory Board. 2016. An assessment of the use and potential use of Ecosystem Service Valuation (ESV) within NOAA, 55 pages.

Nowacek, D.P., C.W. Clark, D. Mann, P.J.O. Miller, H.C. Rosenbaum, J.S. Golden, M. Jasny, J. Kraska, and B.L. Southall. 2015. Marine seismic surveys and ocean noise: time for coordinated and prudent planning. Frontiers in Ecology and the Environment 13(7):378–386.

Peterson, C.H., S.D. Rice, J.W. Short, D. Esler, J.L. Bodkin, B.E. Ballachey, and D.B. Irons. 2003. Long-term ecosystem response to the *Exxon Valdez* oil spill. Science 302:2082-2086.

Roberts, J.J., B.D. Best, L. Mannocci, E. Fujioka, P.N. Halpin, D.L. Palka, L.P. Garrison, K.D. Mullin, T.V.N. Cole, C.B. Khan, W.A. McLellan, D.A. Pabst, and G.G. Lockhart. 2016.

Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. Scientific Reports 6:22615. doi:10.1038/srep22615

Roberston, F.C., W.R. Koski, J.R. Brandon, T.A. Thomas, and A.W. Trites. 2015. Correction factors account for the availability of bowhead whales exposed to seismic operations in the Beaufort Sea. Journal of Cetacean Research and Management 15:35–44.

Rode, K.D., R.R. Wilson, E.V. Regehr, M. St. Martin, D.C. Douglas, and J. Olson. 2015. Increased land use by Chukchi Sea polar bears in relation to changing sea ice conditions. PLoS ONE 10(11): e0142213. doi:10.1371/journal.pone.0142213

Schwacke, L.H., C.R. Smith, F.I. Townsend, R.S. Wells, L.B. Hart, B.C. Balmer, T.K. Collier, S. De Guise, M.M. Fry, L.J. Guillette, Jr., S.V. Lamb, S.M. Lane, W.E. McFee, N.J. Place, M.C. Tumlin, G.M. Ylitalo, E.S. Zolman, and T.K. Rowles. 2013. Health of common bottlenose dolphins (*Tursiops truncatus*) in Barataria Bay, Louisiana, following the Deepwater Horizon oil spill. Environmental Science and Technology, 48(1):93–103.

Shelden, K.E.W., R.C. Hobbs, C.L. Sims, L. Vate Brattström, J.A. Mocklin, C. Boyd, and B.A. Mahoney. 2017. Aerial surveys of beluga whales (*Delphinapterus leucas*) in Cook Inlet, Alaska, June 2016. NOAA National Marine Fisheries Service AFSC (Alaska Fisheries Science Center) Processed Report 2017-09, 62 pages.

Short, J.W. 2017. Advances in understanding the fate and effects of oil from accidental spills in the United States beginning with the Exxon Valdez. Archives of Environmental Contamination and Toxicology 73:5-11.

Širović, A., H.R. Bassett, S.C. Johnson, S.M. Wiggins, and J.A. Hildebrand. 2013. Bryde's whale calls recorded in the Gulf of Mexico. Marine Mammal Science (doi: 10.1111/mms.12036)

Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendation. Aquatic Mammals 33(4):411–521.

Udevitz, M.S., R.L. Taylor, J.L. Garlich-Miller, L.T. Quakenbush, and J.A. Snyder. 2013. Potential population-level effects of increased haulout-related mortality of Pacific walrus calves. Polar Biology 36(2):291-298.

Venn-Watson, S., K.M. Colegrove, J. Litz, M. Kinsel, K. Terio, J. Saliki, S. Fire, R. Carmichael, C. Chevis, W. Hatchett, J. Pitchford, M. Tumlin, C. Field, S. Smith, R. Ewing, D. Faquier, G. Lovewell, H. Whitehead, D. Rotstein, W. McFee, E. Fougeres, and T. Rowles. 2015. Adrenal gland and lung lesions in Gulf of Mexico common bottlenose dolphins (*Tursiops truncatus*) found dead following the Deepwater Horizon Oil Spill. PLoS ONE 10(5): e0126538. doi:10.1371/journal.pone.0126538

Vieira, M.D.M., and M.A.J. Huijbregts. 2017. Comparing mineral and fossil surplus costs of renewable and non-renewable electricity production. International Journal of Life Cycle Assessment doi:10.1007/s11367-017-1335-6.

Wolvovsky, E., and W. Anderson. 2016. OCS Oil and Natural Gas: Potential Lifecycle Greenhouse Gas Emissions and Social Cost of Carbon. BOEM OCS Report 2016-065, 44 pages.