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April 19, 2019

Comments on *Strategic Priorities to Protect California's Coast and Ocean 2019-2024*

Dear Secretary Crowfoot and Members of the Ocean Protection Council:

The Natural Resources Defense Council appreciates the Ocean Protection Council's (OPC) leadership in marshaling and coordinating state resources to protect marine and coastal ecosystems. We support the broad goals outlined in OPC's five-year strategic plan and submit these comments to highlight key principles we hope OPC will take into account as it finalizes and implements its strategic plan.

1. **Safeguarding Coastal and Marine Ecosystems and Communities in the Face of Climate Change**

We support OPC's goal of safeguarding coastal and marine ecosystems from the effects of climate change (Objectives 1.1 to 1.4). Like OPC we believe that advancing scientific research, enhancing resilience in natural and built environments, and coordinating state and local policy responses are all important for meeting that goal.

As OPC determines what measures to invest in, we encourage OPC to carry forward the actions identified in California's ocean-climate contribution, which was released during last year's Global Climate Action Summit.[1] That document identified an array of actions within state control, among them: promoting seagrass and wetland restoration, working with state agencies and local governments to ensure key decisions account for climate change, investing in ocean acidification and hypoxia research, and managing California's fisheries and marine protected areas to ensure their long-term health as ocean conditions change. We hope OPC will continue to support these actions through strategic investments.

2. **Protecting and Restoring Coastal and Marine Ecosystems**

[1] Sandy Aylesworth, *COP 24: California Announces its Ocean-Climate Contribution,* NATURAL

We strongly support OPC's goals to ensure the long-term success of California's marine protected area (MPA) network (Objectives 2.1 and 2.2). OPC has served as a leader in championing the State's MPA network and provided critical support to the California Department of Fish and Wildlife (CDFW), as well as to other agencies and nongovernmental organizations working to secure the success of the network. The state has made really strong progress – for example, the legislature passed AB2369 last year, CDFW has created a new Marine Enforcement Division, and is rolling out a new electronic records management system – but more resources and capacity will be needed.

We urge OPC's continued leadership both for the benefit of California's ocean habitats and marine species – and the human communities that depend upon and treasure them – and to continue to promote California's MPA network as a model for global MPA design and implementation. MPAs are increasingly viewed as a critical strategy to shelter ocean resources and to provide resilience in the face of changing ocean conditions. In 2020, parties to the Convention on Biological Diversity will gather in Beijing to consider global biodiversity targets, including proposals to expand global MPA targets and increase the effectiveness of these areas. California's MPA network – both in its design and its implementation – can serve as an important model to help shape these international commitments, thus playing a role in preserving ocean ecosystems beyond our state waters.

We urge OPC to continue its leadership role, with special attention to:

- Ensuring that OPC continues to invest resources in MPA management, with a focus on research and monitoring, outreach and education, enforcement and compliance, and policy and permitting;
- Supporting CDFW—both through investment of OPC-guided funds and through OPC's policy leadership—to ensure that the agency has adequate resources to manage and safeguard the MPA network;
- Improving MPA enforcement – Helping fund additional CDFW wardens, as well as improving monitoring technology will assist in deterring poaching and protecting MPA ecosystems;
- Habitat restoration – Marine and coastal habitats like kelp forests, eelgrass beds, and coastal wetlands, provide crucial habitats for fish and invertebrates. Supporting projects that restore these habitats will enhance the health and diversity of MPAs;
- Shellfish restoration – OPC flagged the need to counterbalance the effects of power plants using once-through cooling (OTC) technology. OTC power plants can have significant impacts on adjacent shellfish populations and it would be useful to direct funding to scientifically-based projects that seek to enhance affected shellfish populations;
- Invasive species eradication – Invasive species threaten the balance in MPA ecosystems, and dedicating OPC funding to eliminating these species will help foster healthy MPAs;
- Improving MPA water quality through upstream projects – Enhancing coastal water quality improves overall ecosystem health, supports healthy habitats, and species diversity and productivity. Projects like removing dams and other stream barriers,

restoring natural riparian habitat, improving circulation in wetlands and bays, and enhancing pollution controls will all improve coastal water quality.

3. **Ensuring Thriving and Sustainable Marine Fisheries**

California has one of the world's most productive marine ecosystems and a robust fishing industry. We appreciate OPC's support of science-based and collaborative management approaches, and we highlight here the management practices we have advocated for in other forums and that we hope OPC will keep in mind as it implements its strategic plan.

Regarding Objective 3.5, the Marine Life Management Act (MLMA) Master Plan is meant to guide CDFW in achieving the act's goals of conserving the marine environment in state waters and the sustainable use of state fisheries. Comments we have previously made regarding the MLMA Master Plan are also applicable to OPC's work, and we highlight the main points made in our letters[2]:

- Ecological Risk Analyses (ERAs) are crucial tools for identifying species and ecosystem risks. OPC should support CDFW in developing a clear timetable for completing ERAs and ensuring robust public participation in the process.
- We encourage the use of Management Strategy Evaluations (MSE) in identifying optimal management procedures for stocks managed by the state, particularly when evaluating how best to manage stocks for which little data is available and when climate change might be affecting the resource. Current staffing levels at CDFW do not provide sufficient capacity for use of MSE and OPC could support building capacity to use these quantitative management tools.
- Rebuilding overfished stocks is an essential part of sound management, and OPC should support rebuilding, including by assisting CDFW in: identifying reference points for key fisheries, regularly evaluating the status of stocks relative to those reference points using Enhanced Status Reports (ESRs), evaluating the status of data-limited stocks, and prioritizing the management of stocks in need of rebuilding.
- Climate change is already affecting California fisheries, and it must be accounted for when managing state fisheries. For example, researchers predict particularly dramatic latitudinal shifts in fish stocks along the West Coast of the U.S., and the state must take measures to monitor these changes and manage stocks accordingly. In addition, robust management strategies must be identified given uncertainties caused by climate change. OPC should support CDFW in incorporating climate change into its planning. The following are some of the strategies OPC could support:
    - Conducting climate vulnerability assessments for California stocks;
    - Integrating information gleaned from those assessments into the MLMA framework and prioritization processes;

[2] *See* Letter from Natural Resources Defense Council to California Fish & Game Commission, *Re: Comments on Draft Marine Life Management Act Master Plan* (April 18, 2018)(attached).

- Supporting dynamic management strategies (i.e., inclusion of ecosystem indicators into harvest control rules), and;
- Fostering economic and social resilience in the fishing industry (i.e., evaluating the feasibility of transferring fishing permits, gear switching potential, creating a fisheries insurance program).[3]

We also support OPC's objective of reducing marine life entanglement in fishing gear off California's coasts and supporting projects aimed at that goal (Objective 3.6). Entanglement in fishing gear can be deadly for whales, sea turtles, and other marine life.[4] Entanglements off the West Coast are on the rise,[5] and have included humpback whales, blue whales, and Pacific leatherback sea turtles. These entanglements are primarily caused by fixed gear vertical lines between the trap and the surface float, such as those found in Dungeness crab, spot prawn, and spiny lobster fisheries. Warming ocean temperatures, shifting food sources, and marine population dynamics have all contributed to an increase in co-occurrence between wildlife and fishing gear.

We ask that OPC add to its strategic plan a specific commitment to testing "ropeless" gear systems, with the goal of developing viable strategies to reduce entanglement. Ropeless fishing systems have been deployed for assorted marine operations, including by the Department of Defense and the oil and gas industry for over twenty years. As such, they are mature technologies with great promise in reducing entanglement risks. For ropeless gear to be successful, a number of carefully planned pilot tests and field trials need to be conducted. Initial trials of ropeless systems in the Dungeness crab fishery in the State of California were conducted in May 2018 by fishing and conservation members of the Dungeness Crab Fishing Gear Working Group.[6] Building on these efforts by supporting additional pilots and field trials of those systems in collaborating with fishermen, and other projects recommended by the Dungeness Crab Fishing Gear Working Group, will help pave the way for broader adoption of ropeless systems.

Further, the settlement in *Center for Biological Diversity v. California Department of Fish and Wildlife*, specifies that only ropeless fishing gear may be used in certain fishing districts

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[3] Letter from Heal the Bay, Natural Resources Defense Council, *et. al.* to California Department of Fish and Wildlife (October 10, 2017)(attached).

[4] *See, e.g.,* Michael Moore, *How we can all stop killing whales: a proposal to avoid whale entanglement in fishing gear*, ICES JOURNAL OF MARINE SCIENCE (2019); R.S. El-Mallakh, and M. Hartman, *The curious case of the missing face: Death of California sea lion by Dungeness crab trap*, INTERNATIONAL JOURNAL OF AQUATIC BIOLOGY, 6(4), pp.198-201 (2018); Kayla Hamelin, Michael James, *et. al.*, INCIDENTAL CAPTURE OF LEATHERBACK SEA TURTLES IN FIXED FISHING GEAR OFF ATLANTIC CANADA, AQUATIC CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS, 27(3), pp.631-642 (2017).

[5] *See* NOAA FISHERIES, *2017 West Coast Entanglement Summary, Figure 1* (May 2018), https://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/5.2.2018_wcr_2018_entanglement_report_508.pdf

[6] *Initial Trials Exploring Ropeless Fishing Technologies for the California Dungeness Crab Fishery: July 30, 2018 Update to the California Dungeness Crab Fishing Gear Working Group*, Compiled by Geoff Shester, Oceana; http://www.opc.ca.gov/webmaster/_media_library/2018/08/ropeless-trials-update7-30-18.pdf

after April 1, 2021 (until related applications and rulemakings are completed).[7] This impending closure underscores the importance of moving forward with additional testing of ropeless systems, which could allow more fishermen to remain on the water. In addition, there is the need to support the development of technologies to assist in the detection, enforcement, and data sharing of ropeless fishing systems to support regulators and enforcers and reduce potential gear conflicts.

While designing or awarding funds to a ropeless gear pilot project, we encourage OPC to keep several key principles in mind:

- A pilot project must have a clear plan as to how it will be carried out in partnership with the fishing community and set forth the parameters of those partnerships;
- It must allow for practical modifications to previously validated ropeless systems to improve efficiency and reduce costs for fishermen (i.e., improving efficiency of deployment, engineering adjustments to improve compatibility with specific fishing vessels, and assessing other potential economic benefits such as gear loss reduction);
- It must specify a detailed and robust methodology that describes the data that will be collected during the project and how it will be used to advance the viability of ropeless systems;
- It must have an adequate sample size and replication to ensure that the results of the project can be interpreted in a meaningful way;
- It must include components that focus on solutions to the gear conflict and enforcement challenges associated with ropeless fishing systems (i.e., developing electronic tracking systems that allow for gear detection and protect sensitive business information); and
- It must have a plan for collaboration and knowledge sharing with federal and state entities working on the issue, including, the National Marine Fisheries Service, and California Department of Fish and Wildlife.

There have been a number of successful pilot projects and field trials of ropeless fishing systems conducted off the U.S. East Coast and in Canada, which could provide useful models for any pilots sponsored by OPC.

In Canada, l'Association des Pêcheurs Profesionnels Crabiers Acadiens based in the Gulf of St. Lawrence is in the process of testing four different ropeless fishing systems and work to date has included a number of pilot tests, off-season at-sea trials, and in-class and at-sea fishermen training. This collaborative process with fishermen led to the redesign of one of the systems, improving both handling and efficiency.[8] The Coldwater Lobster Association has undertaken

[7] Stipulation and [Proposed] Order Staying Case and Terms of Agreement*, Center for Biological Diversity v. California Department of Fish and Wildlife, et. al.*, Case No. 3:17-cv-05685-MMC (Mar. 26, 2019), Dkt. No. 71; https://www.biologicaldiversity.org/campaigns/fisheries/pdfs/whale-entanglement-settlement-agreement.pdf

[8] M. Noël, l'Association des Pêcheurs Profesionnels Crabiers Acadiens, *Panel presentation at Seafood Expo North America. Sustainability in Crisis – The importance of science, industry & government in protecting right whales and fishing livelihoods* (Mar. 18, 2018); *see also*,

phased trials of one fishing system to date, that comprised 1-2 training days at-sea for each fisher followed by unsupervised sea days and, subsequently, coordinated multi-boat operations with three boats setting and hauling trawls in the same area. A mobile application developed for this purpose was used to aid fishermen in detecting where ropeless traps from each fishing boat had been deployed.[9] The Grand Manan Fishermen's Association is also in the process of testing two ropeless systems, with a specific focus on deepwater fishing in areas with fast tidal currents.[10] Pilot tests and field trials have also been conducted off the U.S. East Coast by the Massachusetts Lobstermen's Association[11] and the South Shore Lobster Fishermen's Association,[12] and plans are in place for a pilot with the offshore lobster fishery in summer 2019[13], among others. We recommend that trials of ropeless fishing systems in California build off the significant efforts already underway in order to expedite the commercial viability of ropeless fishing systems.

Finally, in addition to supporting ropeless gear pilot projects, it could also be useful to have OPC support in developing innovative economic strategies to support eventual gear transition, for example, allowing fishermen to access ropeless gear without bearing the full costs of ownership (i.e., state-owned gear that fishermen could rent on a time-limited basis).

4. **Protecting the Ocean and Encouraging Sustainability in the Blue Economy**

We commend OPC for its commitment to ensuring that marine renewable energy projects minimize impacts to the coastal and marine environment, recreation, and fishing communities (Objective 5.1); and for its sensitivity to working with stakeholders to maximize ocean protection and safeguard sensitive habitats, while developing sustainable energy sources. In these comments we would like to emphasize that OPC is well-positioned to advance the science needed to ensure environmentally responsible marine renewable energy development and to advocate for the highest level of marine protections as offshore energy developments proceed.

Marine renewable energy projects have great potential to provide clean energy, and as the state considers developing such projects, it must also ensure that they are sited to prioritize avoiding harmful impacts to marine ecosystems then developed with a full understanding of

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https://www.andersoncabotcenterforoceanlife.org/blog/scientists-regulators-industry-talk-right-whales-at-seafood-expo/

[9] M. Flagg, Desert Star Systems, LLC, *An 'endless season' of ropeless fishing trials (June-November 2018), Presentation at the Ropeless Consortium* (Nov. 6, 2018), https://ropeless.org/wp-content/uploads/sites/112/2018/11/Marco-Flagg-Endless-Season-of-Ropeless-Fishing-1.pdf

[10] *Id.*

[11] D. Casoni, Massachusetts Lobstermen's Association, CT Harry, IFAW, *Massachusetts Lobstermen's Association & IFAW working hard to preserve right whales. Presentation at the Ropeless Consortium*, (Nov. 6, 2018), https://ropeless.org/wp-content/uploads/sites/112/2018/11/10.-Casoni-Harry-Ropeless-Consortium-Presenatation-1.pdf

[12] M. Lane, South Shore Fishermen's Association, *Panel presentation at Seafood Expo North America. Sustainability in Crisis – The importance of science, industry & government in protecting right whales and fishing livelihoods* (Mar. 18, 2018); *see also,* https://www.andersoncabotcenterforoceanlife.org/blog/scientists-regulators-industry-talk-right-whales-at-seafood-expo/

[13] https://www.bycatch.org/news/new-award-evaluate-ropeless-fishing

their potential environmental impacts and with plans to monitor and mitigate any harmful impacts. We have previously commented on offshore energy proposals before OPC and other bodies, and highlight our recommendations again here:

- As we commented in our letter to the Bureau of Ocean Energy Management, on its Call for Information Regarding Commercial Leasing for Wind Power Development on the Outer Continental Shelf, offshore wind development can be developed responsibly, provided that projects are sited to avoid sensitive habitat, protect wildlife throughout the development process, and monitor and mitigate any impacts to wildlife and habitat throughout construction and operation.[14] Siting decisions must be made in a transparent manner, with full stakeholder engagement.[15]
- OPC should advance the science that is needed to guide siting decisions and fill existing data gaps. As an important first step, the data sets contained in the Data Basin Gateway should be fully analyzed, and at a minimum, the various data layers should be integrated into an environmental sensitivity layer that can be used to assist decision-making.[16] Additional studies are needed on potentially affected fish, marine mammal, and seabird species and habitats in the areas under consideration for leasing.[17]
- As we pointed out in our letter to OPC on the Proposition 84 Competitive Grant Program and offshore wind priorities, safeguarding our marine environment requires any support for renewable energy projects to be based on a precautionary and scientific approach.[18] In particular, it is essential to ensure that: available data (such as information in the Data Basin Gateway) is fully analyzed before siting projects, stakeholders are fully engaged through an inclusive and transparent process allowing full discussion of environmental concerns, and that initial projects start small and are scaled up gradually to allow monitoring and evaluation of the effects of renewable energy projects.[19]

5. **Strengthening Organizational Effectiveness**

We support OPC's goal of strengthening its organizational effectiveness, and in particular, we support its objective of integrating environmental justice and social equity into its conservation work. Marine and coastal protection are of interest to a diverse array of

[14] Letter of Natural Resources Defense Council, Environmental Defense Center, Surfrider Foundation, *et. al.* to Bureau of Ocean Energy Management, *Re: Comments on the Call for Information and Nominations for Commercial Leasing for Wind Power Development on the Outer Continental Shelf Offshore California* (January 28, 2019) at 2 (attached).
[15] *Id.* at 4.
[16] *Id.* at 36.
[17] *Id.* at 37-39.
[18] Letter from Audubon Society, Defenders of Wildlife, Natural Resources Defense Council, *et. al.* to Ocean Protection Council, *Re: California Ocean Protection Council Proposition 84 Competitive Grant Program and NGO Offshore Wind Priorities* (October 25, 2018); *see also,* Letter from Audubon Society, Natural Resources Defense Council, *et. al.* to California Energy Commission, *Re: Environmental Considerations and Goals for California Offshore Wind* (December 17, 2017)(attached).
[19] *Id.*

communities, and it is essential for OPC and other state agencies to keep the full range of stakeholder interests in mind and to ensure broad engagement in the regulatory process.

We appreciate your consideration of these comments. Should OPC require any additional resources or have any follow up questions, we can be reached with the contact information below.

Sincerely,

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April 18, 2018

Mr. Eric Sklar, President
California Fish & Game Commission
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RE: Comments on Draft Marine Life Management Act Master Plan (Agenda Item 14)

Dear President Sklar and Commissioners:

We write with the following comments on the draft revised Marine Life Management Act (MLMA) Master Plan, on behalf of the Natural Resources Defense Council (NRDC) and our three million members and online activists.

Overall we strongly support the revised Master Plan, and we commend the Department for its thorough and inclusive process over the past few years to reach this point. The revised Master Plan contains a number of innovative concepts. Enhanced Status Reports (ESRs) are a good idea, particularly in the form of public-facing "online fisheries portal" pages. Scaled management will help California deploy resources in an efficient manner, and the attention given to Management Strategy Evaluation (MSE) in the revised Master Plan is a step forward. And explicitly recognizing climate change is critical, in bringing California fisheries management into the 21st century.

With that said, the revised Master Plan—like any plan—is only meaningful to the extent it is actually implemented. For example, the revised Master Plan discusses MSE and the advantages this tool can offer, but it is another matter entirely to actually build the agency's scientific capacity and run an MSE tool for California fisheries. And even running a MSE tool is not enough; what matters is whether the results are acted on in a meaningful way. For this reason, we ask the Commission to state a clear commitment that the revised Master Plan will serve as the primary document for guiding fisheries management in

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California, and to direct the California Department of Fish & Wildlife (CDFW) to follow the policies and procedures in the revised Master Plan to the best of its ability.

Moreover, all of the steps in implementing the revised Master Plan are going to be challenging in their own way, and will require troubleshooting, innovation, and careful consideration of resources and staffing. There is a lot of work to be done, and the California Department of Fish & Wildlife (CDFW) will not be able to do everything by itself. As such, we ask the Commission to encourage CDFW to use partnerships with outside entities for Master Plan implementation. Third parties such as universities, non-governmental organizations (NGOs), and industry groups offer significant capacity that CDFW can and should leverage to work on implementation projects.

Turning to the revised Master Plan itself, the following sections offer comments and analysis on individual chapters or topics.

Prioritization (Chapter 2)

The most important thing the Commission can do regarding prioritization is to request a commitment to, and timetable for, running Ecological Risk Analyses (ERAs). ERAs are the main tool for identifying risks to other species and the ecosystem. There are various different versions of ERAs, including a custom ERA platform created by the Ocean Science Trust (OST). We do not have specific views as to the best ERA platform; the important thing is simply getting a workable version and using it. Actually running ERAs, and using the results for prioritization, is what will make the Master Plan's "comprehensive prioritization framework" more than merely Productivity-Susceptibility Analysis (PSA) outcomes.

A few other points bear mentioning regarding the prioritization chapter of the revised Master Plan. First, the Commission should instruct CDFW to create a defined process for stakeholder input, when conducting ERAs for California species. Stakeholder involvement can create buy-in for the results of an ERA, and can yield important information that otherwise would not enter the process. While the revised Master Plan states that ERAs should involve public input (p.10), little detail is provided. More specificity about exactly how stakeholders will be allowed to participate (via web forms, in-person meetings, or other means) would help set expectations.

The Master Plan also should specify that the results from ERAs will be included in ESRs, and accordingly posted on the "online fisheries portal" pages. Given the subjects covered by ERAs, the analysis should provide useful raw material to start filling in the various topics in ESRs. Alternatively, if an ESR page is finished before the ERA is run, the content of

the ERA can be used as a cross-check to confirm that the information in the ESR is accurate. Either way, CDFW should make sure the substance is consistent between these two places.

Finally, we recommend using the ERA results during the management scaling stage, to help identify management changes that are needed for the fishery. The usefulness of an ERA is not limited to prioritization; because ERAs serve to flag important areas where a fishery may be having impacts, they can also serve to identify issues that need management attention. This need not be a formal or quantitative process, and can be as simple as CDFW staff scanning the results of an ERA, taking a few notes, and carrying those notes over into the scaled management stage. The revised Master Plan suggests this will be done (p.10), but the language is vague. The Commission should request CDFW strengthen this language to indicate that consideration of ERA results will be a routine part of the management scaling process.

Scaled Management (Chapter 3)

NRDC strongly supports the concept of management scaling, and we believe the framework for scaled management provided in the revised Master Plan is within the Commission's authority. The MLMA provisions for status reports[1] and Fishery Management Plans (FMPs)[2] are broad enough to accommodate the concepts of ESRs and scaled FMPs, and targeted rulemaking can be conducted based on existing authority.

With respect to ESRs, nothing in the statutory provision for status reports requires them to be narrow or paper-based. Phrased differently, nothing in the Act prevents CDFW from creating comprehensive, web-based status reports. The MLMA merely requires CDFW to report "annually in writing" on "the status of sport and commercial marine fisheries managed by the state."[3] Status reports are to include "information on landings, fishing effort, areas where the fishery occurs, and other factors affecting the fishery as determined by the department and the commission."[4] This requirement is intended to create a catalog, or single source for, information that managers can turn to—and is wholly consistent with the ESR concept as articulated in the revised Master Plan.[5]

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[1] Cal. Fish & Game Code §§ 7065-66.

[2] Id. §§ 7070-88.

[3] Id. § 7065(a).

[4] Id. § 7065(b).

[5] We would also note that the Commission need not be concerned with criticisms that ESRs are being used as vehicles for management. ESRs clearly serve an information gathering function; they have no regulatory power in and of themselves. This is visible not only in the description of the concept and outline of contents of ESRs (pp.13-15), but also in the fact that they are to be prepared at all points on the management

With respect to FMPs, nothing in the Act requires them to be million-dollar undertakings, or hundred-plus page documents. The MLMA provides both process and content requirements for FMPs,[6] but so long as all of the requirements are met, there is a wide range of length and detail that can be used. And given the robust compilation of information that ESRs will contain, it may be possible to meet some of the information-gathering requirements for FMPs simply by incorporating the fishery's ESR by reference.[7] More generally, CDFW's decisions on length and amount of detail are entitled to deference in any judicial review proceeding.

With respect to targeted rulemakings, so long as the Commission operates with some care, this type of scaled management can be fully consistent with existing law. While the MLMA generally grants regulatory authority to the Commission in the context of FMP implementing regulations,[8] various other sections of the Fish & Game Code contain mandates for regulation of certain fisheries,[9] species,[10] and gears.[11] Targeted rulemakings can rely on this pre-existing authority to the extent it is available. There may situations where the subject of a targeted rulemaking is not covered by any pre-existing grant of authority to the Commission; in these cases it may be advisable to prepare a FMP in order to clarify the Commission's authority to regulate. To this end, we recommend the management scaling inquiry include an examination of whether and to what extent CDFW and/or the Commission has pre-existing regulatory authority over the fishery. By incorporating this question into the management scaling inquiry, CDFW can ensure that any fishery over which regulatory authority may be lacking receives either a scaled FMP or full FMP, rather than just targeted rulemaking. This will ensure a strong basis for all Commission rulemakings.

As a policy matter, preparing ESRs for all fisheries is a good idea, and we believe the revised Master Plan generally has solid design principles for ESRs. We particularly support making ESRs web-based as part of the "online fisheries portal," in order to increase their accessibility. We also support the concept of ESRs as living documents that can be updated

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continuum. Even fisheries with full FMPs also will have ESRs (pp.13, 19). Thus there is a clear delineation of function between ESRs and any management action

[6] Id. §§ 7075-78 (process requirements); id. §§ 7080-88 (content requirements).

[7] See, e.g., id. § 7080 (requiring information on the fishery, habitat, ecosystem, etc.).

[8] Id. § 7075.

[9] See, e.g., id. § 200 (providing authority for management of California recreational fisheries).

[10] See, e.g., id. § 8405.3 (granting authority to manage sea cucumbers).

[11] See, e.g., id. § 8841 (granting authority to manage trawls).

as new information comes in, rather than waiting for formal updates only once every four years.[12]

It is important to note that a main function of ESRs is compiling and standardizing information. Maintaining a consistent table of contents across all ESRs is crucial, as it allows for comparison across fisheries. When publishing ESRs as pages on the "online fisheries portal," CDFW should make certain to include all of the headings listed in the ESR table of contents (p.14), even if no information is available on that particular topic. Doing so—and stating explicitly that no information is available if that is the case—will allow readers to identify information gaps, and will help CDFW focus research attention on needed areas. While the revised Master Plan suggests this will be done (p.15), we recommend the text be strengthened to more clearly signal CDFW's intent.

In terms of the specific topic headings in the ESR table of contents (p.14), we offer a few suggestions and comments:

1. We recommend bifurcating the section on "Habitat for the fishery and known threats" into one section on habitat for the target species (including known threats to that habitat), and a different section on habitat impacted by the fishery. These can be very different things. For example, in the ridgeback prawn trawl fishery, the target species uses pelagic habitat but the fishing gear can impact benthic habitat.[13] We believe the statutory requirements would support this restructuring of topic headings.[14]

2. We strongly support the ESR section on reference points ("Criteria to identify when fisheries are overfished or subject to overfishing, and measures to rebuild"). As discussed later in this letter, reference points play a crucial role in management and rebuilding. For present purposes, we would simply reiterate that this heading (like all topic headings in the table of contents) should be included in an ESR even if no reference points exist, with an explanation of why the fishery lacks them.

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[12] We believe CDFW will satisfy the requirement in Cal. Fish & Game Code § 7065(a) by providing web-based, regularly-updated ESRs.

[13] Note that the second topic mentioned above (habitat impacts of the fishery) is similar to the topic of "Measures to minimize any adverse effects on habitat caused by fishing," which is already listed in the ESR table of contents (p.14). It may be possible to consolidate these two together, if desired, by describing both the impacts of the fishery on habitat as well as any management measures intended to mitigate those impacts.

[14] See Cal. Fish & Game Code § 7080(c) (requiring information on the "habitat for the fishery," presumably referring to the target species, and any threats to that habitat); id. § 7084(a) (requiring a determination regarding habitat impacts from fishing, and mitigation measures if necessary). While both of these are requirements for FMPs, we agree with CDFW's view that these provisions provide useful guidance regarding the types of information to collect in ESRs.

3. We suggest restructuring the following headings in Section 2 of the ESR table of contents: "Existing conservation and management measures that contribute to a sustainable fishery," "Limitations on fishing for target species," and "The procedure to establish and periodically review and revise any catch quota." These headings describe an inter-related bundle of issues, but provide less-than-clear dividing lines between the topics. CDFW might consider restructuring them into: (a) fishery management measures, (b) the management process for that fishery, and (c) factors bearing on the sustainability of the fishery. Other ways of lumping and splitting may also be appropriate; our point here is just to note that the existing headings are rather difficult to understand. Also, regardless of how this suggestion is resolved, somewhere Harvest Control Rules (HCRs) should be explicitly discussed, including an explicit statement when no HCR exists for a fishery.

4. Some of the headings in Sections 3 and 4 of the table of contents appear redundant or divided oddly. We understand the reason for the current structure is to specifically call out the elements of a "research protocol," but from a typical fisheries management perspective it would make more sense to keep all of the monitoring topics together (current/past monitoring, future monitoring needs) and distinct from the research topics (research needed to gather EFI, opportunities for collaborative research, etc.). As we understand it, monitoring refers to measures such as observers, logbooks, cameras/sensors, and landing tickets, all of which collect information about the fishery. Research would be topics like biological studies, fishery-independent surveys, habitat impact studies, and so forth—generally not collected in the course of fishing activity.

On a process note, we recommend the Commission direct CDFW to establish some kind of process allowing for stakeholder input on ESRs. This could be a web form for commenting on sections of the ESR via the "online fisheries portal," a mailing address for written comments, in-person stakeholder review meetings for draft ESRs (or bundles of ESRs), or any number of other methods. The purpose is both to create buy-in for the results and to tap into the extensive knowledge held by members of industry, universities and research institutions, and non-governmental organizations (NGOs). While stakeholder input needs to be curated by CDFW, the time spent by CDFW staff would be well worth it in terms of the information and engagement generated.

Lastly, as a minor editorial comment on this chapter, we recommend striking the following sentence: "This revised format ensures that a basic standard of MLMA-based management is applied across all fisheries in a consistent fashion." (p.13) Simply cataloging information about a fishery is not the same as actually managing a fishery, and this sentence could be

read as suggesting the contrary. The easiest change here would be to simply drop the sentence.

Management Strategy Evaluation (Chapter 5 and Appendices G & J)

NRDC strongly encourages the use of MSE to identify optimal management procedures for California-managed stocks, particularly in cases where traditional stock assessments are not available. We ask the Commission to express clear support for the use of MSE, and in particular, the Data-Limited Toolkit (DLMTool). MSE platforms like the DLMTool offer the potential to improve management of California fisheries, by identifying and setting minimum performance criteria, clarifying risks and trade-offs, and helping to select appropriate data-limited management procedures.

Having said that, MSE is not likely to be applied to many California fisheries unless CDFW's capacity for building and running simulation models like the DLMTool is addressed. There is a dramatic need to increase the number of people within CDFW who can execute quantitative fisheries analysis. Current staffing levels provide little capacity for CDFW to review and evaluate MSE results—much less actually set up and run the models. This is a critical flaw in the revised Master Plan's vision of using MSE to guide California fisheries management. We urge the Commission to think about this problem, discuss it explicitly during open public meetings and with CDFW, and consider what would be required in terms of budgeting and hiring to create a bare minimum capacity within CDFW for running MSE models and understanding their results.

With the hope that CDFW's capacity problem gets addressed and MSE becomes a part of California fisheries management, we offer some further comments on this topic and the revised Master Plan below.

First, we recommend CDFW define and include in the Master Plan a process for stakeholder participation in MSEs. Bringing in stakeholders can create essential buy-in for the outcomes of an MSE, and setting a defined process for stakeholder involvement in the Master plan would help set expectations among stakeholders beforehand. The need for stakeholder involvement is particularly relevant for the step of setting performance metrics. Certain metrics may need to be set by CDFW ahead of time based on legal mandates (acceptable risk of collapse, etc.), but others, particularly socioeconomic goals, should be customized to each fishery. And these latter metrics should be based heavily on stakeholder input, rather than CDFW assumptions or guesses about stakeholder views. Parameterizing the operating model is another step when stakeholder input is necessary. Members of industry, research scientists, and other stakeholders can offer important information about species life history and fishery dynamics; incorporating this information

makes the operating model more accurate and can help the results be more widely accepted. We recommend adding to the discussion in Appendix J of both the performance metric-setting stage (page J-3) and the parameterization stage (page J-5), and defining a specific process for engaging stakeholders at those stages. We also suggest strengthening the language in Chapter 5 of the main document (bottom of p.31) to indicate that stakeholders will be involved in the MSE process. The existing language is ambiguous, and this is an important commitment to state in the Master Plan itself.

Second, we recommend CDFW consider writing up some guiding principles for interim management action, when MSE results indicate management intervention is needed but before formal action (whether in the form of targeted rulemaking or FMP) can be taken. Appendix J, or possibly Appendix I, would be the likely place to do this.

Third, and most importantly, we urge the Commission to direct CDFW to construct a standardized process for aggregating and organizing fisheries data. This means drawing up specific steps that will be taken to format fisheries data and store it in a single location. For example, the operating model data tables in the DLMTool could (and we believe should) be used as a storehouse for all California fisheries data going forward. This would mean that whenever new data is gathered, CDFW would require it to be inputted to the data tables directly, as the last step of whatever data collection or research job is being done. Setting this ground rule (i.e., the job is not considered finished until data is input into the DLMTool data tables) would be a relatively small change that would have enormous ramifications, as it would enable much more streamlined MSE runs and stock assessments in the future, requiring less scientific capacity and allowing higher throughput.

To this end, we recommend adding text to Chapter 5 and Appendix F with specific policies for data aggregation and organization. The existing text in the revised Master Plan does not accomplish this purpose.[15] Specific places to add guidance on this would be pages 27-28 in Chapter 5, and some combination of pages F-1, F-7, F-8, F-12, or F-14 in Appendix F. A cross-reference in Appendix J should be added as well. Chapter 10 should also include a statement that one of the tasks to be completed in the peer review process is to ensure all data are housed in a standardized format and location, to enable future use. The table of contents for FMPs (p.17) also should be edited, to add a heading for "Data Modernization/Standardization" under Section 6 of the FMP outline.[16]

[15] Chapter 5 briefly notes "opportunities to standardize and streamline data collection" as a "[k]ey higher-level consideration[]" (p.28), but no further detail is provided, and this falls well short of stating an intent on behalf of CDFW. And the section heading on "Data Modernization/Standardization" in the ESR outline (p.14) is helpful, but does not substitute for a centralized CDFW policy statement on the issue.

[16] For some reason this heading shows up in the ESR table of contents (p.14) under Section 4, but it appears to have been dropped in the FMP table of contents (p.16).

Lastly, we offer a few minor editorial comments on this chapter and the associated appendices. On page 26, there appears to be a typo stating "OP" rather than "OY." Also on page 26, we recommend changing the phrase "In other words, it requires" to "This has generally involved developing." This change would convey that abundance estimates are a standard approach, but are not necessarily the only way to manage stocks sustainably; it also would bring the language more in line with the following paragraph, which explains that other approaches exist. On page 27, we recommend changing "ideally" to "traditionally," as there are a number of situations where non-biomass-based management can perform suitably. And a small correction on page J-3: assuming the relevant reference point set by federal managers for "unsustainable" biomass is the Minimum Stock Size Threshold (MSST), also known as the overfished threshold, then that level is 25% of Bzero, not 10% of Bzero. The latter is where fishing is supposed to stop entirely, under the "40-10 rule"; it is well below the overfished level.

Rebuilding (Chapter 5 and Appendix H)

Rebuilding is a crucial subject in fisheries management. It is one of the most difficult problems for managers to deal with, and can have significant consequences for industry. Because of its importance, we recommend rebuilding receive its own freestanding section within Chapter 5 or Appendix H. This new rebuilding section in the Master Plan should address the topics discussed below.

At the outset, the rebuilding section of the Master Plan should take the opportunity to clarify the meaning of a few terms defined in the MLMA. Specifically, the statutory definition of "depressed" [17] suggests fisheries are to be classified as depressed primarily on the basis of a trend, rather than a level of biomass. While trends can be useful proxies in data-limited situations, the Master Plan should clarify that the concept of a depressed fishery is intended to mean a diminished size of a fish stock—often thought of in terms of biomass or abundance or spawning potential—and not a trend, strictly speaking. The Master Plan also should address the definition of "overfished" [18] and provide some guidance around the criterion that "a reduction in take" must be the principal means for rebuilding the population. In some ways, a reduction in take always is the principal means for rebuilding, as it is the only thing fishery managers have direct control over. We recommend the Master Plan provide interpretive guidance stating that "overfished" is a broad concept, and in most cases a stock that is depressed also will be overfished. This is

[17] Cal. Fish & Game Code § 90.7.

[18] Id. § 97.5.

important because the rebuilding provisions for FMPs[19] are keyed to the term "overfished." A broad view of this term also is consistent with the legislative intent expressed in the findings and policy sections of the MLMA, which indicate that all depressed fisheries should be rebuilt to sustainable levels.[20]

The Master Plan also should clarify the meaning of the MLMA provisions for rebuilding under FMPs, which we understand were intended to resemble the federal statute but ended up phrased in somewhat less clear terms. This discussion should start with the conceptual difference between overfishing (the act of removing fish at an unsustainable rate) and being overfished (the status of a fish stock that has significantly reduced biomass, abundance, or reproductive potential). The Master Plan then should explain that the MLMA language that FMPs must "prevent, end, or otherwise address overfishing and to rebuild the fishery" [21] represents two separate requirements—one to deal with overfishing, and one to rebuild—each of which is freestanding and independent of the other. It also may be useful to clarify that the MLMA's timeframe language[22] is intended to mirror the federal statute, and accordingly applies to rebuilding situations, not overfishing situations.[23] Finally, the Master Plan should explain that the language in the Act requiring FMPs to contain "criteria for identifying when the fishery is overfished" [24] means that FMPs should have reference points for both overfishing (i.e., F-rates or similar proxies) and overfished status (i.e., biomass or other threshold).

Next, the Master Plan's new rebuilding section should articulate some substantive points regarding rebuilding policy:

> 1. Reference points are the key to rebuilding. Only by specifying criteria for when a fishery is depressed do managers know when to trigger rebuilding measures, and where to shoot for in rebuilding. More generally, a stock's status is only meaningful relative to a reference point. Because reference points play such a fundamental role, the Master Plan should underscore CDFW's commitment to considering—and ideally, identifying—reference points for all fisheries.

[19] Id. § 7086.

[20] Id. §§ 7055(b), 7056(c).

[21] Id. § 7086(b).

[22] Id. § 7086(c).

[23] If the timeframe language were applied to overfishing situations, it would suggest that managers could wait up to 10 years before stopping overfishing; this clearly is not the intent of the statute.

[24] Cal. Fish & Game Code § 7086(a).

2. ESRs are to be the initial vehicle for considering and identifying reference points. The ESR outline in Chapter 3 appropriately contains a section heading on reference points and rebuilding (p.14). This is important, because ESRs apply to all stocks, not just those with FMPs. While some stocks may go on to receive a FMP, it is neither necessary nor appropriate to wait for a FMP to consider reference points.

3. The MLMA's status reporting provisions[25] provide the basis for ESRs addressing reference points. Status reporting is required for all stocks—not just those with FMPs—and implies the need for reference points, since reference points are what enable a stock's status to be determined. Moreover, the MLMA directly requires CDFW to identify depressed stocks, discuss the causes, and explain the rebuilding plan for each depressed stock, irrespective of whether it is under a FMP.[26] There is ample legal basis for including in all ESRs a field for reference points, and for filling in this field whenever possible.

4. Criteria for determining depressed/overfished status can be set for data-limited stocks as well as data-rich stocks. Reference points do not have to take the form of classic Maximum Sustainable Yield (MSY)-based biomass thresholds, but instead can be set with various proxies and triggers, such as declines in Catch Per Unit Effort (CPUE) or landings.[27] There is a wide literature on how to do this, and the DLMTool may be helpful in modeling the performance of various reference points as embodied in HCRs.

5. Ramp-down HCRs should be used whenever possible, as they contain built-in rebuilding plans. As biomass (or another relevant indicator) decreases, a ramp-down HCR will reduce catch (or effort) to the point where, below a certain critical threshold, no fishing is allowed. These HCRs tend to perform well in simulation modeling, and if they are set in a sufficiently precautionary manner, they can help to avoid rebuilding situations to begin with.

6. Rebuilding stocks should be reviewed periodically for adequate progress. Progress reviews are an important part of rebuilding, because they check on whether the rebuilding measures actually are having the desired effect. To this end, the Master Plan should explain that rebuilding measures will be reviewed for adequate progress periodically, and CDFW should develop (either outside the

[25] Id. § 7065.

[26] Id. § 7066(b).

[27] Note that the statutory definition of "depressed" in Cal. Fish & Game Code § 90.7 suggests that using trend-based reference points (rather than absolute levels) would be permissible.

Master Plan or in the new Chapter 5 / Appendix H section on rebuilding) standardized rules for increasing the stringency of management actions to be taken if time is passing and the stock is failing to make adequate progress in rebuilding. This kind of progress review easily falls within CDFW's statutory authority under the status reporting and rebuilding provisions of the MLMA.[28]

The Master Plan also should address how rebuilding interacts with the new framework for MLMA management. Specifically, the need for rebuilding should weigh heavily in the prioritization process. There are stocks that are known to need rebuilding, yet lack FMPs; these stocks should be at the top of the priority list. The need for rebuilding also should be a strong factor in the management scaling component—probably best addressed under the inquiry regarding the degree of management change needed. Rebuilding entails difficult harvest level and allocation decisions, and stocks in need of rebuilding are likely to requires more intensive management.[29]

Finally, we offer a few minor editorial comments on Chapter 5 and Appendix H relevant to the topic of rebuilding. Specifically, we recommend adding a bullet to the list of MLMA provisions on page 26, stating that the Act requires CDFW to identify depressed fisheries, indicate the causes, describe steps being taken to rebuild, and recommend any further steps necessary to rebuild the fishery (citing Cal. Fish & Game Code § 7066(b)). We also recommend adding a citation to this same statutory provision (§ 7066(b)) after the first sentence of the first bullet on page 30.

Climate Change (Chapter 11)

We commend the Department for incorporating climate change into the draft Master Plan. Climate change is an important part of 21st century fisheries management, and changes are already underway that are affecting California's fisheries.

Developing climate-ready fisheries is a challenging undertaking, and one that will be ongoing over the decades to come. But the Master Plan revision offers an opportunity to make important adjustments now—at the early stages of restructuring the fisheries management system in California. This offers California the chance to be a leader, making

[28] See Cal. Fish & Game Code §§ 7065, 7066(b); see also id. § 7066(c) (requiring CDFW to periodically review the management system).

[29] We note that if the management scaling inquiry for an overfished stock results in a targeted rulemaking, this outcome is likely supportable by the MLMA even in the absence of a FMP, so long as the rulemaking is dealing with rebuilding. This is because the Act directly requires CDFW to identify depressed fisheries, describe steps being taken to rebuild each such fishery, and recommend additional management measures—irrespective of whether the fishery is managed under a FMP. See Cal. Fish & Game Code § 7066(b).

fisheries management consistent with California's global leadership role in climate change mitigation and adaptation policies.

It is important to stress, however, that climate-ready fisheries management is not necessarily achieved simply by "doing a good job at traditional fisheries management." First, even under the best of circumstances traditional fisheries management is never perfectly implemented. Of particular concern in the context of climate change are the routine delays in modifying harvest rates in response to population fluctuations, due to scientific uncertainty, resistance to change, and lags in data collection and analysis that are inherent in fisheries science.[30] In addition, many assumptions of traditional fisheries science are violated in a changing environment—like the assumptions of a constant environment and fixed spatial extent of the species.[31] Lastly, traditional fisheries management systems tend to be designed to maximize long-term yield, rather than to promote ecological or evolutionary resilience. Fishing can truncate age structure and reduce genetic, phenotypic, and geographic variation, resulting in a reduced ability of populations to buffer environmental variation[32]; this is routinely overlooked by standard fisheries management.

Ensuring that fisheries remain sustainable and resilient in the face of climate change will require adjustments to the traditional fisheries management system. We recommend editing the opening paragraph of Chapter 11 of the revised Master Plan (p.62), to acknowledge this fact clearly. The Master Plan should state directly that managing California fisheries in the face of climate change will require monitoring, analysis, and management strategies that go beyond traditional fisheries management.

Due to the notable deficiencies in traditional fisheries management systems, we see two immediate priorities to begin working on climate-ready fisheries management in the context of Master Plan revision: (1) develop science and policy structures to better deal with shifting fish distributions, and (2) promote ecological and evolutionary resilience in fisheries management.

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[30] See, e.g., Brown CJ, Fulton EA, Possingham HP, Richardson AJ. 2012. How long can fisheries management delay action in response to ecosystem and climate change? Ecological Applications 22, 298-310. (doi:10.1890/11-0419.1).

[31] See, e.g., King JR, McFarlane GA. 2006. A framework for incorporating climate regime shifts into the management of marine resources. Fisheries Management and Ecology 13, 93-102. (doi:10.1111/j.1365-2400.2006.00480.x).

[32] See, e.g., Pinksy, ML and D Byler. 2015. Fishing, fast growth and climate variability increase the risk of collapse. Proceedings of the Royal Society B 282, 20151053. (doi:10.1098/rspb.2015.1053).

In terms of developing science and policy structures for shifting fish distributions, we recommend the discussion of this topic in the Master Plan be strengthened in the following ways:

- Expand on the discussion in Chapter 11 (bottom of p.66) to explain that shifting fisheries and emerging fisheries are distinct things, and acknowledge that the Commission's Emerging Fisheries Policy needs more detail in order to address fisheries that are emerging due to climate change. Also acknowledge the need to develop a policy on managing fisheries that are experiencing range shifts. Stocks that are experiencing range shifts tend to have a higher risk of overfishing and collapse; fishing pressure on the leading and trailing edges should be minimal in order to maintain genetic diversity and promote ecological resilience. The revised Master Plan is an important opportunity to clarify these concepts and provide first steps toward addressing them.

- Provide a cross-reference in Chapter 5 under "considerations in identifying data collection strategies" (p. 28), mentioning the value of electronic monitoring in enabling spatial information to be collected and synthesized. This can be a key tool in helping to track changes in fish distributions, as port landing information generally has insufficient spatial resolution. Chapter 11 mentions this fact briefly (p.67), but it should be noted as well in Chapter 5.

- State the need to develop an expert working group to evaluate permit transfers and gear switching. The revised Master Plan acknowledges the importance of permitting systems (p.66), but states that analysis will be limited to CDFW and the Commission; a wider working group could be useful in identifying specific action or next steps.

In terms of promoting ecological and evolutionary resilience, we recommend the discussion of this topic in the Master Plan be strengthened in the following ways:

- Highlight the value of MSE in identifying management approaches that are robust to uncertainties in species' responses to climate change. The value of MSE in generating defensible, tactical management guidance, taking into consideration climate uncertainties, should be featured somewhere in Chapter 11. One possible place for doing so would be in the list of points under "Maintaining ecological resiliency" (pp.66-67).

- Edit the following sentence in the "Manage for genetic diversity" bullet (p. 65): "This may be difficult due to a lack of information about the genetic makeup of

marine populations, but a precautionary management approach may help by decreasing existing stressors" to say instead "This may be accomplished through a variety of management approaches including maintaining large populations, maintaining size/age distributions, and maintaining connectivity across metapopulations."

More generally, we recommend providing stronger language in the Master Plan regarding California's commitment to addressing climate change in fisheries management. One important place to do so would be in the lead-in text introducing management approaches for dealing with climate change (p.64), which currently contains only a weak indication of commitment ("The following sections provide an overview of some management approaches that may be applicable to California's fisheries.").

In terms of the framework for MLMA management, we commend CDFW for including "Climate Readiness" in the outline of topics to be addressed by ESRs (p.14). And Chapter 11 helpfully expands on this, by providing seven different types of information on climate change that each ESR should address (pp.67-68). Taken together, the information described in Chapter 11 comprises a sort of "climate profile" for each fishery—a narrative description of the anticipated effects of climate on the fishery. This will be an extremely valuable resource, and we strongly encourage the Department to fill in this section of ESRs to the best of its ability. Filling in this "climate profile" need not involve an intensive literature review; much of the information can be described quite briefly, and the section largely can be based on expert opinion. Our only suggestion here is to add one further bullet to the list, addressing the anticipated effects on the human side of the fishery due to climate change. This could include expected effort shift in or out of the fishery, longer transit times for fishermen as species distributions change, altered timing of harvest seasons, expected conflicts resulting from shifting distributions, and similar sorts of fishery dynamics.

We strongly support the revised Master Plan's mention of climate as a relevant factor in the prioritization component (p.10). It is important to allow climate change to bump a given fishery up or down in the priority list, depending on the anticipated impacts of climate change on the fishery.[33] We suggest editing the text in Chapter 2 to be more clear in the intent that climate impacts or climate vulnerability, to the extent they are understood, will be integrated into the prioritization scheme. Formal Climate Vulnerability Analysis (CVA) results would provide a clear, boiled-down metric that is amenable to integration into an ERA or could be used as a stand-alone factor when doing the comprehensive prioritization.

[33] Unexpected synergistic impacts of fishing mortality, life history, and climate variability could modify the results of PSA analyses in important ways. See, e.g., Pinksy and Byler, 2015.

But even without CVA results, the Department will have ample information (albeit in narrative long-form) in the ESR section on climate change. Absent a CVA, the fishery's "climate profile" should be reviewed and translated into an expert opinion on whether the fishery should be bumped up or down the prioritization list. This can be done rapidly and informally, and to the extent CVA results become available later, the informal version can be replaced with a formal methodology that relies on CVA results. The revised Master Plan suggests this may be done, but the language ("Until such results are available, the Department will consider augmenting the ERA results . . . .") (p.10) should be strengthened to signal a clear intent.

Similarly, we support the revised Master Plan's inclusion of climate as a relevant factor in the management scaling component (p.17). The anticipated effects of climate change on a fishery could increase the degree of complexity of a fishery, or affect the amount of management change needed. As suggested above for prioritization, we recommend strengthening the commitment to consider climate change under the management scaling component. This can be done before CVA results are available, simply using expert judgment and the fishery's "climate profile" in the ESR. And when CVA results become available in the future, expert judgment can be replaced with a formal methodology using CVA results. The revised Master Plan suggests the possibility of doing this ("information on species' climate vulnerability as it becomes available will provide additional insights . . . .") (p.17), but should be strengthened to signal a clear intent.

The revised Master Plan also should strengthen its mandate for addressing climate change in MSEs. Appendix J contains a discussion of how simulation modeling can approach climate change, including both mechanistic and empirical approaches (pp.J-7 to J-8). This discussion is good; we recommend also mentioning the subject in the main body of the Master Plan (likely p.67), and noting the ability of MSE to simulate different futures and help prepare the management system for climate change. We also recommend adding references to climate in the MSE discussion in Chapter 5 (p.31), and adding language to Appendix J (likely p.J-7) signaling CDFW's intent to integrate climate into MSEs when possible.

Finally, we offer one minor editorial comment on Chapter 11, in the section on "Changing ocean chemistry" (p.64). The opening sentence ("California is already experiencing . . . .") suggests that ocean acidification is caused by climate change, whereas in reality ocean acidification and climate change are two independent consequences of greenhouse gas emissions. We suggest correcting this, and also making sure that Chapter 11 more generally refers to both climate change and ocean acidification.

* * *

Just as California has become a leader in demonstrating marine protected areas through implementation of the Marine Life Protection Act, the state should strive to set a standard for sustainable, science-based, and climate-ready fisheries management through implementation of the MLMA. The revised Master Plan is a good first step toward this goal, and we encourage the Commission and CDFW to complete the revision process and adopt the revised Master Plan. The real test will come in enacting the policies and principles contained in the revised Master Plan over the years to come. To this end, we recommend the Commission express a public commitment to use the Master Plan, and to seek all resources necessary for effective implementation of the revised Master Plan.

Thank you for your consideration, and please feel free to contact us if we can answer any questions.

Sincerely,

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January 28, 2019

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Submitted electronically

Re: Comments on the Call for Information and Nominations for Commercial Leasing for Wind Power Development on the Outer Continental Shelf Offshore California [*Docket No. BOEM-2019-0045*]

Dear Ms. Thurston:

On behalf of the Natural Resources Defense Council (NRDC), Environmental Defense Center (EDC), National Audubon Society (Audubon), California Coastal Protection Network, Defenders of Wildlife (Defenders), Surfrider Foundation, Sierra Club, and our millions of members, we submit these comments on the Bureau of Ocean Energy Management's (BOEM's) Call for Information and Nominations (Call) for Commercial Leasing for Wind Power Development on the Outer Continental Shelf (OCS) Offshore California. Our organizations are united in support of responsibly-developed offshore wind energy as a critically-needed climate change solution, and our organizations have long advocated for policies and actions needed to bring it to scale in an environmentally protective manner.

We applaud BOEM's substantial progress in advancing offshore wind energy development along the Atlantic Coast and are supportive of California also potentially benefitting from this innovative renewable energy opportunity. Advancing offshore wind to fight climate change, reduce local and regional air pollution, and grow a new industry that supports thousands of well-paying jobs is critical to our future, but we must also ensure offshore wind is developed responsibly and in a manner that protects our valuable marine life. Offshore wind development advances must include strong protections for valuable and vulnerable coastal and marine habitat and wildlife every step of the way. We urge BOEM to adopt an approach which engages stakeholders early and often in discussions on efforts to avoid, minimize, and mitigate any potential impacts to California's beloved ocean life.

In this letter, we address several central issues: 1.) we offer recommendations for how BOEM should proceed on offshore wind by working in partnership with the state of California, and other key stakeholders (See Section II below); 2.) we respond to BOEM's request for relevant "socioeconomic, biological, and environmental information" on the three Call Areas, sharing our initial review of relevant

data for benthic habitat, fish, seabird, marine mammal, and sea turtle data (See Sections III through V below); and, 3.) we summarize several potential mitigation measures that could be used to help advance offshore wind (See Section VI and Appendix below).[1]

I. INTRODUCTION

Offshore wind energy must advance in an environmentally responsible manner that will minimize conflicts and enable additional development in the future while safeguarding vulnerable ocean habitats and wildlife, benefitting the environment and industry alike.

In California, our organizations have been deeply engaged both in advancing California's mandate to achieve 100 percent clean energy by 2045, including fostering the responsible development and siting of terrestrial wind energy. Further, our organizations have been working collaboratively with the California Energy Commission (CEC) and other state and local agencies to ensure that the process for siting offshore wind energy reflects the lessons learned from our onshore siting and development efforts. Offshore wind development may offer California an opportunity to tap into a sustainable, clean, fossil-free energy source that could help the state achieve its target goals to transition to 50 percent renewable electricity by 2026, to 60 percent by 2030, and to 100 percent by 2045.

Our continued development of fossil fuels has come at a great cost, exacerbating climate change, polluting air and water resources, and significantly harming public health and wildlife, among other impacts. In our oceans, climate change is already bleaching coral, displacing species, and acidifying the water, making it harder for shell-building organisms like oysters to grow shells and survive. In California, ocean acidification and warming waters are already having deleterious impacts on fisheries productivity.[2] We therefore need to embrace clean industries such as offshore wind while incorporating protections that will help defend marine life that is already stressed.

Several decades of offshore wind development in Europe suggest that offshore wind power can be developed responsibly in California, provided that all siting and permitting decisions are based on sound science and informed by key experts and stakeholders. The European experience shows us that avoiding sensitive habitat areas, requiring strong measures to protect wildlife throughout each stage of the development process, and comprehensive monitoring of wildlife and habitat before, during, and after construction are essential for the responsible development of offshore wind energy.[3]

Despite offshore wind's rapid growth in Europe, U.S. offshore wind remains a new industry, with the nation's first commercial project – Block Island Wind Farm (30 MW) – only coming online in December 2016. Given that the industry is in early stages in the United States, BOEM needs to rigorously review the potential impacts of offshore wind development on marine wildlife and habitat here in the United States and develop and adopt appropriate mitigation measures. Various potential impacts that may be associated with offshore wind construction and operations and could directly, indirectly, and cumulatively impact marine species and habitats in the coastal zone and offshore environment. The likelihood, nature, and significance of potential impacts will vary based on the siting, design, construction, and operation plans of specific projects.

[1] For this letter we did not review sea turtle data extensively and did not assess potential impacts to bats.
[2] Chavez, F. P.*, Costello, C.*, Aseltine-Neilson, D., Doremus, H., Field, J. C., Gaines, S. D., Hall-Arber, M., Mantua, N. J., McCovey, B., Pomeroy, C., Sievanen, L., Sydeman, W., and Wheeler, S. A.(California Ocean Protection Council Science Advisory Team Working Group). 2017. Readying California Fisheries for Climate Change. California Ocean Science Trust, Oakland, California, USA.
[3] O'Brien, Sue. "Lessons learned from the European experience." Presentation at the *State of the Science Workshop on Wildlife and Offshore Wind Energy Development*. Nov. 13-14, 2018.

The national NGOs who are signatories to this letter have supported the progress of offshore wind development along the East Coast while also emphasizing the importance of protecting our living marine resources.[4] Of particular concern for East Coast development is the North Atlantic right whale, an iconic species and one of the planet's most endangered large whales, whose habitat is limited largely to the East Coast. Noise from site assessment, construction, and operations could potentially disrupt vital behaviors and cause habitat loss. And, increased vessel traffic associated with offshore wind development may exacerbate ship-strike risk for this species. NRDC, together with the National Wildlife Federation (NWF) and the Conservation Law Foundation (CLF), have negotiated agreements[5] with Mid-Atlantic and Northeast wind developers to reduce noise impacts and ship-strike risk during the initial site assessment phase of wind development as well as during construction and throughout the operation of the project.[6] This month, Vineyard Wind agreed to a set of mitigation measures to reduce noise impacts and limit ship speeds during the first commercial scale wind project in U.S. waters. These collaborative efforts demonstrate that offshore wind can develop in a way that protects wildlife. Through taking sensible actions guided by science, it is possible to minimize conflict and reduce impacts to already vulnerable marine life.

As detailed in NRDC, Audubon, and Defenders' September 2018 comment letter in response to FRN RFI Fed Reg 55228, there are some key differences between the East Coast and the West Coast in terms of offshore wind development. Offshore wind development on the East Coast has been possible due in large part to the shallow waters of the Atlantic Ocean's continental shelf. Offshore wind energy projects have historically been built in relatively shallow waters (0-30m) where it is possible to fix the foundations to the ocean floor. For the Block Island project, wind turbines were pile driven 200 feet below the seabed.[7] By comparison, the West Coast's continental shelf plunges steeply and quite close to shore, making shallow-water installation technology impossible. In addition to California's steep continental shelf, development is further complicated by the presence of numerous protected marine areas; drawing on extensive public engagement, the State of California and the United States Government have put necessary protective measures in place to preserve the state's abundance of living marine resources—from deep sea corals and fish to seabirds and marine mammals. Given the commitment the federal government and state of California have made to protecting California's marine environment, we believe offshore wind development can only proceed in a manner that safeguards these protected ocean habitats and species.

As BOEM advances offshore wind, the agency must bear in mind that preserving ecosystem function is also crucial to ocean health. It is essential that BOEM also preserve the ocean's ability to deliver its mitigatory benefits while boosting ocean health to build resilience to climate change. For example, protecting the eel grasses that carpet Humboldt Bay has the co-benefits of serving as a carbon sink and ameliorating the impacts of ocean acidification on local shellfish populations.[8]

We appreciate the opportunity to inform the offshore wind leasing process in California and hope these comments and information presented here and in the Appendix are informative and useful as BOEM proceeds with its efforts to develop a new renewable energy source in California. We urge BOEM to consider these comments, which provide environmental information on the three proposed Call Areas and the potential environmental impacts associated with offshore wind energy development.

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[4] In the Atlantic, NRDC and colleague organizations have fought for the federal investment tax for offshore wind and for state procurement policies including the solicitations currently under way in New York and New Jersey.

[5] http://www.clf.org/blog/going-above-and-beyond-deepwater-wind-adjusts-offshore-wind-construction-schedule-to-protect-right-whales/

[6] Deepwater Wind, Conservation Law Foundation Reach Agreement to Protect Right Whales During Block Island Wind Farm Construction – Press Release

[7] http://www.blockislandtimes.com/article/bi-wind-farm-foundations-completed/44158

[8] Merkel and Associates, Inc. Humboldt Bay Eelgrass Comprehensive Management Plan. 2014.

II. DEPARTMENT OF DEFENSE SHOULD NOT BE THE DE FACTO SITING AGENCY FOR OFFSHORE WIND DEVELOPMENT IN CALIFORNIA

We commend Department of Defense (DoD) and BOEM for establishing a cooperative process to identify potential areas for offshore wind development. However, we are concerned that the DoD use conflict discussions are elevating DoD's role in the BOEM leasing process to supersede other stakeholder priorities.

The DoD uses the California OCS intensively and extensively for military testing, training, and operations. These activities occur in the airspace, on the water, and throughout the water column on California's OCS.[9] The use of the California OCS for military purposes is so extensive that the conflicts with prospective offshore wind developments threaten the very potential of developing offshore wind on California's OCS. The Call states that, "DoD is currently reviewing additional detailed project information supplied by the offshore wind energy industry to determine if any of the areas previously identified by DoD as incompatible in the Morro Bay Call Area may be identified as compatible after further analyses." By engaging in private negotiations with offshore wind developers to discover areas of potential compatibility with offshore wind development on the Central Coast, BOEM, DoD, and industry become the sole parties to privileged and confidential information—a practice for offshore wind development that is contrary to the inclusive, science-based, and stakeholder-driven process we urge BOEM to conduct.

When one stakeholder entity is engaged in private negotiations with BOEM and developers, environmental or other stakeholder considerations run the risk of becoming of relatively lesser importance. Our concern is that rather than BOEM identifying and selecting an area with lower environmental sensitivities, the agency is endowing DoD with greater priority siting authority than that of other stakeholders. We urge BOEM to work with CEC and the Ocean Protection Council to conduct a comprehensive stakeholder-driven process that balances priorities and elevates environmental protections.

Our organizations and others have stated repeatedly that a state and/or federal stakeholder-driven process to identify areas of least conflict would provide a more streamlined process for decision making and reflect environmental and other concerns. We believe that BOEM, working in partnership with the state, should facilitate an inclusive and transparent process to identify least conflict lease areas.[10] The Desert Renewable Energy Conservation Plan (DRECP) and San Joaquin PV Least Conflict stakeholder process are examples of a state and federal partnership and a state-led stakeholder-driven effort that have facilitated more efficient and environmentally-sound permitting of renewable energy projects in California.

III. ECOLOGICAL CONSIDERATIONS FOR DEVELOPMENT IN CALIFORNIA CURRENT LARGE MARINE ECOSYSTEM

[9] California Renewable Energy Task Force meeting, September 17, 2018, Department of Defense Engagement Activities, Steve Chung, U.S. Navy.

[10] We expect that many fishing communities would also support this approach. In April 2014, the Pacific Fisheries Management Council wrote a letter to BOEM stating the Council's preference for such a process.

The complexity and importance of California's marine ecosystem is well-documented, and includes ecological areas of global significance. The central coast of California contains one of the rarest bio-regions in the world, due to its location in the confluence of two major ocean currents, the mixing of which results in the highest biodiversity in the mainland United States. The California coast also includes hundreds of species that are not found anywhere else on the planet. The overlap of "oceanographic processes in the region fosters the transport of materials, such as nutrients and fish and invertebrate larvae between the marine islands and coastal habitats and are primary food sources that support biological communities."[11]

The Call Areas are situated in the California Current System (CCS) and located adjacent to the coastal Davidson Current, which carries warmer, more saline water from the south into the cooler, fresher water travelling from the north in the CCS.[12] The mixing of these different water masses makes the Call Areas highly dynamic and productive, and an ecologically important pelagic habitat for many fish species, marine mammals and seabirds.[13]

The ecological value of the California Current Ecosystem (CCE) is well known and well supported. The coast of California is home to four National Marine Sanctuaries (NMSs): Cordell Banks, Greater Farallones, Monterey Bay, and Channel Islands. The Monterey Bay NMS lies adjacent to the Morro Bay Call Area and near the Diablo Canyon Call Area. These Call Areas also fall within the nominated Chumash Heritage NMS. California's landmark network of 124 marine protected areas (MPAs) lies within State waters. Critically, the effectiveness of California's MPA network relies not only on the protections individual MPAs afford but on the connectivity of the entire MPA network.[14] The following discussions of benthic habitat, fish, seabirds, marine mammals, and sea turtles are intended to provide an overview of some of the most important biological resources the CCE sustains.

Benthic habitat and fishes

Benthic habitat is primarily classified based on physical substrate and depth.[15] In California, the geological shelf extends offshore to the shelf break, and has a steep change in slope, which occurs at 130 m in northern and central California and ranges from 80–145 m in southern California.[2] The Call Areas are located well offshore of the continental shelf 200 m isobath on the lower continental slope and range in depth from 500-1200 m. The habitats in these deeper regions of the continental slope off California are made up primarily of soft-bottom habitat; the dominant sediment type is thought to be mud.[16]

The seemingly featureless continental slope habitat is, in fact, an extremely rich ecosystem that supports infaunal and microbial communities that play an important role in nutrient cycling and CO_2 exchange.[17] The microbial ecology of the continental slope oxidizes methane and sequesters carbon into marine

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[11] *A Biogeographic Assessment of the Channel Islands National Marine Sanctuary: A Review of Boundary Expansion Concepts for NOAA's National Marine Sanctuary Program*, NOAA Technical Memorandum NOS NCCOS 21, November 2005. Available at: https://repository.library.noaa.gov/view/noaa/2161.

[12] https://www.cencoos.org/sites/default/files/documents/learn/oceanObserving/flowingoceanCCS.pdf

[13] https://earthobservatory.nasa.gov/images/87575/california-coastal-current

[14] Saarman E., Gleason M., Ugoretz J., Airamé S., Carr M., Fox E., Frimodig A., Mason T., Vasques J. (2013) "The role of science in supporting marine protected area network planning and design in California," Ocean and Coastal Management.

[15] Allen, M.J. 2006. Continental Shelf and Upper Slope. In: All LG, Pondella DJ, Horn MH (eds). The Ecology of Marine Fishes: California and Adjacent Waters [Internet]. University of California Press. Berkley, CA; [cited 2019 Jan 9]; p. 167-202. Available from: ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/JournalArticles/488_continental_shelf.pdf

[16] Surpless KD, Ward RB, Graham SA. 2009. Evolution and Stratigraphic Architecture of Marine Slope Gully Complexes: Monterey Formation (Miocene), Gaviota Beach, California. Marine and Petroleum Geology [Internet]. [cited 2019 Jan 9]; 26(2):269-288. Available from: doi: 10.1016/ j.marpetgeo.2007.10.005

[17] Thurber AR, Sweetman AK, Narayanaswamy BE, Jones DOB, Ingels J, Hansman RL. 2014. Ecosystem function and services provided by the deep sea, Biogeosciences [Internet]. [cited 2019 Jan 9];11:941-3963. Available from: https://doi.org/10.5194/bg-11-3941-2014.

sediments and helps to mitigate climate change caused by these greenhouse gases.[18,19] Scientists are just beginning to understand these microbial communities and their critical role in the global carbon cycle. We do not currently have a comprehensive understanding of how these communities may react to localized or widespread disturbances to the deep-sea benthos.

Nutrient cycling is also an important component of these benthic communities. Nutrient cycling converts critical nutrients like nitrogen and phosphorus into biologically-useable forms that support the growth and reproduction of marine organisms.[20] The slope ecosystem also supports habitat-forming macro-invertebrates such as sponges and corals, which support commercially-important species of groundfish. Living organisms such as sponges, sea pens, gorgonians and other types of coral provide three-dimensional structure. This bio-genic shelter protects against predators and currents and provides firm substratum and increased food supply. These areas also are generally associated with high densities and diversity of fishes.[21]

Demersal and benthic fish habitat within the Call Areas largely consists of soft sediment and is likely muddy sea bottom with occasional rocky outcrops. The Pacific Fisheries Management Council (PFMC) has designated Habitat Areas of Particular Concern (HAPC), which are subsets of Essential Fish Habitat (EFH) that have a particularly important ecological role in fish life cycles or are especially sensitive, rare or vulnerable. HAPCs should be considered high priority areas for conservation because they are "rare, sensitive, stressed by development, or important to ecosystem function."[12] While the HAPC designation does not afford additional protections, the designation helps resource managers prioritize and focus their conservation efforts.[22] Overlap with HAPC occurs in all three Call Areas – in Humboldt it is 6.9 square nautical miles (nm^2); in Morro Bay, 39.3 nm^2, and in Diablo 231 nm^2 (See Figure 1 below).

In addition to overlapping with existing HAPC, the National Oceanic and Atmospheric Administration (NOAA) National Deep-Sea Coral and Sponge Database, comprising data from 1842 to the present day, identifies coral and sponge resources within all three Call Areas.[23] These resources have slow growth rates and are long-lived species that provide habitat for a range of other species including important commercial species like deep-living rockfishes and thornyheads. As an example, Black coral (Order Antipatharia) are extremely slow growing and long lived and have been aged to 174 years old in California, though likely live much longer – some species of black coral in other areas have been aged to over 1000 years old.[24]

The PFMC manages a total of 119 commercially-caught fish species off the California coastline under four fishery management plans: salmon, groundfish, Coastal Pelagic Species (CPS) and Highly Migratory

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[18] Wallmann K, Piñero E, Burwicz, E, Haeckel M, Hensen C, Dale A, Ruepke L. 2012. The Global Inventory of Methane Hydrate in Marine Sediments: A Theoretical Approach. Energies [Internet]. [cited 2019 Jan 9];5. Available from: doi:10.3390/en5072449

[19] Orcutt BN, Sylvan JB, Knab NJ, Edwards KJ. Microbial ecology of the dark ocean above, at, and below the seafloor. 2011. Microbiol Mol Biol Rev [Internet]. [cited 2019 Jan 9];75(2):361-422. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3122624/

[20] Bristow LA, Mohr W, Ahmerkamp S, Kuypers MMM. **2017** Nutrients that limit growth in the ocean. **Curr**. Biol. [Internet]. [cited 2019 Jan 9];27:74-478. Available from: https://www.sciencedirect.com/science/article/pii/S0960982217303287

[21] Buhl-Mortensen L, Vanreusel A, Gooday AJ, Levin LA, Priede IG, Buhl-Mortensen P, Gheerardyn H, King NJ, Raes M. 2010. Biological structures as a source of habitat heterogeneity and biodiversity on the deep ocean margins. Marine Ecology [Internet]. [cited 2019 Jan 9];31:21-50. Available from: doi:10.1111/j.1439-0485.2010.00359.x

[22] NOAA Fisheries West Coast Region: Essential Fish Habitat. National Oceanic and Atmoshpheric Administration [Internet]. [cited 9 Jan 2019]. Accessible from : https://www.westcoast.fisheries.noaa.gov/habitat/fish_habitat/hpac.html

[23] NOAA National Deep-Sea Coral and Sponge Database 1842 – present [Internet]. National Oceanic and Atmospheric Administration [cited 2019 Jan 9]. Available from: https://catalog.data.gov/dataset/noaa-national-deep-sea-coral-and-sponge-database-1842-present. Information is based on observations from trawl surveys, by-catch data and other scientific surveys

[24] Love M, Yoklavich M, Black B, Andrews A. 2007. Age of black coral (Antipathes dendrochristos) colonies, with notes on associated invertebrate species. BULLETIN OF MARINE SCIENCE [Internet]. [cited 2019 Jan 14];80:391-400. Available from: https://www.researchgate.net/publication/228350918_Age_of_black_coral_Antipathes_dendrochristos_colonies_with_notes_on_associated_invertebrate_species

Species (HMS).[25] Many of the fishing grounds of these species overlap with all three Call Areas.[26] Coastal fish stocks in the region comprise a minority of the fish biomass of the region. The fish species and stocks that harvest the massive productivity of this region are primarily migrating species.[27] CPS, such as sardines, anchovy and mackerel, are generally found from the surface down to approximately 1000 m, but are not solely associated with the seafloor. HMS, such as sharks and tunas, are pelagic species that have wide geographic distributions and undertake migrations of significant but variable distances for feeding and reproduction purposes.

In contrast to many demersal species, CPS and HMS are generally not ecologically linked to seafloor habitat features.[28] Determination of EFH for CPS and many HMS are largely based upon a thermal range bordered within the geographic area where a CPS species is present at any life stage. EFH for these species is therefore derived from distributional (presence/absence) data, oceanographic data (e.g., sea surface temperatures) and relationships between oceanographic variables.[29]

Along the California coastline, abiotic habitat varies greatly between seasons and years and often determines prey abundance of CPS and HMS species.[30] Abiotic habitat fluctuations are also strongly impacted by El Niño/La Niña cycles and the Pacific Decadal Oscillation (PDO).[31] This variability means that the abundance of CPS and HMS along the California coast also varies greatly between seasons and years. The most well-known example of this is the fluctuation in abundance of sardine and anchovy species.[32] The significance of the spatial and temporal variability in CPS and HMS abundance means that impacts caused by offshore wind farm development on these populations will be difficult to quantify, particularly in short term. Without due consideration of the importance of the interactions between CPS and HMS with wind farm developments, consequences will likely be ecosystem-wide due to the important role they play as prey species for mammals and birds and in food web structure respectively.[33]

The habitat features of CPS and HMS may be dynamic because their habitat is associated with fronts, upwellings, and downwellings. This habitat fluidity means that CPS and HMS often appear in different areas from year to year depending on abiotic habitat conditions (e.g., temperature, productivity, etc.). In contrast, groundfish species are more closely tied to fixed habitat structures and generally experience lower levels of abiotic habitat variability as compared to CPS and many HMS. For this reason, it is easier to define fixed habitat areas for groundfish species than for CPS and HMS. As such, much of the California coast has been designated EFH for sheepshead, sturgeon skate and steelhead. It should, however, be noted that benthic habitat is important for some CPS during certain stages of their life cycle. For example, market squid needs benthic substrate to attach their egg cases to, although this is usually in much shallower, coastal water than the Call Areas (e.g., Monterey Bay, Carmel Bay and the Channel Islands).[34]

[25] http://www.fisherycouncils.org/pacific/
[26] Although much of the general information presented herein relates to all fish species in the Call Areas, Groundfish are discussed in terms of HAPC.
[27] Parrish, Nelson & Bakun, Transport Mechanisms and Reproductive Success of Fishes in the California Current. Biological Oceanography, 1981.
[28] Note: although many shark species are classified as demersal and HMS, they are often wide ranging foragers.
[29] https://www.westcoast.fisheries.noaa.gov/publications/habitat/essential_fish_habitat/coastal_pelagic_appendix_d.pdf
[30] https://www.westcoast.fisheries.noaa.gov/publications/habitat/essential_fish_habitat/coastal_pelagic_krill_appendix_12.pdf
[31] https://sealevel.jpl.nasa.gov/science/elninopdo/
[32] Chavez et al. From Anchovies to Sardines and Back: Multidecadal Change in the Pacific Ocean. Science. 2003.
[33] Andrew F. Johnson. MarEcoFish. Personal communication..
[34] Zeidberg et al. Estimation of spawning habitats of market squid (Doryteuthis opalescens) from field surveys of eggs off Central and Southern California. Marine Ecology. 33(3):1-11 · 2011

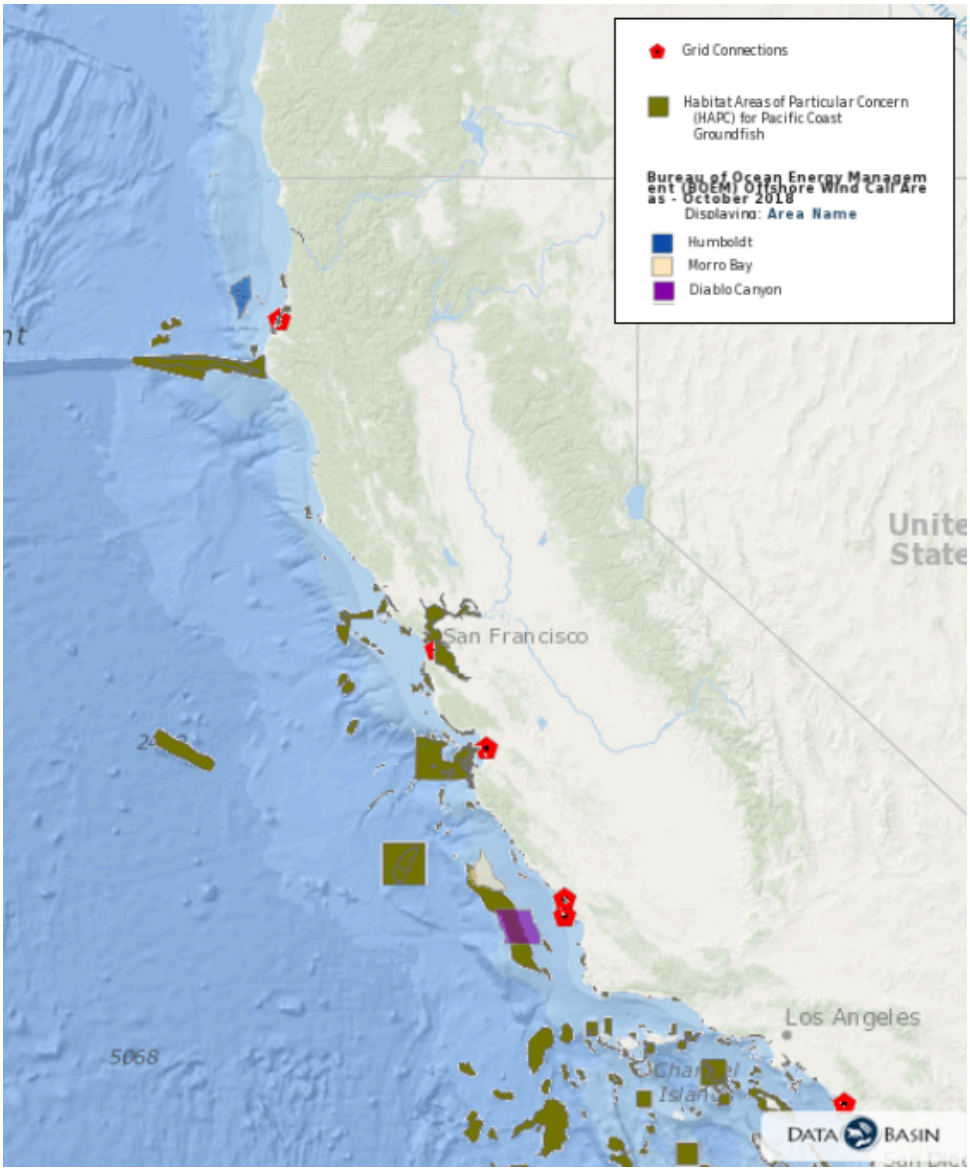

Figure 1. Bureau of Ocean Energy Management (BOEM) Offshore Wind Call Areas with the Pacific Fisheries Management Council (PFMC) Habitat Areas of Particular Concern (HAPC) for Groundfish showing overlap with the Humboldt, Morro Bay and Diablo Call Areas.

The information presented in Table 1 for CPS and HMS –all of which are commercially caught species– show the wide distribution of fishing activity off the California coast. California's recreational fisheries effort is concentrated on the near-shore OCS while the commercial fisheries effort extends further offshore. Since all three Call Areas begin between approximately 19-24 nm offshore and extend between 32-49 nm offshore, it is likely that there will be significant overlap with commercial fisheries effort in some form, whether it be active fishing or fishing vessel transits through the Call Areas.

Species name		General distribution	Presence in call area (2016*)			Important forage species	Notes
Common	Scientific		Diablo Canyon	Morro Bay	Humboldt		
Pacific sardine[35]	*Sardinops sagax*	Mexico to Alaska	Med.	Med.	Low	Yes	Appear seasonally in north
Pacific (chub) mackerel[36]	*Scomber japonicus*	Mexico to Alaska	High	High	Low	Yes	Most abundant south of Point Conception
Northern anchovy[37]	*Engraulis mordax*	Mexico to British Columbia	High	High	Low	Yes	N, central & S subpopulations
Jack mackerel[38]	*Trachurus symmetricus*	Mexico to Alaska	High	High	High	Yes (only smaller Y1-Y2 individuals)	Most abundant S California. Offshore late spring to early fall
Market Squid[15]	*Doryteuthis opalescens*	Mexico to Alaska	Med.	Med.	High	Yes	Most abundant between Baja and Monterey Bay

Table 1. Coastal Pelagic Species (CPS) present off the California coast. Data based on relative, approximate extractions from Pacific Fisheries Management Council (PFMC) stock assessment reports.[39] Data for market squid comes from 2001.[40]

Group	Species name		West coast US distribution		
	Common	Scientific	Juvenile	Adults	Adult SST range
Sharks	Common Thresher	*Alopias vulpinus*	Occur within 2 to 3 miles of the coast. Santa Barbara county through to Monterey Bay. Near surface waters.	Range extends north to Columbia River mouth	13 to 25°C
	Pelagic Thresher	*Alopias pelagicus*	South of Mexican border	Santa Rosa - Cortes ridge, San Diego - Long Beach	14 to 28°C
	Bigeye Thresher	*Alopias superciliosus*	Southern California coastal waters	South of Monterey Bay to San Diego	15 to 24°C
	Shortfin Mako	*Isurus Oxyrhinchus*	Mexico to San Francisco coastal waters	Channel Islands and outer banks of Southern California Bight	15 to 25°C
	Blue Shark	*Prionace glauca*	Oceanic waters – Mexico to Alaska		8 to 21°C
Tunas	Albacore	*Thunnus alalunga*	Oceanic waters – Mexico to Alaska		15 to 19°C

[35] http://www.pcouncil.org/wp-content/uploads/2017/05/Appendix-C-2017-sardine-assessment-NOAA-TM-NMFS-SWFSC-576.pdf
[36] http://www.pcouncil.org/wp-content/uploads/2017/05/Appendix-B-2017-Pacific-Mackerel-Projection-Estimate.pdf
[37] https://www.pcouncil.org/coastal-pelagic-species/fishery-management-plan-and-amendments/northern-anchovy-fmp/
[38] https://www.pcouncil.org/coastal-pelagic-species/current-season-management/#monitored
[39] https://www.pcouncil.org/coastal-pelagic-species/background-information/
[40] Final Market Squid Fishery Management Plan (Final MSFMP) Section 1 - 18 Chapter 2. Background: A Description of the Species, the Fishery, and Social and Economic Components of the Market Squid Fishery. 2005.

	Bigeye	*Thunnus obesus*	Oceanic waters – Mexico to Point Conception / Monterey Bay		10 to 15°C
	Northern Bluefin	*Thunnus orientalis*	Mexico to Canada	No regular habitat inside US West coast EEZ	17 to 23°C
	Skipjack	*Katsuwonus pelamis*	No regular habitat inside US West coast EEZ	Oceanic waters – Mexico to Point Conception	18 to 33°C
	Yellowfin	*Thunnus albacares*	Oceanic waters – Mexico to Point Conception	No regular habitat inside US West coast EEZ	18 to 31°C
Other*	Striped Marlin	*Tetrapturus audax*	No regular habitat inside US West coast EEZ	Mexico to Point Hueneme	20 to 25°C
	Broadbill swordfish	*Xiphias gladius*	Mexico to Oregon	Southern and Central California	25 to 29°C
	Dorado / Mahimahi	*Coryphaena hippurus*	Coastal waters Mexico to Santa Rose-Cortes Bank	Oceanic waters – Mexico to Point Conception	19 to 24°C

Table 2. Commercially caught, Highly Migratory Species (HMS) present off the California coast[41]. *Other may also include Opah (*Lampris guttatus*) and Basking (*Cetorhinus maximus*), Megamouth (*Megachasma pelagios*) and Great White (*Carcharadon carcharias*) sharks.

Current HAPC types – estuaries, canopy kelp, seagrass, rocky reefs and "areas of interest"[42] – do not include a specific pelagic classification. If attempts are made to demarcate areas of special interest for California's CPS and HMS relative to the Call Areas, the important connection between banks, canyons and seamounts and oceanic productivity is an important consideration.

The mobile habitat and variable geographic distributions of CPS and HMS mean that attempting to specifically demarcate areas of fish presence for CPS along the California coast is a difficult task. Historic catch records of CPS and HMS show a wide distribution within and between species that varies temporally. For this reason, at the time of this letter, scientists believe it is not possible to specifically demarcate areas of importance for one CPS or HMS over another at a resolution of the Call Areas.[43]

Instead, we summarize the main CPS and note their abundance in each call area based on the latest NOAA stock assessments (2016) (Table 1) and note the approximate distributions of HMS based on the best available NOAA reporting (Table 2).

Call Area	Commercial fishery restriction	EFH	EFH Conservation Area
Diablo Canyon	Yes	Yes	Yes
Morro Bay	Yes	Yes	Yes
Humboldt	No	Yes	No

Table 3. Approximate distances of Call Areas offshore and their overlap with extant commercial fishery restrictions, Essential Fish Habitat (EFH) and EFH Conservation Areas.

[41] https://www.westcoast.fisheries.noaa.gov/publications/habitat/essential_fish_habitat/highly_migratory_species_appendix_f.pdf
[42] This includes submarine features such as banks, seamounts, and canyons
[43] Johnson, Andrew F for MarFishEco. Final Fish and Fisheries report prepared for NRDC.

The Diablo Canyon and Morro Bay Call Areas already have some commercial fishery restrictions in place while the Humboldt Call Area does not. Similarly, while all Call Areas overlap with EFH designations, only the Diablo Canyon and Morro Bay Call Areas overlap with EFH Conservation Areas, which are areas closed to specific types of fishing.

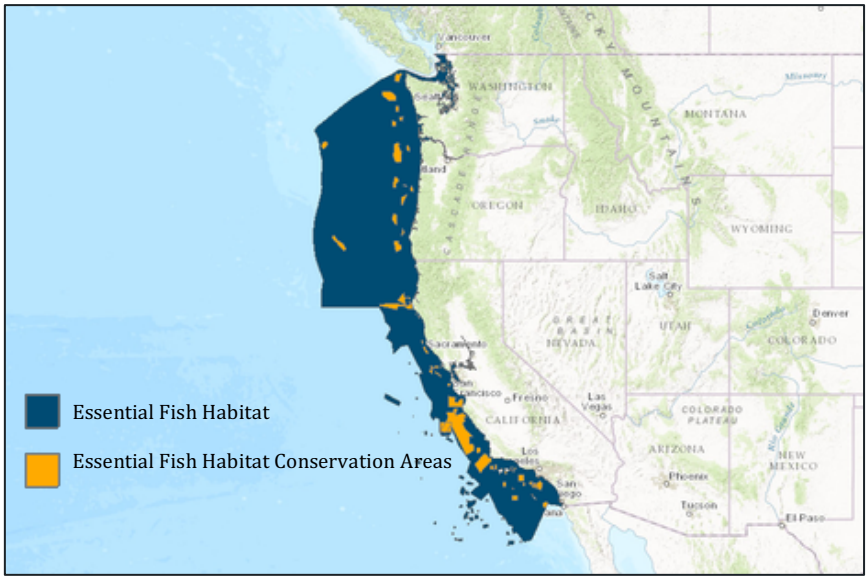

Figure 2. Map showing areas designated Essential Fish Habitat (EFH) and Essential Fish Habitat Conservation Areas. (Map adapted from databasin.org)

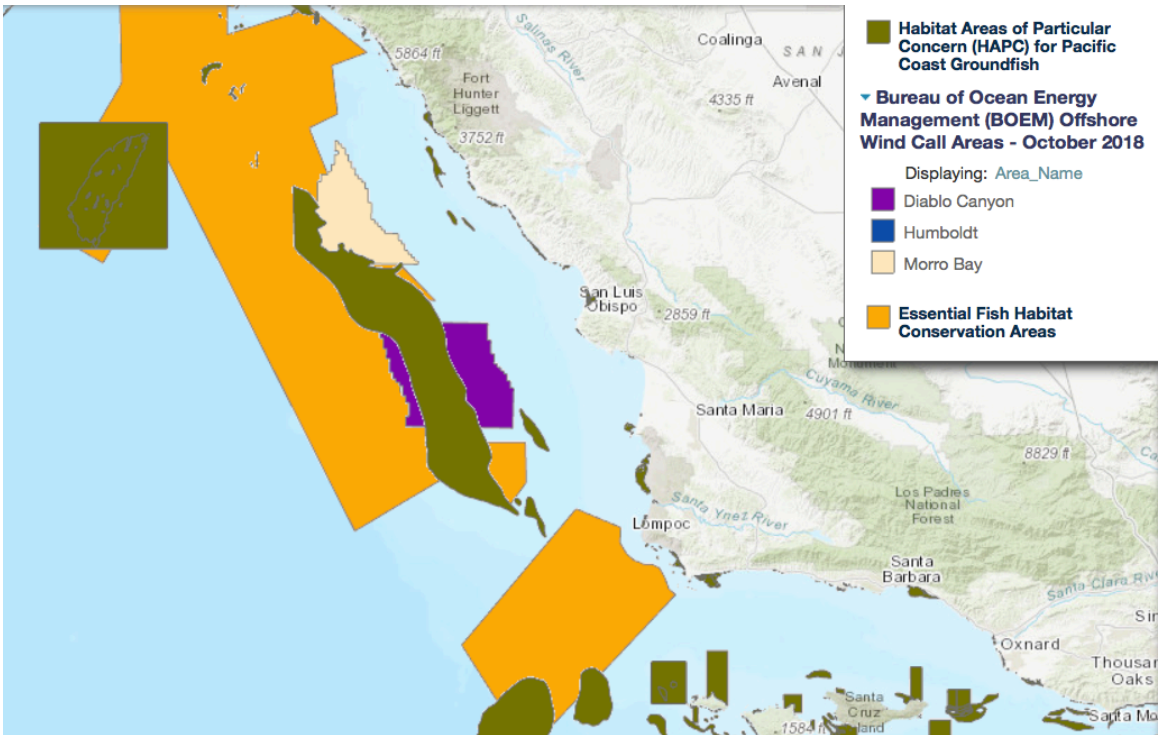

Figure 3. Map showing Habitat Areas of Particular Concern **(**HAPC) and Essential Fish Habitat (EFH) Conservation Areas overlay with Morro Bay and Diablo Canyon Call areas. (Map adapted from databasin.org.)

Seabirds

Conspicuous and ubiquitous marine vertebrates, seabirds have long been recognized as valuable ecosystem indicators,[44] and observations of seabirds can, for example, provide information on oceanographic conditions,[45] ecosystem variability,[46] prey availability,[47] and ecosystem shifts due to ocean warming.[48] Further, as a group, they play a large role in global marine trophic webs as top consumers—for example, three species from the CCE can consume >60,000 metric ton of forage fish in a single breeding season.[49] Seabirds species, in general, are k-selected: they tend to live a very long-time and raise a single chick when they breed, meaning that population trajectories rely on high adult survival so that individuals can cumulatively accrue reproductive fitness over a long lifetime. Thus, similar to other long-lived taxa such as marine mammals and some fish groups, premature mortality of adults from human impacts can lead to population decline. Almost 30 percent of the world's seabird species are globally threatened, and the majority of populations are in decline.[50] Indeed, a study by Paleczny *et al.* (2015) demonstrated a 70 percent decline in the world's monitored seabirds, with the most prominent declines in pelagic seabirds.[51] The rapidly-deteriorating status of the world's seabirds has led to calls for urgent policy changes to address the major threats to seabirds, which include fisheries bycatch, habitat loss, invasive species, contamination, and climate change.[52]

Over 75 species of seabirds frequent the CCE, including year-round residents, seasonal residents, or long-distance migrators *en route* to breeding or wintering grounds. While many species exploit waters close to shore, many prefer to forage in offshore waters at or beyond the continental shelf[53] following concentrations of prey that can often occur far offshore in the CCE.[54]

Important Bird Areas (IBAs) occur directly east along the coastline from all three Call Areas, at distances of <16.2 nm shoreward. Because of the vicinity of the Call Areas to regions of significant biological importance to seabirds, the seabird populations that rely on these habitats may be at an increased risk for negative impacts from offshore wind energy infrastructure (OWEI), including possible collision, habitat displacement, barrier effects, and contamination.

Using a predictive model constructed from seabird occurrence data and environmental covariates, Nur *et al*. (2011) identified spatially-restricted seabird hotspots throughout the extent of the CCE, including regions off Cape Mendocino (near the Humboldt Call Area),[55] as well as around the Channel Islands (near

[44]Furness and Camphuysen (1997), "Seabirds as Monitors of the Marine Environment"; Piatt and Sydeman (2007), "Seabirds as Indicators of Marine Ecosystems."
[45] Santora et al. (2017), "Biogeography of Seabirds within a High-Latitude Ecosystem: Use of a Data-Assimilative Ocean Model to Assess Impacts of Mesoscale Oceanography."
[46] Gagne et al. (2018), "Trophic Signatures of Seabirds Suggest Shifts in Oceanic Ecosystems."
[47] Lyday et al. (2015), "Shearwaters as Ecosystem Indicators: Towards Fishery-Independent Metrics of Fish Abundance in the California Current"; Kitaysky, Piatt, and Wingfield (2007), "Stress Hormones Link Food Availability and Population Processes in Seabirds."
[48] Carpenter-Kling et al. (2019), "Gentoo Penguins as Sentinels of Climate Change at the Sub-Antarctic Prince Edward Archipelago, Southern Ocean."
[49] Warzybok et al. (2018), "Prey Switching and Consumption by Seabirds in the Central California Current Upwelling Ecosystem: Implications for Forage Fish Management."
[50] IUCN (2019)
[51] Paleczny et al. (2015), "Population Trend of the World's Monitored Seabirds, 1950-2010."
[52] McCauley et al. (2015), "Marine Defaunation: Animal Loss in the Global Ocean."
[53] Allen, Pondella, and Horn (2006), *The Ecology of Marine Fishes: California and Adjacent Waters*. California's Continental Shelf ranges from 0.27 nm to 97.2 nm offshore.
[54] Ainley et al. (2015), "Seabird Flight Behavior and Height in Response to Altered Wind Strength and Direction."
[55] Nur et al. (2011), "Where the Wild Things Are : Predicting Hotspots of Seabird Aggregations in the California Current System"

the Morro Bay Call Area). Additionally, an analysis of seabird abundance data from shipboard transects in the southern CCE and also found persistent hotspots of seabird abundance in the Southern California Bight, as well as north of Point Conception near the proposed Morro Bay Call Area.[56] Over 15 species breed in southern and central California, primarily in the Channel Islands of the Southern California Bight and on southeast Farallon Island off the coast of San Francisco. In the higher latitudes of the CCE, the region north and northwest of Cape Mendocino is another significant region of seabird breeding and foraging activity[57] and is commonly frequented by two out of the three species of North Pacific albatross. Another notable location of seabird importance on the northern California coast is Castle Rock, the second largest seabird colony in California, which hosts large colonies of breeding storm-petrels, cormorants, and alcids, located ~40.5 nm north of the Humboldt Call Area. This distance from the Humboldt Call Area is well within the possible flight range of most foraging seabird species.

Marine Mammals and Sea Turtles

The CCE boasts the presence of an extensive diversity and density of large marine species including marine mammals and sea turtles.[58] This range and abundance of large marine species creates unique challenges for offshore wind energy development. Large baleen whales including blue (*Balaenoptera musculus*), grey (*Eschrichtius robustus*), humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), minke (*Balaenoptera acutorostrata*), and North Pacific right (*Eubalaena japonica*) inhabit the area. Additionally, the CCE boasts populations of sperm, killer, sei and multiple species of beaked whales – all of which of are protected under the Endangered Species Act and/or Marine Mammal Protection Act. The CCE also hosts high densities of a number of pinniped and dolphin species.

Within California waters, NOAA has designated Biologically Important Areas (BIAs) for a number of whale species. BIAs are areas identified by expert consultation to be reproductive areas, feeding areas, migratory corridors, and areas in which small and resident populations are concentrated (See Figure 4). They are identified using available data sources, including boat-based and aerial survey data, tracking data and expert opinion.[59] BIAs have an outsized importance in the feeding habitat for cetaceans—although the areas comprise less than five percent of the overall West Coast area, the vast majority of sightings for each species (77 to 89 percent) occur within BIAs.[60]

Because of this unique assemblage of large whales and their conservation status, there are additional environmental concerns for offshore wind development, and the potential need for additional caution in California waters that do not exist in European waters where most offshore wind energy – and the only floating turbine development – currently exists.

[56] Santora and Sydeman (2015). , "Persistence of Trophic Hotspots and Relation to Human Impacts within an Upwelling Marine Ecosystem."
[57] Nur et al. (2011), "Where the Wild Things Are : Predicting Hotspots of Seabird Aggregations in the California Current System"; Sowls et al. (1980), "Catalog of California Seabird Colonies"; Guy et al. (2013), "Overlap of North Pacific Albatrosses with the U.S. West Coast Groundfish and Shrimp Fisheries."
[58] Block, B.A., Jonsen, I.D., Jorgensen, S.J., Winship, A.J., Shaffer, S.A., Bograd, S.J., et al. (2011). Tracking apex marine predator movements in a dynamic ocean. *Nature* 475(7354)**,** 86-90. doi: 10.1038/nature10082.
[59] Calambokidis, J., Steiger, G.H., Curtice, C., Harrison, J., Ferguson, M.C., Becker, E., et al. (2015). 4. Biologically important areas for selected cetaceans within US waters-west coast region. *Aquatic Mammals* 41(1)**,** 39.
[60] Id.

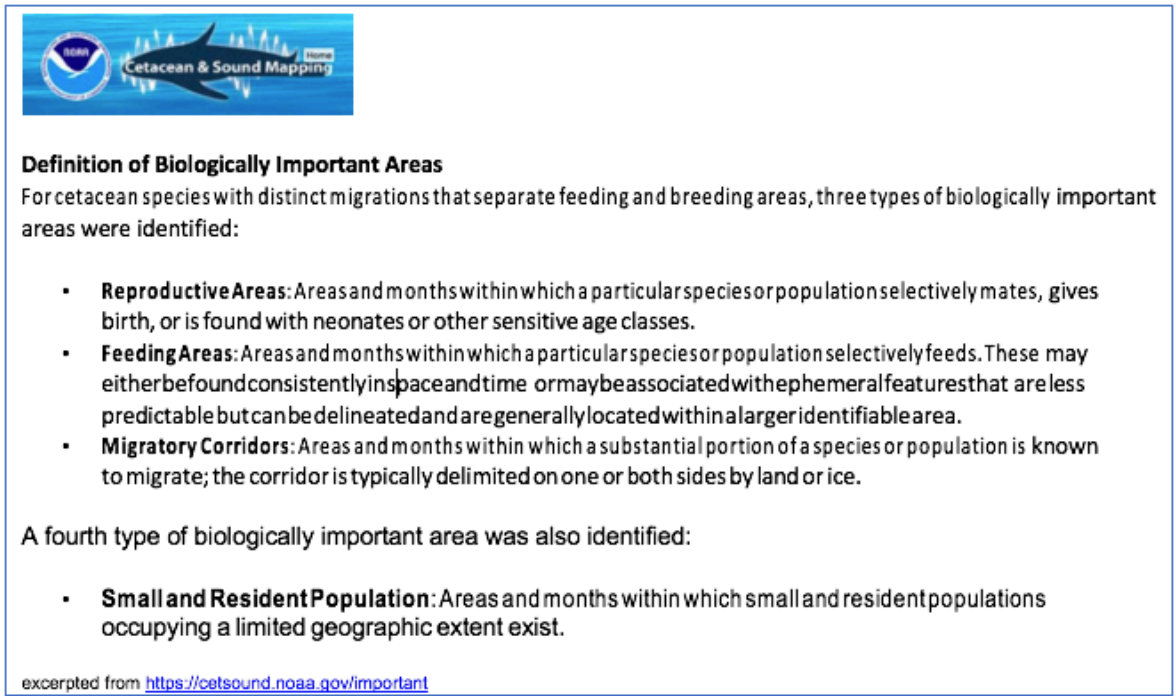

Figure 4. National Oceanic and Atmospheric Administration (NOAA) definition of Biologically Important Areas (BIAs). Excerpted from CetSound.noaa.gov

IV. POTENTIAL ENVIRONMENTAL RISKS ASSOCIATED WITH FLOATING OFFSHORE WIND TECHNOLOGY

Deployment of commercial-scale floating turbines is a recent development. Given that the industry is in early stages, the near- and long-term environmental impacts are largely unknown. Floating offshore wind turbines may have deleterious impacts on marine wildlife through: habitat loss; collision with turbines and project-associated vessels; entanglement; operational noise; and electromagnetic fields (EMF). In the proposed Call Areas, the potential for impacts to marine mammals, seabirds, sea turtles, and fish habitat are of particular concern.

BOEM is well-aware that California's deep bathymetry means that floating wind turbines are the only practical offshore wind technology for commercial scale wind farms in California's offshore waters. While there are risks associated with floating technology, floating technology avoids some of the significant environmental impacts of some types of fixed offshore wind platforms. For example, in contrast to the pile driving that may be required for tower installation in shallower depths, floating technology can be anchored using less acoustically impactful anchors or suction buckets.[61] In addition, floating platforms and associated anchors and cables can be fully removed from the environment during decommissioning.[62]

[61] Reifolo L., Lanfredi C., Azzellino A., Tomasicchio G., Felice D, Penchev V., Vicinanza D. Offshore Wind Turbines: An Overview on the Marine Environment, International Society of Offshore and Polar Engineers, 2016.
[62] Id.

Immediately below we describe potential environmental impacts to benthic habitat, fishes, seabirds, and marine mammals of offshore wind development within the CCE in the categories of: habitat loss, collision and entanglement, noise, and EMF.

Habitat Loss

Benthic communities

The chief risk floating technology poses to marine benthic habitat is habitat loss and degradation due to the anchors and attached mooring cables. No floating offshore wind farm studies to date have shown major deleterious effects on benthic communities or reefing fish; however, the time scales over which these devices have been monitored do not enable an examination of whether benthic communities have reached equilibrium or whether reefing communities are in balance with nearby populations.[63] Studies of pile-driven offshore wind farms areas in Europe indicate that development does cause shifts in the macrobenthic community,[64] suggesting that this may also be a concern for floating technologies.

Research indicates that mooring lines and anchors may not remain in the same place, particularly in high sea states. Models have indicated that mooring lines may move across the seafloor, thereby affecting benthic habitat, in direct relation to increasing wave height. For example, in an experiment with six meter (m) waves, more than 60 square miles of benthic habitat were affected.[65] At offshore wind farms, the interaction between turbine foundations and local hydrodynamics affect sediment characteristics by reducing flow and preventing the re-suspension of finer sediments and sand around a device.[66] In addition, alteration of the natural hydrodynamics near turbine foundations can result in bottom scour.[67] Bottom surveys of any project areas will be necessary to fully assess potential impacts to benthic habitat. The nautical charts of the area indicate that the bottom is mud and/or clay, yet data on the Call Areas' bottom profile and habitat composition are sparse.[68]

The benthic footprint and level of impact will depend entirely on the type of system selected and the exact location of deployment. Our cursory assumption based on the depths of the Call Areas, is that all types of floating offshore wind energy platforms (semi-submersible, spar-buoy, tension leg), moorings (taut-leg, catenary, semi-taut) and anchoring systems (drag-embedded, driven pile, suction pile, gravity anchor) could be used.[69] It will be important to consider that impacts vary depending on the type of platform, moorings and anchoring developers utilize. A taut-leg mooring system coupled with suction pile anchors

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[63] De Backer, A., Van Hoey, G., Coates, D., Vanaverbeke, J., and Hostens, K. 2014. Similar diversity-disturbance responses to different physical impacts: Three cases of small-scale biodiversity increase in the Belgian part of the North Sea. Marine Pollution Bulletin 84(1-2):251 262. doi: 10.1016/j.marpo1bul.2014.05.006.
Lindeboom, HJ, et al. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone: a compilation. Environmental Research Letters 2011; 6(3):035101.
Lindeboom, H., Degraer, S., Dannheim, J., Gill, A., and Wilhelmsson, D. 2015. Offshore wind park monitoring programmes, lessons learned and recommendations for the future. Hydrobiolgia 756:169 180. doi: 10.1007/ s10750-015-2267-4.

[64] De Backer et al. 2014.
Coates, DA., Deschutter, Y., Vincx, M., and Vanaverbeke, J. 2013. Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea. Marine Environmental Research 95: 1-12.

[65] Krivtsov, V., and Linfoot, B. 2012. Disruption to benthic habitats by moorings of wave energy installations: A modelling case study and implications for overall ecosystem functioning. Ecological Modelling 245:121 124. doi:10.1016/j.ecolmodel.2012.02.025, http://tethys.pnnl.gov/publications/disruption-benthic-habitats-moorings-wave-energy-installations-modelling-case-study.

[66] Coates, D. A., Deschutter, Y., Vincx, M., and Vanaverbeke, J. 2014. Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea. Marine Environmental Research 95:1 12. doi: 10.1016/j.marenvres.2013.12.008.

[67] Chen, L., Lam, W., and Shamsuddin, A. 2013. Potential Scour for Marine Current Turbines Based on Experience of Offshore Wind Turbine. Paper Presented at the International Conference on Energy and Environment 2013, Putrajaya, Malaysia; Copping et al. 2016.

[68] NOAA Nautical Chart 18700, Point Conception to Point Sur and NOAA Nautical Chart 18620 Point Arena to Trinidad Head.

[69] Rhodri J, Costa Ros M. 2015. Floating Offshore Wind: Market and Technology Review: Prepared for the Scottish Government [Internet]. [cited 2019 Jan 9]. Available from: https://www.carbontrust.com/media/670664/floating-offshore-wind-market-technology-review.pdf

would have the smallest benthic footprint and should be assessed to determine if this combination is appropriate for the conditions in the Call Areas.

Fish
As described in Section III, habitat for CPS and HMS is largely defined by water temperature and can be highly variable between seasons and years. The thermal habitat preferences of CPS and HMS are not likely to be impacted by the offshore windfarm development as the presence of the floating turbines and moorings will unlikely change local water temperatures significantly, with the exception of having some shading effects due to offshore wind platforms.[70] It is noteworthy that increased sedimentation during construction and regular operations and maintenance from seabed disturbance may have an impact on demersal and benthic fish species. There may be impacts on pelagic species if certain life stages of CPS or HMS use benthic habitat for spawning or egg-laying.[71]

Marine mammals
While there is little data or knowledge on how marine mammals will respond to the permanent introduction of physical structures, such as mooring lines and cables resulting from offshore wind development, or the surface platforms, some research indicates that if enough large static objects are placed in the marine environment, larger marine mammals may avoid the area altogether, keeping them from important feeding, mating, rearing, or resting habitats, or from vital movement and migratory corridors.[72]

Seabirds
Offshore wind projects have the potential to harm birds through disturbance and habitat loss or damage.[73] Disturbance to birds can occur during wind farm construction and continue due to post-construction operations and maintenance (O&M) activities. These disturbances may lead directly to expulsion and thus loss of territory for certain species of birds. For example, research at Horns Rev offshore wind farm located in Denmark's offshore waters found that changes in distributions of divers, common scoter, and common guillemot/razorbills were observed, and these species of birds tended to avoid the wind farm site and the two and four km zones around the wind farm.[74] Conversely, some species, such as gull and tern, showed a preference for the wind farm area in this study, possibly increasing risk of collision for selected species.

Some bird species are known to actively change course to travel around perimeters of wind-farms and/or avoid the area in response to increased ship traffic. This avoidance can lead to increased energetic costs when traveling to and from breeding/foraging sites[75] and result in a functional loss of habitat.[76] This would be especially true if more wind farms were built in the foraging areas or along the migration routes

[70]Offshore wind farms and marine mammals: impacts & methodologies for assessing impacts - https://tethys.pnnl.gov/sites/default/files/publications/Offshore_Wind_Farms_EC_Workshop.pdf
[71] Andrew F. Johnson, MarEcoFish.
[72] Malcolm, I., Godfrey, J., and Youngson, A. 2010. Review of Migratory Routes and Behaviour of Atlantic Salmon, Sea Trout and European Eel in Scotland's Coastal Environment: Implications for the Development of Marine Renewables. Report published by Marine Scotland Science, Caithness, UK. Pp. 77.
[73] Snyder B, Kaiser MJ. Ecological and economic cost-benefit analysis of offshore wind energy. Renewable Energy 2009;34(6):1567e78.
Sun X, Huang D, Guoqing W. The current state of offshore wind energy technology development. Energy 2012; 41:298-312.
[74] Petersen IK, Christensen TK, Kahlert J, Desholm M, Fox AD. Final results of bird studies at the offshore wind farms at Nysted and Horns Rev, Denmark. Denmark: Report to Dong Energy and Vattenfall A/S, National Environmental Research Institute; 2006.
http://www.folkecenter.net/mediafiles/folkecenter/pdf/Final_results_of_bird_studies_at_the_offshore_wind_farms_at_Nysted_and_Horns_Rev_Denmark.pdf.
[75] Drewitt and Langston (2006), "Assessing the Impacts of Wind Farms on Birds"; Masden et al. (2010), "Barriers to Movement: Modelling Energetic Costs of Avoiding Marine Wind Farms amongst Breeding Seabirds"; Masden et al. (2009), "Barriers to Movement: Impacts of Wind Farms on Migrating Birds."
[76] Furness, Wade, and Masden (2013), "Assessing Vulnerability of Marine Bird Populations to Offshore Wind Farms"; Dierschke, Furness, and Garthe (2016), "Seabirds and Offshore Wind Farms in European Waters : Avoidance and Attraction."

of birds and together cause significant contributions to cumulative impacts, as suggested by some studies.[77] Increased energetic costs can have observable impacts on adult condition and reproductive success, particularly during the breeding season. Increased energetic costs can also have population-level impacts during the non-breeding season in years of poor ocean conditions. The demographic consequences of disturbance on populations should be modeled for species of high-displacement risk.[78] Mendel *et al.* (2019) recently demonstrated significant changes in distribution patterns of loons after the development of OWEI in the German North Sea. The results showed that loons were likely avoiding both turbine footprints and the associated increased ship traffic.[79]

While some species are displaced by OWEI through avoidance (e.g., loons, gannets, divers, fulmars), other species may be attracted to turbines for opportunities for roosting, preening, and socializing (e.g., cormorants, gulls).[80] Some vessel-attracted species such as gulls, may also be attracted to OWEI areas due to increased shipping traffic. Further, fouling species that colonize the base of wind turbines may create an artificial reef, resulting in increased feeding opportunities within an offshore wind development. Fish may be attracted to these bases due to the reef effect as well as shelter from fishing vessels. Consistent with this prediction, seabirds have been observed feeding within OWEI—their presence has been attributed to increased fish stocks aggregating around offshore wind platforms.[81]

Collision and entanglement risk

Marine Mammals – Collision

There is no direct evidence that large marine mammals are at risk from colliding with turbine platforms, mooring lines, or draped power cables associated with OWEI, or any other existing infrastructure associated with the offshore petrochemical industry, the closest parallel to marine renewables moorings.[82] However, floating wind turbines of this scale have not yet been developed in important habitat for large baleen whales and so the potential impacts to naïve animals remain unforeseen. While fixed submerged structures are likely to pose little collision risk, cables, chain, power lines, and components free-moving on the surface or in the water column (i.e., the mooring lines and cables of floating turbines) will pose a much higher risk of collision.[83]

Collisions with ships are currently a leading cause of baleen whale mortality on the West Coast.[84] Increased vessel traffic associated with site assessment, construction, and operations and maintenance poses an increased ship strike risk for marine mammals, and particularly baleen whales. The risk of serious injury and mortality from a collision with a vessel significantly increases when that vessel is traveling at a speed of 10 knots or greater.[85] BOEM should carefully consider adopting regulatory

[77] Id.
[78] Pirotta et al. (2018), "Understanding the Population Consequences of Disturbance."
[79] Mendel et al. (2019), "Operational Offshore Wind Farms and Associated Ship Traffic Cause Profound Changes in Distribution Patterns of Loons (Gavia Spp.)."
[80] Dierschke, Furness, and Garthe (2016), "Seabirds and Offshore Wind Farms in European Waters : Avoidance and Attraction."; Leopold, Dijkman, and Teal, L. (2011). "Local birds in and around the Offshore Wind farm Egmond aan Zee (OWEZ) (T-0 & T-1, 2002-2010)". NoordzeeWind report
[81] Krijgsveld et al. (2011), "Effect Studies Offshore Wind Farm Egmond Aan Zee"; Vanermen et al. (2011), . "Seabirds & Offshore Wind Farms: Power and Impact Analyses 2010."
[82] Copping et al. 2016.
[83] Wilson, B., Batty, R.S., Daunt, F., and Carter, C. 2007.Collision risks between marine renewable energy devices and mammals, fish, and diving birds. Report to the Scottish Executive, Scottish Association for Marine Science, Oban, Scotland, PA37 1QA; Inger et al. 2009.
[84] Rockwood, R. C., Calambokidis, J., & Jahncke, J. (2017). High mortality of blue, humpback and fin whales from modeling of vessel collisions on the US West Coast suggests population impacts and insufficient protection. *PloS one*, *12*(8), e0183052.
[85] Conn, P. B., & Silber, G. K. (2013). Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. *Ecosphere*, *4*(4), 1-16.

measures to limit the vessel speeds of offshore wind project-associated vessels both within eventual Wind Energy Areas (WEAs) and along primary transit routes.

Marine Mammals – Entanglement

The extensive network of inter-array cables that interconnects turbines to one another and connects the turbines to the floating substation raises questions about the risks of entanglement, and whether this cable network has the potential to disrupt migratory species, such as whales. Large marine animals may be at risk from colliding with or becoming entrapped in dense configurations of mooring lines,[86] particularly in large-scale arrays. Entrapment can be defined as physically trapping a marine animal or causing confusion in or around a set of mooring lines.[87] This is of particular concern for OWEI that are designed to be deployed with multiple mooring lines and inter-array cables in close proximity to each other.

Risk of entanglement as a result of floating offshore wind development has been determined to be relatively modest[88] given that the moorings are tight and constructed of large diameter line or chain—when lines have less curvature than fishing lines for example, the risk of loop creation and subsequent entanglement is relatively low. It is important to note, however, that the inter-array power cables connecting turbines are likely to have greater curvature and will sit roughly 100 m below the surface. It is likely that marine mammal species will be able to detect the large diameter mooring lines, either through echolocation, vibrations detected through vibrissae (in the case of pinnipeds) or basic acoustic detection (hearing) as lines and cables produce noise in proportion to current flow.[89] This detection may occur at a distance to as little as a tenth of a meter. However, how marine mammals, and particularly migratory baleen whales, may respond to a large network of cables within the water column is unknown.

Entanglement risk at floating turbines could be influenced by a number of factors including:[90]

- The geometry of the mooring lines (i.e., taut versus draped)
- The depth of the draping of mooring lines
- Whale behavior near turbines
- Detection of mooring lines, which will be influenced by the configuration and material, used for mooring lines, as well as the extent and type of movement of mooring lines in the water column.

No entanglement in mooring lines or related gear has been reported for floating turbines in Scotland since operation began in October of 2017;[91] killer, long-finned pilot, sperm, fin, and minke whales occur in Scottish waters, although this area does not represent an equivalent high-use migratory corridor for large whales as observed in the CCE.[92] However, large baleen whales are considered to be of the greatest risk because of their large body size and foraging habits, according to a report to the Scottish Government.[93] Baleen whales are particularly sensitive as they forage by feeding with their mouths open and therefore may be entangled through the mouth, and any smaller diameter cables may become lodged behind the jaw or baleen and be difficult to remove without human aid.[94] Species with large appendages such as humpback whales or leatherback turtles also have a greater propensity for entanglement. If entanglement were to occur, it may occur as a result of a lack of detection, or attraction to lines as a result of the aggregating effect of floating objects such as floating turbines. Floating objects, such as turbines, can

[86] Benjamins et al. 2014.
[87] Id.
[88] Id.
[89] Id.
[90] Copping, A., Grear, M., and Sanders, G. (2018). Risk of whale encounters with offshore renewable energy mooring lines and electrical cables [Presentation]. Presented at the Environmental Interactions of Marine Renewables 2018, Kirkwall, Orkney, Scotland, UK.
[91] Personal communication, Caroline Carter, Scottish National Heritage
[92] https://www.nature.scot/sites/default/files/2017-07/Naturally%20Scottish%20-%20Whales%2C%20Dolphins%20and%20Porpoises.pdf
[93] Benjamins et al. (2014).
[94] Id.

serve as attractants to forage fish and their marine megafauna predators and this can be particularly prominent in less productive areas such the Call Areas further offshore. Large whales have also been anecdotally observed using surfaces to rub against to presumably remove parasites or scratch itches, which may increase entanglement risk.[95]

Marine Mammals – Secondary Entanglement

Research indicating that Abandoned, Lost or otherwise Discarded Fishing gear (ALDFG) or other marine debris may become caught among moorings and platforms and pose a secondary entanglement risk is a concern.[96] Floating wind turbines are expected to remain in the marine environment for the operational lifetime of a given project, before either being replaced or decommissioned. If ALDFG or marine debris are held in the water column for extended periods, they would present a novel and significantly heightened entanglement or bycatch risk for a wide range of species, including those otherwise too small to be adversely affected (e.g., pinnipeds, small cetaceans, and seabirds). While little is currently known about the likelihood of this occurring, the potential for secondary entanglement cannot be discounted and requires further research. Entanglement, including that in fishing gears, has been demonstrated to lead to population-level impacts in a number of marine mammal species. For example, on the East Coast, humpback whales are thought to have an up to 12.1 percent annual entanglement rate,[97] with annual severe entanglement rates at 3 percent,[98] and entanglement from fishing gear is the primary driver of the highly endangered North Atlantic right whale's rapid decline.[99]

While offshore wind farms are deployed, the cable and mooring line surfaces will be colonized by many different species of marine algae and invertebrates unless stringent antifouling measures are taken. If such biofouling communities are able to establish themselves and are allowed to develop, the combined mass of such communities may influence the behavior of the moorings over time. The presence of biofouling communities will increase the surface roughness of both devices and moorings and could increase opportunities for derelict fishing gears and other marine debris becoming attached.[100] Such changes could modify existing entanglement risks to marine megafauna.[101]

Seabirds - Collision

Collision is the most conspicuous risk of OWEI to flying seabirds[102] and the risk of such collisions off the coast of California is not well known, making this an important factor for BOEM to consider when evaluating the appropriateness of offering an area for commercial lease. Collision can be a significant enough predicted risk to have previously halted OWEI development at some sites.[103] Notably, results from a large-scale data-intensive study (the "Offshore Renewables Joint Industry Program (ORJIP) Bird Collision and Avoidance Study") determined that seabird-turbine collision rates at offshore wind farms were significantly lower than anticipated due to birds avoiding the wind farms altogether (macro-avoidance).[104] While this is a promising finding, it is important that planners do not extrapolate results from one region to another, since the species composition and regional wind characteristics will be different across regions (and, as discussed above, there may also be detrimental energetic consequences as result of area avoidance or habitat loss).

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[95] Id.
[96] Copping et al. 2016.
[97] Robbins, J. (2009). Scar-based inference into Gulf of Maine humpback whale entanglement: 2003–2006. *Report to National Marine Fisheries Service, Northeast Fisheries Science Center, Woods Hole, MA. NOAA Contract# EA133F04SE0998*.
[98] Robbins, J., and Mattila, D.K. (2001). Monitoring entanglements of humpback whales (Megaptera novaeangliae) in the Gulf of Maine on the basis of caudal peduncle scarring. *Unpublished report to the Scientific Committee of the International Whaling Commission: SC/53/NAH25*.
[99] https://www.fisheries.noaa.gov/species/north-atlantic-right-whale
[100] Id.
[101] Id.
[102] Cook et al. (2018), "Quantifying Avian Avoidance of Offshore Wind Turbines: Current Evidence and Key Knowledge Gaps."
[103] Id.
[104] Skov et al. (2018). "ORJIP Bird Collision and Avoidance Study. Final report – April 2018."

The CCE is frequented by an abundance of Procellariforms, such as albatross, that are very large, gliding seabirds that may not as effectively avoid the areas as other more maneuverable seabirds.[105] Further, even small rates of mortality can have major impacts on species that are of critical conservation concern, such as Short-Tailed Albatross and Ashy Storm-Petrel.

In general, it is thought that the species most vulnerable to collision risk are those whose distributions overlap with wind farms and do not avoid wind farms, that have a greater percentage of flight time within the rotor sweep zone, and that fly at night when visual acuity is poorer.[106] As a first approach to evaluating species-specific risk to OWEI, planners and managers should become familiar with the work of Kelsey *et al.* (2018) and Adams *et al.* (2016). These scientists used a generalized framework to rank seabird species of the CCE based on population vulnerabilities as well as vulnerabilities to wind-turbine collision and displacement.[107] It is then critical that subsequent studies model precise species-specific risks to bird-turbine collision risk using empirical data collected at each site,[108] incorporating wind and wave conditions, seabird behavioral state and detailed flight characteristics, and turbine features, etc. Measurements of flight behavior at sites should also occur in each season, since seasonality will influence behavior and wind/wave conditions, and, accordingly flight characteristics.[109]

Seabirds - Secondary Entanglement
Underwater mooring lines may pose an entanglement risk for diving seabirds if the underwater infrastructure accumulates derelict fishing gear, such as nets and hooks/lines.[110] As discussed for marine mammals, it will be important for scientists to evaluate "snagging risk" of derelict fishing gear on cables within proposed mooring systems for floating turbines. OWEI developers could, for example, follow the recommendations outlined in Benjamins *et al*. (2014) to conduct a qualitative risk assessment that would facilitate risk management and the development of mitigation strategies in early development of OWEI.[111]

Fish – Secondary Entanglement
Secondary entanglement is of particular concern for fish because ALDFG continues to catch marine species. In turn, fish and other creatures caught in the abandoned gear can serve as a bait for other, larger predators, causing more unintended catch and death of these predators. For example, a school of CPS could become caught in an abandoned fishing net that is snagged on a wind turbine platform or mooring line. These CPS then act as bait for larger fish and eventually large HMS that come to feed off these fish and subsequently get caught by the nets. It is likely that with increased biofouling, there will be an increased risk of fishing gear entanglement as the windfarm structures become increasingly textured and rough with marine life. It is important to note that there is a tradeoff between the use of biocides to keep the mooring lines and platforms free from marine life to decrease the risk of gear entanglement and the potential for biocides to leach pollutants.

[105] Ainley et al. (2015), "Seabird Flight Behavior and Height in Response to Altered Wind Strength and Direction."
[106] Kelsey et al. (2018), "Collision and Displacement Vulnerability to Offshore Wind Energy Infrastructure among Marine Birds of the Pacific Outer Continental Shelf"; Adams et al. (2016), "Collision and Displacement Vulnerability among Marine Birds of the California Current System Associated with Offshore Wind Energy Infrastructure."
[107] Kelsey et al. (2018), "Collision and Displacement Vulnerability to Offshore Wind Energy Infrastructure among Marine Birds of the Pacific Outer Continental Shelf"; Adams et al. (2016), "Collision and Displacement Vulnerability among Marine Birds of the California Current System Associated with Offshore Wind Energy Infrastructure."
[108] Ainley et al. (2015), "Seabird Flight Behavior and Height in Response to Altered Wind Strength and Direction."
[109] Id.
[110] Benjamins et al. (2014), "Understanding the Potential for Marine Megafauna Entanglement Risk from Marine Renewable Energy Developments." Scottish Natural Heritage Commissioned Report No. 791
[111] Benjamins et al. (2014), "Understanding the Potential for Marine Megafauna Entanglement Risk from Marine Renewable Energy Developments." Scottish Natural Heritage Commissioned Report No. 791.

Noise

Detrimental impacts from noise on marine wildlife are one of the most prominent issues of concern when considering offshore wind, given the crucial importance of sound to marine wildlife and the large environmental footprint of anthropogenic noise. Underwater noise may also result in habitat loss and displacement of marine mammals from the area. A benefit of floating wind technology is the reduced noise produced during the development of a floating wind turbine array relative to pile-driven turbines in shallower waters. However, after an offshore wind farm becomes operational, operational turbines will produce low levels of underwater noise, and associated maintenance activities and will last over the lifetime of the wind farm.[112]

Marine mammals

The greatest concerns regarding noise impacts on marine mammals include the potential to mask sounds made by marine mammals for communication, locating prey, and navigation.[113] Risks may include changes in marine mammals' behavior for hunting, swimming, rearing, mating, resting, and avoiding underwater threats, as well as changes in migratory patterns if sufficient noise is generated.[114] Importantly, as the scale of projects increase, the cumulative impacts of underwater sound may increase and cause additional masking or other effects at greater distances from the source.[115]

While low-level operational noises are considered to have a low impact on marine mammals due to the low-intensity and low-frequency of the noise,[116] these low levels may still result in habitat displacement for some sensitive species.[117] For example, changes of behavior were observed for seals and harbor porpoises at two wind farms in Denmark during their operation and the number of these marine mammals was found to be reduced within the development area.[118] The potential for habitat displacement to continue over the long term remains an area of active research.

Fish

It is important to consider the construction, operational and decommissioning noise from floating turbine systems, the increase in vessel traffic in areas with new turbine structures, and potential resonance from mooring cables and water currents/movement. Offshore wind developments may alter fish habitat if fish are attracted to a device by its physical presence or the sound emanating from it. Fish are able to detect vibration through their lateral line and inner ear and many species are well known to be able to discriminate between sounds and many use acoustic signals to attract mates to spawn.[119] In addition to turbines generating sounds that may mask fish hearing, there is experimental data showing that exposing fish to turbine sounds over long periods of time resulted in tissue damage.[120] Impacts are likely to be greater on long-lived, slow reproducing species, such as sharks and rays. Potential impacts to commercial

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[113] Kastelein, R., van Heerden, D., Gransier, R., and Hoek, L. 2013. Behavioral Responses of a Harbor Porpoise (Phocoena phocoena) to Playbacks of Broadband Pile Driving Sounds. Marine Environmental Research 92:206 214; Clark, C., Ellison, W., Southall, B., Hatch, L., Van Parijs, S., Frankel, A., and Ponirakis, D. 2009. Acoustic masking in marine ecosystems: intuitions, analysis, and implication. Marine Ecology Progress Series 395:201 222. doi: 10.3354/Meps08402.

[114] Richardson, W. J., Greene Jr, C. R., Malme, C. I., & Thomson, D. H. (2013).*Marine mammals and noise*. Academic press.

[115] Copping et al. 2016.

[116] Tougaard, J. 2015. Underwater Noise from a Wave Energy Converter Is Unlikely to Affect Marine Mammals. PLoS ONE 10(7): e0132391. doi:10.1371/journal.pone.0132391; Sun et al. 2012

[117] Thomsen, F., Lüdemann, K., Kafemann, R. & Piper, W. (2006) Effects of offshore wind farm noise on marine mammals and fish. COWRIE Report.

[118] Snyder et al. 2009.

[119] e.g. Hawkins and Amorim, Spawning Sounds of the Male Haddock, Melanogrammus aeglefinus. Environmental Biology of Fishes. 2000.

[120] Halvorsen, M., Casper, B., Woodley, C., Carlson, T., and Popper, A. 2012. Threshold for onset of injury in Chinook salmon from exposure to impulsive pile driving sounds. PloS one 7(6):e38968. doi: 10.1371/journal.pone.0038968.

fisheries must also be taken into consideration as well as to forage fish which provide critical resources to seabirds and shorebirds.[121]

Electromagnetic Fields (EMF)

Inter-array cables have the potential to affect magnetosensitive species. Introduction of additional EMF into the marine environment can potentially disrupt or alter animals' ability to detect or respond to natural magnetic signatures, potentially altering their survival, reproductive success, or migratory patterns.[122] The highest sensitivity taxa known are the elasmobranchs, the jawless fish (Agnatha), and sturgeons, paddlefish, and relatives (the chondrosteans),[123] but also include marine mammals, sea turtles, bony fish, crustacea (lobsters and prawns) and mollusca (snails, bivalves, cephalopods).[124] The potential for EMF to cause an impact is considered most likely for organisms living on or near the seabed (e.g., eggs, larvae, benthic or demersal species), especially species with limited mobility or in critical habitat areas, because mobile species are able to avoid/move away from areas with EMF if they need to.[125]

In general, little is known about the potential impacts of EMF on marine organisms.[126] If there are any consequences for magnetosensitive species of exposure to EMF from OWEI, then they are most likely to be associated with multiple encounters with the EMF over a short timescale.[127] For example, if several individuals were diverted from their migratory paths on each encounter with an EMF emitted from a cable, then the accumulated cost in terms of time wasted and energy used in diversion could compromise the animals.[128] Another possible cumulative effect could occur if animals continue to be attracted to EMF associated with OWEI because the emission resembles the bioelectric field of potential food sources.[129] If the animals continue to respond to every encounter with perceived bioelectric fields then this hunting of inanimate items may result in lack of food gain and also energetic compromise.[130]

V. SITE-SPECIFIC CONSIDERATIONS

HUMBOLDT CALL AREA

Benthic communities

[121] Bailey et al. 2014.
[122] EPRI 2013
[123] Normandeau Associates Inc., Exponent Inc., Timothy Tricas, and Andrew Gill. 2011. "Effects of EMFs from Undersea Power Cables on Elasmobranchs and Other Marine Species." U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA. OCS Study BOEMRE 2011-09; Gill, A.B., Bartlett, Thomsen, F. 2012. Potential interactions between diadromous fishes of U.K. conservation importance and the electromagnetic fields and subsea noise from marine renewable energy developments. Journal of Fish Biology 81(2):664 695.
[124] Wiltschko, W. & Wiltschko, R. (2005) Magnetic orientation and magnetoreception in birds and other animals. Journal of Comparative Physiology A – Neuroethology and Sensory Neural and Behavioral Physiology, 191, 675–693. doi: DOI: 10.1007/s00359-005-0627-7; Luschi, P., Benhamou, S., Girard, C., Ciccione, S., Roos, D., Sudre, J. & Benvenuti, S. (2007) Marine turtles use geomagnetic cues during open-sea homing. Current Biology, 17, 126–133; Gould, J.L. (2008) Animal navigation: the evolution of magnetic orientation. Current Biology, 18, R482–R484. *doi: DOI:* 10.1016/j.cub.2008.03.052; Copping et al. 2016.
[125] Woodruff, D.L., V.I. Cullinan, A.E. Copping, and K.E. Marshall. 2013. Effects of Electromagnetic Fields on Fish and Invertebrates: Task 2.1.3: Effects on Aquatic Organisms: Fiscal Year 2012 Progress Report: Environmental Effects of Marine and Hydrokinetic Energy. PNNL-22154. Pacific Northwest National Laboratory (PNNL), Richland, WA (US); Gill, A.B., I. Gloyne-Phillips, J.A. Kimber, P. Sigray. 2014. Marine renewable energy, electromagnetic fields and EM-sensitive animals. In: Humanity and the Sea: marine renewable energy and the interactions with the environment. Eds. M. Shields and A. Payne.
[126] Copping et al. 2016.
[127] Gill et al. 2012.
[128] Masden et al. 2009
[129] Kimber, J.A., Sims, D.W., Bellamy, P H. and Gill, A.B. 2014. Elasmobranch cognitive ability: using electroreceptive foraging behaviour to demonstrate learning, habituation and memory in a benthic shark. Animal Cognition 1-11.
[130] Gill et al. 2012

The Humboldt Call Area ranges in depth from approximately 500 m to 1100 m, and there is limited information available on the benthos. The assumption based on existing maps is that the benthos is primarily comprised of soft-sediment. Recent work by Yoklavich *et al.* 2016[131] with an Autonomous Underwater Vehicle (AUV) characterized 21,352 m^2 of seafloor habitat approximately 50 km to the north and south of the Call Area at a depth of 695-1169 m. Yoklavich *et al*. found soft mud sediments (85 percent) and some mixed rock (12 percent) and observed 13,758 (20 species) corals, 2549 (8 species) sponges and 5580 (18 species) fishes.[132] This observed diversity and density of species provides strong evidence that a thorough benthic survey should occur in the Call Area to identify areas with high levels of diversity and abundance to provide siting guidance to minimize benthic impacts.

The Call Area is sited between two submarine canyons, Trinidad Canyon approximately 8.6 nm to the north west, and Eel Canyon, approximately 4.9 nm to the south. Submarine canyons are well documented to serve as habitats, nurseries, forage areas, refugia, and carbon sequestration and storage areas.[133] It is unknown how development in proximity to these canyons may affect the canyons' ecosystem functions and services they provide.

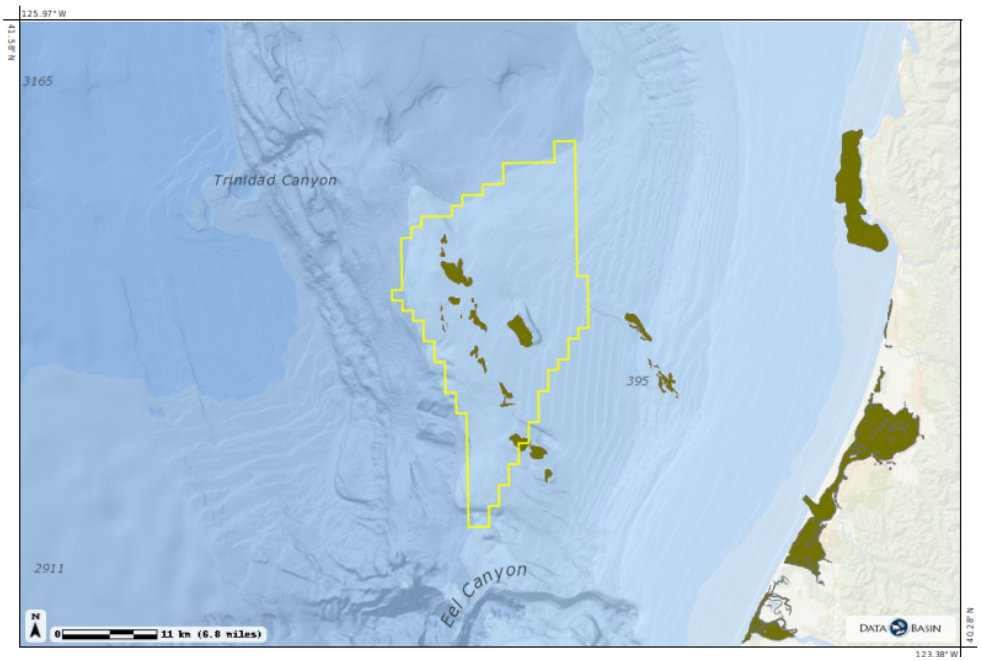

Figure 5. Detail of the Bureau of Ocean Energy Management (BOEM) Humboldt Call Area shown in yellow outline overlapping with the Pacific Fisheries Management Council (PFMC) Habitat Areas of Particular Concern (HAPC) for Groundfish shown in olive. The HAPC overlaps 7.96 mi^2 with the Humboldt Call Area.

[131] Yoklavich, Mary, M. Elizabeth Clarke, Tom Laidig, Erica Fruh, Lisa Krigsman, Jeff Anderson, Jeremy Taylor, and Chris Romsos. 2016. A characterization of deep-sea coral and sponge communities in areas of high bycatch in bottom trawls off northern California. NOAA Technical Memorandum NMFS-SWFSC-556 (39 p.) [Internet]. [cited 2019 Jan 9]. Available from https://swfsc.noaa.gov/publications/TM/SWFSC/NOAA-TM-NMFS-SWFSC-556.pdf

[132] Id.

[133] Fernandez-Arcaya U, Ramirez-Llodra E, Aguzzi J, Allcock AL, Davies JS, Dissanayake A, Harris P, Howell K, Huvenne VAI, Macmillan-Lawler M, Martín J, Menot L, Nizinski M, Puig P, Rowden AA, Sanchez F, Van den Beld IMJ. 2017. Ecological Role of Submarine Canyons and Need for Canyon Conservation: A Review. Frontiers in Marine Science [Internet]. [cited 2019 Jan 9];4. Available from: DOI=10.3389/fmars.2017.00005

Species of concern

Seabirds- Species of particular concern
While there are no designated NMSs or Pelagic IBAs in the vicinity of the Humboldt Call Area, the waters in this region have been identified as an important and persistent hotspot of seabird occurrence.[134]

Phoebastria Albatross spp.: Short-tailed (*Phoebastria albatrus*), black-footed (*P. nigripes*) and Laysan (*P.immutabilis*) are the only three albatross species in the North Pacific Ocean and all occur throughout the CCE, although Laysan albatross typically range farther offshore and are much more uncommon in the CCE than black-footed and short-tailed albatross. Black-footed and short-tailed albatross are common in waters near the continental shelf break; indeed, the best predictor of black-footed occurrence in a recent seabird predictive habitat model was distance to the 1000 m isobath (i.e., the continental shelf break).[135]

The offshore waters offshore Cape Mendocino that overlap with the Humboldt Call Area were identified as a persistent and important area for CCE seabirds in a predictive model (See Figure 6, Nur *et al.* 2011).[136,137]

Juvenile, subadult, and adult short-tailed albatrosses heavily frequent this region for foraging, and potentially molting, grounds in late summer through October.[138] Guy *et al*. (2013) found both black-footed and short-tailed albatross to frequent waters north of 36°N and towards the shore from the 2000 m isobath.[139] Short-tailed albatross are listed as endangered in the United States, Japan, and Canada and as Vulnerable by the International Union for Conservation of Nature (IUCN). The IUCN lists Black-footed albatross as Near Threatened and are a species of special concern in the United States and Canada.[140] Black-footed albatrosses can display high site fidelity to their foraging/molting grounds during the post-breeding season,[141] and birds that demonstrate less behavioral flexibility may be more vulnerable to displacement risks. Furthermore, albatrosses are large-bodied, gliding birds that would be less able to avoid a collision with a turbine if they entered an OWEI-developed area—albatrosses in the Humboldt Call Area may be vulnerable to both collision and displacement risks.

Marbled Murrelets: As described above, marbled murrelets do not forage offshore in the regions of the Humboldt Call Area; however, they do inhabit waters shoreward from the Call Area and thus are susceptible to impacts from OWEI shore-associated activities.

Marine Mammals and Sea Turtles

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[134] Nur et al. (2011), "Where the Wild Things Are : Predicting Hotspots of Seabird Aggregations in the California Current System"; Sowls et al. (1980), "Catalog of California Seabird Colonies"; Guy et al. (2013), "Overlap of North Pacific Albatrosses with the U.S. West Coast Groundfish and Shrimp Fisheries."
[135] Id.
[136] Id.
[137] Due to OWEI site selection being limited by a maximum depth threshold ~1000 m, all three Call Areas are positioned over or near the 1000 m isobath (shelf break), and thus overlap with habitat for seabirds that are continental shelf break foragers.
[138] Orben et al. (2018), "Ontogenetic Changes in At-Sea Distributions of Immature Short-Tailed Albatrosses Phoebastria Albatrus.; "Guy et al. (2013), "Overlap of North Pacific Albatrosses with the U.S. West Coast Groundfish and Shrimp Fisheries"; Suryan and Kuletz (2018), "Distribution,
Habitat Use, and Conservation of Albatrosses in Alaska" (available online, for an English version contact Kathy_kuletz@fws.gov or Rob.Suryan@noaa.gov).
[139] Orben et al. (2018), "Ontogenetic Changes in At-Sea Distributions of Immature Short-Tailed Albatrosses Phoebastria Albatrus.; "Guy et al. (2013), "Overlap of North Pacific Albatrosses with the U.S. West Coast Groundfish and Shrimp Fisheries"; Suryan and Kuletz (2018), "Distribution,
Habitat Use, and Conservation of Albatrosses in Alaska" (available online, for an English version contact Kathy_kuletz@fws.gov or Rob.Suryan@noaa.gov).
[140] USFWS. 2002. COSEWIC. 2007.
[141] Conners (2015) "Comparative Behavior, Diet, and Post-Breeding Strategies of Two Sympatric North Pacific Albatross Species", Dissertation – University of California, Santa Cruz

Blue whales: Blue whales are listed as "endangered" under the Endangered Species Act and are "depleted" under the Marine Mammal Protection Act.[142] In contrast to some other protected cetaceans, blue whale populations have not increased over the last 20 years.[143]

Blue whale habitat overlap with the Humboldt Call Area varies according to the data source; however, the Call Area does not overlap with blue whale BIAs. Blue whales are found primarily on the continental shelf, and have greater probability of occurring in waters off California than offshore Washington or Oregon.[144] Blue whales' foraging habitat shifts because it depends on large scale oceanographic conditions (i.e., Pacific Decadal Oscillation) as the animals follow krill populations.[145] Tracking data show that the Humboldt Call a]Area overlaps with the core and overall home ranges of a number of blue whales (overall home range: 10-16 of 171 tagged individuals; core home range: 1-9 individuals).[146] Yet, during the summer months, WhaleWatch predicts some of the highest densities of blue whales (approximately 3 individuals per cell) will overlap with all three Call Areas;[147] Becker *et al*.[148] predicts the same for the Humboldt Call Area. Future shifts in feeding habitat may, however, occur under climate change and this requires further research.

Grey whales: The Humboldt Call Area does not overlap with grey whale feeding BIAs, as all grey whale feeding BIAs occur on the continental shelf and in coastal nearshore waters, and further north of the Call Areas, primarily in Washington and Oregon.[149] Similarly, migration corridors and BIAs occur close to shore (within 5.4 nm). It is important to note that in defining BIAs, NOAA included a 25.4 nm buffer. The buffer represents the potential path of some individuals that move farther offshore during annual grey whale migrations. The southbound migration occurs from October through March (peak December through March) and the northbound migration occurs from January through July (peak April through July).[150] This buffer overlaps with more than half of the footprint of all three Call Areas; however, since it is a buffer region, overlap is of less concern. It is possible that with new data on migration and movement patterns of grey whales, these areas may emerge has important habitat with more certainty.

Humpback whales: Concentrations of humpback whales are known to increase with proximity to shore.[151] Humpback whale feeding BIAs occur approximately 10.8 nm closer to the shore than the Call Areas. NOAA Southwest Fisheries Science Center (SWFSC) density models, which are based on ship-based surveys, predict the Humboldt Call Area to overlap with regions of high or moderate density for humpback whales, however it should be noted that humpbacks were not sighted in that area during any of the six cruise years.[152]

[142] http://www.fisheries.noaa.gov/pr/species/mammals/whales/blue-whale.html.
[143] Calambokidis, et al., 2015.
[144] Croll, D.A., Marinovic, B., Benson, S., Chavez, F.P., Black, N., Ternullo, R., et al. (2005). From wind to whales: trophic links in a coastal upwelling system. *Marine Ecology Progress Series* 289**,** 117-130.; Keiper, C., Calambokidis, J., Ford, G., Casey, J., Miller, C., and Kieckhefer, T.R. (2011). "Risk assessment of vessel traffic on endangered blue and humpback whales in the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries". (Bolinas, CA: Oikonos.).
[145] Calambokidis et al (2015).
[146] Irvine, L.M., Mate, B.R., Winsor, M.H., Palacios, D.M., Bograd, S.J., Costa, D.P., et al. (2014). Spatial and temporal occurrence of blue whales off the US West Coast, with implications for management. *PLoS One* 9(7)**,** e102959.
[147] Hazen, E.L., Palacios, D.M., Forney, K.A., Howell, E.A., Becker, E., Hoover, A.L., et al. (2016). WhaleWatch: a dynamic management tool for predicting blue whale density in the California Current.
[148] Becker, E.A., Forney, K.A., Fiedler, P.C., Barlow, J., Chivers, S.J., Edwards, C.A., et al. (2016). Moving towards dynamic ocean management: how well do modeled ocean products predict species distributions? *Remote Sensing* 8(2)**,** 149.
[149] Calambokidis et al (2015).
[150] Id.
[151] Keiper et al. (2011).
[152] Becker, E.A., Foley, D., Forney, K., Barlow, J., Redfern, J., and Gentemann, C. (2012). Forecasting cetacean abundance patterns to enhance management decisions. *Endangered Species Research* 16**,** 97–112; Becker et al. (2016).

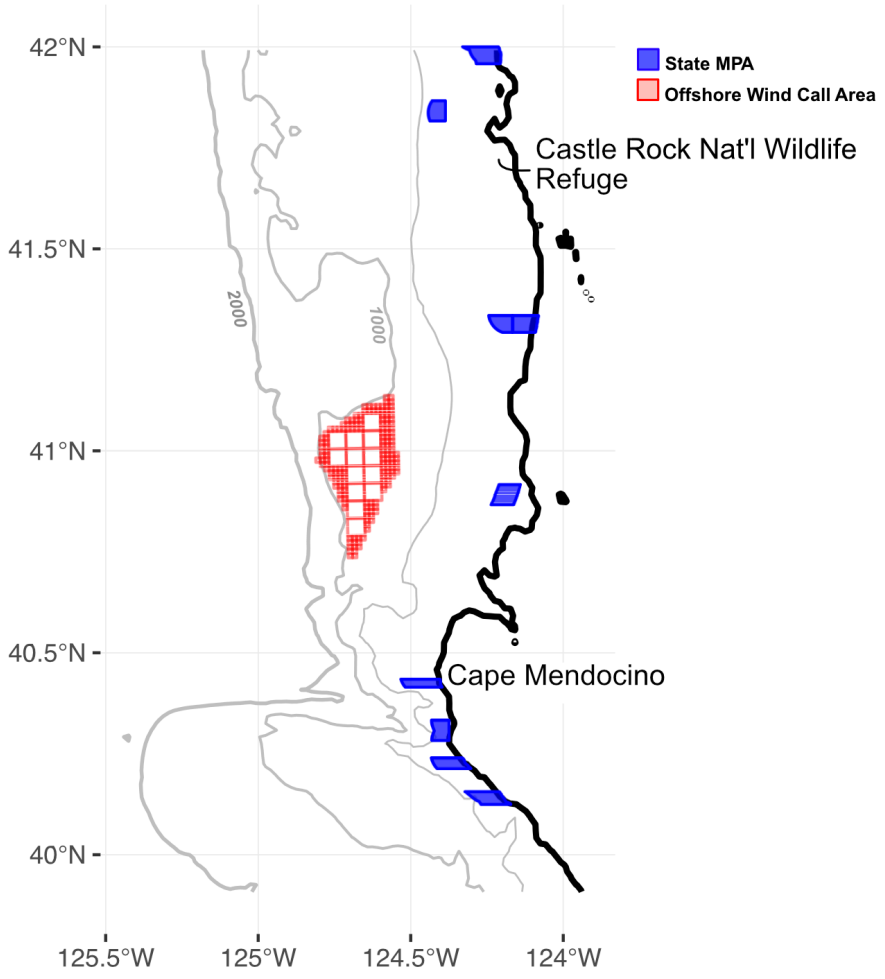


Figure 6. The Humboldt Call Area sits offshore from a network of coastal state MPAs and coastal IBAs (coastal IBAs not shown).

Fin whales: Fin whales occur in both pelagic and coastal waters, and where they feed primarily on krill and fish. Current research suggests that only some fin whales undergo long distance migrations, with some individuals even remaining resident in warmer waters of Southern California.[153] The variability in movements make BIAs difficult to define and thus have not been designated. Satellite tagging-based habitat suitability models suggest the Humboldt Call Area falls in a low density or low-moderate habitat suitability region.[154] Shifts in feeding habitat may, however, occur under climate change.

Minke whales: Minke whales in California are usually sighted on the continental shelf.[155] Populations in inland California waters are thought to be resident populations that establish home ranges, though

[153] Calambokidis et al (2015).
[154] Scales, K.L., Schorr, G.S., Hazen, E.L., Bograd, S.J., Miller, P.I., Andrews, R.D., et al. (2017). Should I stay or should I go? Modelling year-round habitat suitability and drivers of residency for fin whales in the California Current. *Diversity and Distributions* 23(10), 1204-1215; Becker et al. (2016).
[155] Carretta, J.V., Oleson, E., Weller, D.W., Lang, A.R., Forney, K.A., Baker, J., et al. (2014). "U.S. Pacific Marine Mammal Stock Assessments: 2013". US Department of Commerce, NOAA Technical Memorandum, NMFS-SWFSC-532).

individuals in Alaska migrate to warmer waters for breeding.[156] The population size and status are unknown, and little is known about individual movements, making impacts and potential overlap with the Call Area difficult to assess.

North Pacific right whales: Potential overlap of North Pacific right whale habitat with the Call Areas is unknown. Very limited information exists on the distribution of North Pacific right whales, though sightings have occurred almost exclusively in Alaska; those that exist in California were not in the vicinity of the Humboldt call area.[157] Sightings have occurred in Mexican waters and thus there is some evidence that they travel through California waters to reach reputed breeding grounds in Southern California or Mexico in the summer months,[158] though how many animals utilize this migratory route is unconfirmed.[159]

Leatherback Sea Turtles:
The Humboldt Call Area does not fall within Critical Habitat for leatherback sea turtles designated under the Endangered Species Act.[160] All three Call Areas may overlap with high density areas that were identified from habitat modeling approaches.[161]

MORRO BAY AND DIABLO CANYON CALL AREAS

As detailed in our previous comment letter, the Morro Bay and Diablo Canyon Call Areas are located in proximity to multiple protected areas. The Morro Bay Call Area is immediately outside the southwest corner of the Monterey Bay NMS. Further, the Diablo Canyon Call Area and southeast corner of the Morro Bay Call Area, transmission cables, and floating substations would be located within the currently nominated Chumash NMS. Both of these areas protect a number of vital marine resources, including feeding and migratory habitat for federally protected marine mammals and seabirds, as well as habitat for other federally threatened and endangered species. The potential for offshore wind development to have negative impacts on the effectiveness of the Monterey Bay NMS and the suitability of siting offshore wind inside of, or in immediate proximity to, a NMS are important considerations.

Our organizations are concerned about the potential for offshore wind development to have a negative impact on Sanctuary resources if sited either within the nominated Chumash NMS, or adjacent to, the Monterey Bay NMS. We therefore recommend that BOEM evaluate the potential impacts of any wind development located in proximity to a NMS extremely carefully, undertake the necessary studies to fill any data gaps, and proceed incrementally with any developments, so that the activities associated with offshore wind development and operations can be modified in order to avoid impacts to the marine life and habitats within the NMS.

Within State waters, protecting California's landmark network of MPAs is important. Critically, the effectiveness of California's MPA network relies not only on the protections individual MPAs afford, but

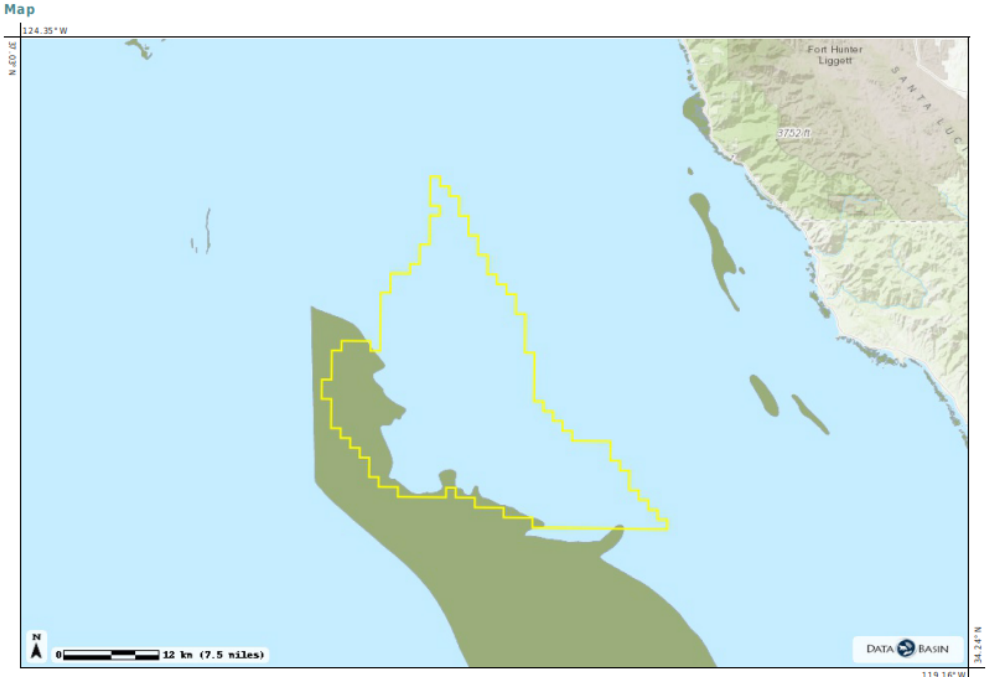
[156] https://www.fisheries.noaa.gov/species/minke-whale
[157] National Marine Fisheries Service. 2013. Recovery plan for the North Pacific right whale (*Eubaleana japonica*). National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD; Brownell Jr, R.L., and Clapham, P.J. (2001). Conservation status of North Pacific right whales. *Journal of Cetacean Research and Management* (2), 269-286.
[158] Crance, J.L, Berchok, C.L., Wright, D.L., and Clapham, P. (2018). Can their Pacific cousins be saved? The plight of the North Pacific right whales and a comparison of two very different populations. Poster presentation. North Atlantic Right Whale Consortium 2018 Annual Meeting, New Bedford, MA, USA, 7-8 November, 2018.
[159] https://www.fisheries.noaa.gov/species/north-pacific-right-whale
[160] https://www.westcoast.fisheries.noaa.gov/maps_data/endangered_species_act_critical_habitat.html
[161] Eguchi, T., Benson, S.R., Foley, D.G., and Forney, K.A. (2017). Predicting overlap between drift gillnet fishing and leatherback turtle habitat in the California Current Ecosystem. *Fisheries Oceanography* 26(1), 17-33.

on the connectivity of the entire MPA network.[162] There are 10 California MPAs located directly shoreward of the proposed lease areas. In evaluating commercial wind development's potential interactions with the Monterey Bay NMS and nominated Chumash NMS, which each include state MPAs, it is also important to consider overall impacts to the MPA system.

The Morro Bay Call Area is located approximately 20 nm north and northwest of Santa Lucia Bank, a geologic feature that attracts cetaceans, commercially important fish, and ecologically important benthic communities.[163] The Monterey Bay NMS's Davidson Seamount is also a biologically rich geologic feature located roughly 45 nm west of the Morro Bay Call Area. It is not clear whether or how a commercial wind farm would interfere with migratory pathways between Santa Lucia Bank and the Monterey Bay NMS, yet the potential for interaction should be considered in evaluating the suitability of the proposed Call Area, given that any projects would be located between Davidson Seamount and the Monterey Bay NMS.

Benthic communities

There is limited information available on the benthic composition and habitat within the Morro Bay Call Area. The Davidson Seamount is located approximately 16.2 nm west of the Call Area and is part of the Monterey Bay NMS and designated as a HAPC. As stated above, the Call Area abuts the Monterey Bay NMS southwest and southern boundary, and Santa Lucia Bank is located directly south of the Call Area. The Bank rises to 400 m from the surface and is part of a persistent upwelling cell.[164,165] This Call Area has a 24.4 nm^2 overlap with HAPC.



[162] Saarman E., Gleason M., Ugoretz J., Airamé S., Carr M., Fox E., Frimodig A., Mason T., Vasques J. (2013) "The role of science in supporting marine protected area network planning and design in California," Ocean and Coastal Management.

[163] Minerals Management Service, Proposed 1983 Outer Continental Shelf Oil and Gas Lease Sale. General information on deep sea reefs in Kaplan, B., C.J. Beegle-Krause, D. French McCay, A. Copping, S. Geerlofs, eds. 2010. "Updated Summary of Knowledge: Selected Areas of the Pacific Coast." OCS Study BOEMRE 2010-014. US Department of Interior, Bureau of Ocean and Energy Management, Regulation, and Enforcement, Pacific OCS Region, Camarillo, CA.

[164] Hendy IL, Pedersen TF, Kennett JP,Tada R. 2004. Intermittent existence of a southern Californian upwelling cell during submillennial climate change of the last 60 kyr. Paleoceanography [Internet]. [cited 2019 Jan 9];19:PA3007. Available from: doi:10.1029/2003PA000965.

[165] Proposed Chumash Sanctuary: Area 2 [Internet]. Northern Chumash Tribal Council [cited 2019 Jan 9]. Available from: https://chumashsanctuary.com/area/area-2/

Figure 7. Detail of Bureau of Ocean Energy Management (BOEM) Morro Bay Call area shown in yellow outline overlapping with the Pacific Fisheries Management Council (PAMC) Habitat Areas of Particular Concern (HAPC) for groundfish shown in olive. The HAPC overlaps 45.2 mi^2 with the Morro Bay Call Area.

The Diablo Call Area has limited information available on the benthos and ranges in depth from approximately 550 m to 1100 m. The western portion of the Call Area is located directly on Santa Lucia Bank, and has 146.6 nm^2 of overlap with a HAPC (See Figure 8). The NOAA National Deep-Sea Coral and Sponge Database, 1842-Present identifies significant coral and sponge observations throughout this Call Area. Comprehensive baseline characterization studies will be required to document the habitats and ecological communities present.

Generally, areas located around marine banks such as Santa Lucia Bank have complex circulation patterns and are hotspots of diversity and productivity.[166] The potential for significant impacts to established benthic communities are likely higher in the Diablo Call Area than in the Humboldt and Morro Bay Call Areas. The grid connection for the Diablo Call Area would likely pass through the Point Buchon State Marine Reserve (SMR) and Conservation Area. Current state regulations do not allow development within a SMR and state policy requires state marine protected areas to be managed to promote areas of minimal human disturbance.[167]

BOEM should conduct comprehensive surveys of Santa Lucia Bank, and should avoid designating WEAs that overlap with the HAPC within the Diablo Call Area. There is an approximately a 108 nm^2 section that does not overlap with the HAPC within the Call Area (See Figure 8). Locating development in this inshore section of the Diablo Call Area outside of the HAPC may significantly reduce benthic impacts and could be explored for potential development, while also considering of other potential impacts to species of concern such as marine mammals, forage fish, and birds.

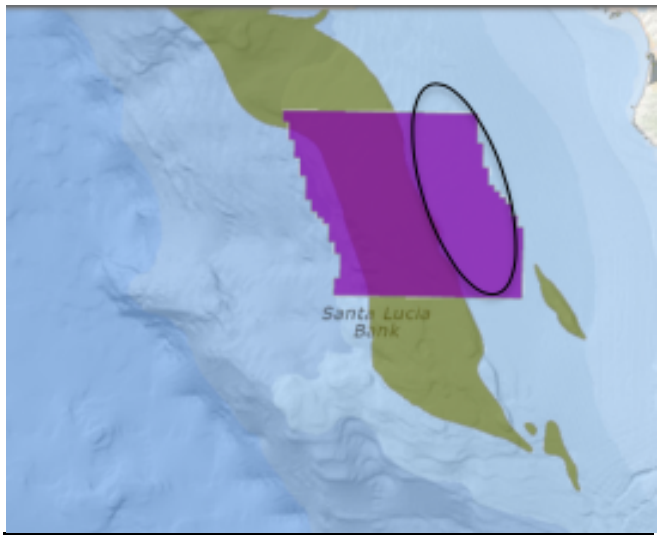


Figure 8. Bureau of Ocean Energy Management (BOEM) Diablo Call Area (purple) overlapping with Pacific Fisheries Management Council (PFMC) Habitat Areas of Particular Concern (HAPC, olive) for

[166] Yoklavich M, Wakefield W. 2015. Pacific Coast Region. In: Our living oceans: habitat: Status of the habitat of U.S. living marine resources [Internet], [cited 2019 Jan 9]; p. 189-221. NOAA Technical Memorandum NMFS-F/SPO-75. Available from: https://swfsc.noaa.gov/publications/CR/2015/2015Yoklavich.pdf

[167] Marine Life Protection Act. California Department of Fish and Wildlife [Internet]. [cited 2019 Jan 9]. Available from: https://www.wildlife.ca.gov/Conservation/Marine/MPAs/MLPA

Groundfish. Black circle indicates approximately 108 nm^2 located on the inshore area of the Call Area that should be explored as the priority location within this Call Area due to the likelihood it could reduce benthic impacts.

Species of concern

Seabirds
Both call areas are adjacent to and slightly overlapping with the Piedras Blancas IBA (Diablo Canyon Call Area) and the Point Sal 121W35N IBA (Morro Bay Call Area). The Piedras Blancas and Point Sal IBAs have been identified as essential habitat for wintering sooty shearwaters and breeding/wintering pink-footed shearwaters, respectively.[168]

Ashy Storm-Petrels: There should be a substantial effort to understand the seasonal and annual abundance and distribution of the Ashy Storm-Petrel (*Oceanodroma homochroa*) within the two Call Areas offshore southern California. The entire global population of Ashy Storm-Petrel is estimated at roughly 10,000 individuals, with breeding colonies occurring in a restricted area along the California coast from the Coronado Islands (32 °N) to Mendocino county (41 °N).[169] Notably, roughly half of the world's population is thought to occur in the Channel Islands, roughly 60 nm south of Morro Bay Call Area.[170] Further, Ashy Storm-Petrels have been caught via mist-nests on Vandenberg Air Force Base, which is located north of Point Conception[171] and ~ 14.6 nm southeast from the Morro Bay Call Area. The Ashy Storm-Petrel is listed as Endangered with a decreasing population trend by the IUCN, and are listed as a Species of Special Concern with both the California Department of Fish and United States Department of Fish and Wildlife Service. The at-sea range is thought to be restricted, and range dynamics of this species are not well-understood. The small physical size of Ashy Storm-Petrels (~ 40 g) is incompatible with most bio-logging instrumentation methods and their small size also contributes to the challenge of observing them at-sea. The limited observations of Ashy Storm-Petrels that do exist indicate the at-sea range is restricted to waters along the edge of the continental shelf from northern Baja California to central California.[172] Importantly, from a conservation perspective, they have been observed to aggregate at-sea in large flocks during the fall primary feather molt. Hotspots of Ashy Storm-Petrels have been documented in waters both south (33.5 °N) and north (38 °N) of the Morro Bay and Diablo Canyon Call Areas[173] and individuals have also been documented foraging on the continental slope off Point Conception[174] and 5.4-37.8 nm offshore between San Miguel Island (32 °N and Point Buchon 35.3 °N).[175]

The limited range of Ashy Storm-Petrels and at-sea aggregations make them particularly susceptible to local disasters such as oil spills or other impacts from human activities and offshore development.

Other seabird species of conservation concern occur in the California Current at the same latitudes as the Morro Bay and Diablo Canyon Call Areas. These include IUCN-listed Vulnerable Leach's Storm-Petrel (common), Pink-footed Shearwater (common), Black-legged Kittiwake (common), Scripps Murrelet (uncommon), and Short-tailed Albatross (uncommon), as well as the Endangered Hawaiian Petrel and Guadalupe Murrelet (both uncommon). Short-tailed albatrosses are designated as a federally listed endangered species through the Endangered Species Act as well as a State endangered species of Alaska.

[168] https://netapp.audubon.org/iba/Reports/4687; https://netapp.audubon.org/iba/Reports/4692
[169] Ainley, et al (1995). "Variations in Marine Bird Communities of the California Current, 1986-1994"; Carter et al. (2008). "Organochlorine Contaminants in Ashy Storm-Petrel Eggs from Santa Cruz Island, California, in 1992–2008: Preliminary Findings."
[170] Carter et al. (2016), "Range-Wide Conservation and Science of the Ashy Storm-Petrel Oceanodroma Homochroa."
[171] Brown et al. (2003), "A Potential New Colony of Ashy Storm-Petrels on the Mainland Coast of California, USA."
[172] Ainley and Boekelheide (1990), "Seabirds of the Farallon Islands."
[173] Carter et al. (2016), "Range-Wide Conservation and Science of the Ashy Storm-Petrel Oceanodroma Homochroa."
[174] Adams and Takekawa (2008), "At-Sea Distribution of Radio-Marked Ashy Storm-Petrels Oceanodroma Homochroa Captured on the California Channel Islands."
[175] Mason et al. (2007), "At-Sea Distribution and Abundance of Seabirds Off Southern California : A 20-Year Comparison".

While uncommon in the Call Areas, the loss of even a few individual Short-tailed albatrosses can result in population-level impacts. Particular effort should be made to model flight heights of Short-tailed albatross in the wind regimes experienced in the Call Areas and response actions should be established for mitigating loss of birds, including the temporary cessation of turbines if Short-tailed albatross are in the area. Populations of vulnerable pink-footed shearwaters are declining, and they occur in high numbers in the California Current offshore southern California. Their presence triggered the Audubon Society's establishment of Point Sal Important Bird Area, which was intended to highlight the important wintering grounds of this species. The boundary of the Morro Bay Call Area is adjacent to, and slightly overlapping with, the Point Sal IBA in the sites southeast corner (See Figure 9). Given the proximity to this important bird habitat, an action committee should be established to minimize habitat loss and bird mortality of pink-footed shearwaters from OWEI.

Sooty shearwaters: While sooty shearwaters are abundant and not yet a species of concern on federal or state listings, their populations are declining. The Diablo Canyon and Morro Bay Call Areas are in regions that experience high numbers of wintering sooty shearwaters, and both Call Areas are adjacent to the Piedras Blancas IBA that was established to highlight important habitat for wintering sooty shearwaters. Given the proximity of both Call Areas to this important bird habitat, an action committee should be established to minimize habitat loss and bird mortality of sooty shearwaters from OWEI.

Marbled Murrelets: Marbled Murrelets are listed as Threatened under the federal Endangered Species Act and as Endangered by the state of California. They breed in coniferous forests in California from the Oregon border to Santa Cruz County and also occur in waters off San Luis Obispo county, primarily in fall.[176] Concentrations in San Luis Obispo County occur around San Simeon Cove (35.6 N), directly east of Diablo Canyon Call Area.[177] Marbled Murrelets are a nearshore species, so are not at a high collision or displacement risk from OWEI development.

Marine Mammals and Sea Turtles - Morro Bay

Blue whales: Overlap of the Morro Bay Call Area with blue whale habitat appears to vary depending on the data source; however, the Call Area does not overlap with blue whale BIAs. Tracking data show that the Morro Bay Call Area overlaps with the core and overall home ranges of a low number of blue whales (overall home range: 10-28 of 171 tagged individuals; core home range: 1-9 individuals).[178] It should be noted that one of the primary tagging sites was near the Channel Islands just to the south, thereby potentially biasing home range results to areas near to the tagging location. As previously described, WhaleWatch predicts some of the highest densities of blue whales (approximately three individuals per cell) in the Call Areas will overlap with all three Call Areas during the summer months,[179] though Becker *et al*.[180] predict lower densities for the Morro Bay call area.

Grey whales: The Call Areas do not overlap with grey whale feeding BIAs, as all occur on the continental shelf and in coastal nearshore waters, and further north of the Call Areas, primarily in Washington and Oregon. Similarly, migration corridors and BIAs occur close to shore (within 5.4 nm). It is important to note that in defining BIAs, a 25.4 nm buffer was included. The buffer represents the potential path of some individuals that move further offshore during annual grey whale migrations. The southbound

[176] Henkel (2014), "At-Sea Distribution of Marbled Murrelets in San Luis Obispo County , California At-Sea Distribution of Marbled Murrelets in San Luis Obispo County , California FINAL REPORT Submitted to the Oiled Wildlife Care Network Watsonville , CA 95076."
[177] Henkel (2014), "At-Sea Distribution of Marbled Murrelets in San Luis Obispo County , California At-Sea Distribution of Marbled Murrelets in San Luis Obispo County , California FINAL REPORT Submitted to the Oiled Wildlife Care Network Watsonville , CA 95076."
[178] Irvine, L.M., Mate, B.R., Winsor, M.H., Palacios, D.M., Bograd, S.J., Costa, D.P., et al. (2014). Spatial and temporal occurrence of blue whales off the US West Coast, with implications for management. *PLoS One* 9(7), e102959.
[179] Hazen et al. 2016.
[180] Becker et al. 2016

migration occurs from October through March (peak December through March) and the northbound migration occurs from January through July (peak April through July).[181]

Humpback whales: Humpback whale feeding BIAs occur within 32.4 nm of shore and are located approximately 13.5 nm further inshore than the Call Areas. The SWFSC density models predict the Morro Bay Call Area to overlap with regions of high or moderate density for humpback whales,[182] and humpbacks were sighted during three of the six survey years.[183]

Fin whales: Fin whales occur in both pelagic and coastal waters, and where they feed primarily on krill and fish. Current research suggests that only some fin whales undergo long distance migrations, with some individuals even remaining resident in warmer waters of Southern California.[184] The variability in movements make BIAs difficult to define and thus were not designated. However, the SWFSC density models suggest high fin whale density may occur in the Morro Bay Call Area.[185] Additionally, concentrations of sightings were found in the Saint Lucia Bank region. Satellite tagging-based habitat suitability models also suggest the Morro Bay Call Area is in high suitability habitat areas, particularly during the summer and fall (June through November[186]). The average depth of four satellite-tagged individuals in 2010 was over 700 m and 38.9 nm from shore.[187]

Minke whale: Minke whales in California are usually sighted on the continental shelf. Populations in inland California waters are thought to be resident populations and establish home ranges, although individuals in Alaska migrate to warmer waters for breeding.[188] The population size and status are unknown, and little is known about individual movements, making impacts and potential overlap with Call Areas difficult to assess.

North Pacific right whale: As previously discussed, potential overlap of North Pacific right whale habitat with the Call Areas is unknown. Since 1950, there have been at least four sightings of North Pacific right whales from the eastern population from Washington (one of which occurred since 1990) and twelve in California waters. There were two sightings offshore La Jolla, three in the Channel Islands, one each off Piedras Blancas, Big Sur, Half Moon Bay, and four in the San Francisco vicinity,), including two potentially in the Morro Bay or Diablo Canyon Call areas in the 1990s (Piedras Blancas and Big Sur Coast sightings).[189] Habitat preference models have also indicated that southern California is a potential calving area, based on environmental conditions.[190]

[181] Id.
[182] Becker et al. (2012).
[183] Id.; Becker et al. (2016).
[184] Calambokidis et al. (2015).
[185] Becker et al. (2012).
[186] Scales et al. (2017).
[187] Schorr, G.S., Falcone, E.A., Calambokidis, J., and Andrews, R.D. (2010). "Satellite tagging of fin whales off California and Washington in 2010 to identify movement patterns, habitat use, and possible stock boundaries". CASCADIA RESEARCH COLLECTIVE OLYMPIA WA).
[188] https://www.fisheries.noaa.gov/species/minke-whale
[189] National Marine Fisheries Service. 2013. Recovery plan for the North Pacific right whale (*Eubaleana japonica*). National Marine Fisheries Service, Office of Protected Resources, Silver Spring, MD; Brownell Jr, R.L., and Clapham, P.J. (2001). Conservation status of North Pacific right whales. *Journal of Cetacean Research and Management* (2), 269-286.
[190] Id.

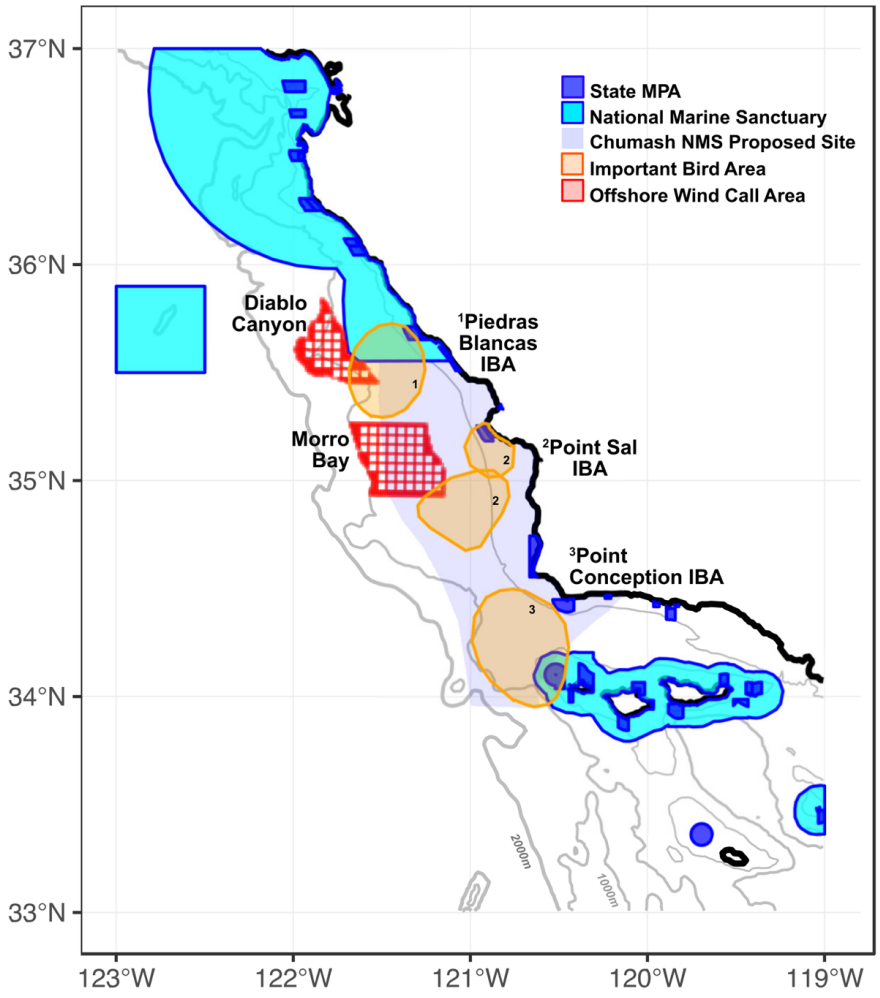


Figure 9. The Morro Bay and Diablo Call Areas are positioned adjacent to, but with minimal overlap with, a network of National Marine Sanctuaries (NMSs) (Designated and Proposed), State marine protected areas (MPAs), and Important Bird Areas (IBAs). Additional IBAs exist along the coastline from the two Call Areas but were removed from map for simplicity since they are not in close proximity to OWEI call areas.

Morro Bay Small Resident Population Harbor Porpoise: Of the harbor porpoises in the northeastern Pacific, the Morro Bay Small Resident Population is distributed from Point Conception to Point Sur, with particularly high densities from Point Estero and Point Arguello.[191] Northeastern harbor porpoises are segregated into smaller groups and are most abundant from shore to the 50 m isobath.[192] The Morro Bay Small Resident Population is especially vulnerable to anthropogenic impacts because of the small core size of its range.[193] The Morro Bay harbor porpoise BIA extends from Point Conception to Point Sur and follows the 200m isobath.[194] Although out of range of where floating turbines would be located, transmission cable construction and vessel traffic for O&M would occur within the Morro Bay harbor porpoise BIA.

[191] Calambokidis, et al. 2015.
[192] Id.
[193] Id.
[194] Id.

Leatherback Sea Turtles: Both the Morro Bay and Diablo Canyon call areas fall entirely within with Critical Habitat for leatherback sea turtles designated under the Endangered Species Act.[195] All three Call Areas may overlap with high density areas identified from habitat modeling approaches.[196]

Marine Mammals and Sea Turtles - Diablo Canyon
Blue whales: Tracking data show that the Diablo Canyon Call Area overlaps with the core and overall home ranges of a low number of blue whales (overall home range: 10-28 of 171 tagged individuals; core home range: 1-5 individuals).[197] It should be noted that one of the primary tagging sites was near the Channel Islands just to the south, thereby potentially biasing home range results to areas near the tagging location. Using habitat modeling approaches, WhaleWatch predicts some of the highest densities of blue whales (approximately three individuals per cell) in the area will overlap with all three Call Areas during the summer and early fall months (July through October);[198] Becker *et al*.[199] predicts the same for the Diablo Canyon Call Area.

Grey whales: Same information as Morro Bay Call Area.

Humpback whales: Same information as Morro Bay Call Area.

Fin whales: SWFSC density models suggest high density fin whale areas may likely occur in the Diablo Canyon Call Area during at least two of their six survey years, with sightings occurring in the region during all but one year.[200] Habitat models based on satellite data also suggest the Diablo Canyon Call Area is in high suitability habitat areas, particularly during the summer and fall (June through November).[201]

Minke whales: Same information as Morro Bay Call Area.

North Pacific right whale: Same information as Morro Bay Call Area.

Leatherback Sea Turtle: Same information as Morro Bay Call Area.

VI. RECOMMENDED AREAS TO AVOID WITHIN THE CALL AREAS

It is clear that any offshore wind development in California, if it is to proceed, will occur within an incredibly rich and biologically-important marine ecosystem. Given that the impacts of floating offshore wind development in the California Current specifically are not yet known, we strongly recommend that BOEM take action to prioritize work to fill the key research needs described in this letter. Our analysis of the biological data forms the basis of following recommendations with respect to the Call Areas.

[195] https://www.westcoast.fisheries.noaa.gov/maps_data/endangered_species_act_critical_habitat.html
[196] Eguchi, T., Benson, S.R., Foley, D.G., and Forney, K.A. (2017). Predicting overlap between drift gillnet fishing and leatherback turtle habitat in the California Current Ecosystem. *Fisheries Oceanography* 26(1)**,** 17-33.
[197] Irvine, L.M., Mate, B.R., Winsor, M.H., Palacios, D.M., Bograd, S.J., Costa, D.P., et al. (2014). Spatial and temporal occurrence of blue whales off the US West Coast, with implications for management. *PLoS One* 9(7)**,** e102959.
[198] Hazen et al. (2016).
[199] Becker et al. (2016).
[200] Becker et al. (2012).
[201] Scales et al. (2017).

Additional research to support decision making could help BOEM to evaluate the suitability of HAPC, EFH Conservation Areas, IBAs, and BIAs for inclusion in WEAs.

1.) **BOEM should exclude HAPC from WEAs.** The Magnuson-Stevens Fishery Conservation and Management Act enables the regional fisheries management councils to identify and designate this specific subset of EFH. On the West Coast, the PFMC has identified HAPC – fisheries habitat that fulfills important ecological functions and/or is especially vulnerable to degradation.[202] NOAA and the PFMC have designated these areas in order to denote that they are a high priority for conservation. To preserve the ecosystem function that sustains the West Coast's valuable commercial fisheries, BOEM should remove the portions of the Humboldt, Morro Bay, and Diablo Call Areas that overlap with HAPC. As previously noted, there is considerable overlap of HAPC and the Diablo Canyon Call Area.

2.) **BOEM should exclude EFH Conservation Areas from WEAs.** The PFMC has identified EFH Conservation Areas "to minimize, to the extent practicable, the adverse effects of fishing on groundfish EFH."[203] To protect the sensitive features of the habitat that warrant protection, EFH Conservation Areas are closed to specific types of fishing. As is evident from Figure 3, there is substantial overlap of EFH Conservation Areas and the Morro Bay and Diablo Canyon Call Areas. Conducting additional benthic surveys in the Morro Bay and Diablo Canyon Call Areas would better equip BOEM and other stakeholders to assess the potential for offshore wind developments to harm or destroy the features the EFH Conservation Area protects.

3.) **BOEM should give IBAs a higher priority of avoidance over other parts of the Call Areas.** The IBA program, administered by the National Audubon Society in the United States, is part of an international effort by BirdLife International to designate and support conservation efforts at sites that provide significant breeding, wintering, or migratory habitats for specific species or concentrations of birds. Sites are designated based on specific and standardized criteria and supporting data. It is important to note that these areas may shift due to climate change, food source, or other factors over the duration of any offshore wind project. IBAs signal the need for a significantly higher level of pre- and post-construction and ongoing data collection, review, adaptive management procedures, and technologies than other areas. If the level of investment or technology needed for that higher level of pre- and post-construction and ongoing data collection, review, and adaptive management procedures and technologies are not financially or technologically feasible, then those areas and appropriate buffers for shifting influences such as climate and food source should be avoided entirely or removed from the Call Areas.

4.) **BOEM should carefully consider BIAs when making siting decisions.** NOAA has identified BIAs for marine mammals because of their particular importance for feeding, reproduction, and migration. Fifty percent of each of the Call Areas overlap with the BIA buffer zone for grey whales. Until there is a better understanding of the use of this BIA buffer, our organizations recommend BOEM prioritize avoiding the grey whale BIA. As important, transit routes for all offshore wind-associated vessels to and from the port to the WEA should be sited outside of BIAs. If this is not possible, BOEM should require stringent vessel speed restrictions and monitoring measures to avoid and reduce the severity of vessel collisions.

5.) **BOEM should prohibit energy leasing within Outer Continental Shelf Lands Act (OCSLA) prohibited areas.** Under OCSLA, BOEM is prohibited from leasing within the boundaries of the National Park Service, National Wildlife Refuge System, National Marine Sanctuary System, and any National Monument. We support BOEM's decision to remove National Marine Sanctuaries from

[202] 50 C.F.R. 600.815(a)(8), NOAA, Essential Fish Habitat, Habitat Areas of Particular Concern: https://www.westcoast.fisheries.noaa.gov/habitat/fish_habitat/hpac.html.
[203] Id.

consideration. Preserving these areas of significant environmental value to secure the health of the larger marine ecosystem and will allow sites with the greatest potential for environmentally responsible development to advance.

VII. RECOMMENDATIONS ON ESSENTIAL SCIENCE FOR BOEM TO ADVANCE OFFSHORE WIND DEVELOPMENT

Our organizations appreciate and recognize BOEM's extensive outreach, the resources the agency has provided, and the approachability and accessibility of the Pacific Region BOEM staff. We encourage BOEM to seize this unprecedented opportunity to set a high environmental bar for the growth of the offshore wind industry in California, a standard that is particularly prudent given the importance of the state's ocean economy and leadership role in ocean conservation.

While we understand the keen interest in initiating the multi-year offshore wind leasing process, it is imperative to have a well-informed understanding of avian, marine mammal, fish, and structural benthic habitat distributions throughout the North and Central Coast prior to making leasing decisions. Proactive measures that prioritize marine resource protection will not only provide the marine protections expected and required of the state and federal government—they will ultimately help the industry succeed and ensure that the lengthy permitting process is smooth. Siting should be based on the best available science, and developments should advance only when they incorporate research and monitoring for potential individual and cumulative impacts.

a) Prioritize funding for a third-party analysis of data layers included in the California Offshore Wind Data Basin Gateway to identify low environmental risk areas

The Call states that BOEM conducted environmental sensitivity analysis for marine mammal and avian species.[204] While we acknowledge BOEM's efforts to incorporate these crucial environmental considerations into the site designation process, our organizations would be very appreciative of greater transparency about the environmental analysis that has informed siting decisions thus far. We are concerned that key governmental and non-governmental stakeholders such as the Ocean Protection Council, the California Coastal Commission, non-federally recognized tribes, fishermen, and environmental organizations lack the environmental data analysis needed to make informed decisions on appropriate locations for WEAs. One way to enable these stakeholders to more fully participate in siting decisions is to leverage the Data Basin's ample resources.

We are supportive of the Data Basin Gateway (Gateway) effort and appreciate the CEC and BOEM's work to make it an inclusive and collaborative federal, state, and stakeholder collaboration. The Gateway now contains over 700 data sets that are intended to guide siting decisions by providing the ecological lens through which decisions should be made. We believe more time and resources are needed to fully analyze and process the data currently in the Gateway and are concerned there are insufficient resources and staff time to fully harmonize and synthesize the enormous volume of studies the site contains.

There is an outstanding need for BOEM to be able to analyze multiple layers simultaneously and provide fine scale detail in certain areas of interest. At present, the low resolution of and gaps inherent in some of the data preclude such careful analysis. Maps that overlay BIAs, krill hot spots, species-specific

[204] "BOEM…endeavored to exclude from Call Areas those places where preliminary analysis indicated the presence of high concentrations of marine mammal and avian species potentially impacted by offshore wind development."

seasonality and sensitivity data, boundaries of protected areas, bathymetry, and areas of developer interest for wind development are still needed.

Decision-support tools should also be developed that assist the user in navigating, overlaying, and interpreting these multiple data layers. The process for creating these maps and tools should be publicly available and guide CEC and BOEM in identifying areas of high environmental importance and/or sensitivity that minimize the risks of offshore wind development to the marine environment.

b) Conduct research to address key data gaps and specify a plan to incorporate ongoing and future scientific studies into project siting

In making this recommendation, we commend BOEM for its completed and planned research that will inform analysis and decision-making of offshore wind development. For instance, BOEM is currently undertaking two studies on seabird and marine mammal abundances in the Central Coast that have the potential to fill some critically-important data gaps.

The offshore wind industry is in nascent stages in California—even the most ambitious projections for a first offshore wind project do not anticipate an initial deployment until 2024. With this amount of time, it is entirely feasible to incorporate these baseline studies and data analysis that are needed to minimize risks to the marine environment into the OCS leasing process, and in so doing, advance the industry in an expeditious manner that reduces risk for businesses. The data gaps presented here fall into two major categories: location-specific biological or ecological data; and environmental impacts associated with floating offshore wind technology.

For each resource category, there is a consistent theme – in order to site offshore wind developments there is an outstanding need to collect biological data at appropriate spatial and temporal scales.[205] For many of the species with known distributions, the data are not of high enough resolution to make localized decisions. If not already in process, sufficient resources and time should be allocated to carry out this analysis at a resolution capable of informing marine planning decisions. Our analyses of the fishes and marine mammals present in the three Call Areas shows the great extent to which key biological events occur seasonally. For instance, groundfish spawning events occur annually in the fall, and there is greater predicted blue and fin whale density within the Call Areas during the summer and early fall months.

As BOEM undertakes research to support offshore wind leasing decisions and development in California, the agency's studies should include at least three years of baseline research on affected species and habitats. These surveys should be conducted at a spatial and temporal scale appropriate to the size of the prospective lease area and include the temporal variability of the species and habitats of concern. From both the standpoint of basic statistical assumptions, and also the inter-annual biological variability of the region, anything less than three years of marine mammal data would be an inadequate baseline from which to assess potential environmental impacts.

BOEM should undertake research to fill key data gaps on species and habitats and to resolve questions about wildlife interactions with utility-scale, floating wind development. In prioritizing research funding, BOEM should include research that aids in evaluating the cumulative impacts of multiple offshore wind developments on Pacific wildlife species and populations. We recommend that CEC, BOEM, and other relevant agencies also analyze and model the potential synergistic and cumulative impacts of initial projects. This modeling should consider present and future ocean conditions.

[205] Furness, Wade, and Masden (2013), "Assessing Vulnerability of Marine Bird Populations to Offshore Wind Farms."

Here we highlight some of top research priorities for benthic habitat, fish, seabirds, and marine mammals. These categories are a representative sample of some, but not all, elements of the marine ecosystem upon which offshore wind development may have an impact.

Benthic habitat:
Although there are some data available that generally describe the type of habitats in each of the Call Areas, there is a need for: (1) detailed ground truthing of current mapping; (2) mapping in areas where there are data gaps on substrate composition and biological communities; and (3) updated biological surveys of areas that were previously surveyed to ensure potential offshore wind sites minimize impact to benthic communities and avoid HAPC and EFH Conservation Areas. New technologies such as rapid deploy landers and autonomous underwater vehicles and improvements to towed camera sleds make this work both highly feasible and affordable.

Fish:
BOEM has acknowledged that there are deficiencies regarding current fishing data and data gaps related to commercial fishing. Although fish landings data will provide the most comprehensive view of estimated fish presence around each of the Call Areas, it must be noted that this will not accurately elucidate where fish are caught as catch records are only recorded at ports. It would therefore be beneficial to combine logbook data, catch records, and Automatic Identification System and Vessel Monitoring System data to give spatially explicit estimates of fish abundance and exact presence in the Call Areas. If this is not possible due to data privacy issues, a more thorough review of catch records is still worthwhile given that it is in the economic interest of fishers to land fish near where it is caught in order to minimize travel costs.[206]

The impacts of warming sea surface temperatures and changes in upwelling intensity along the California coast underscores the importance of considering the future impacts of climate change on CPS and HMS populations.[207] For example, changes in the reproductive performance of marine birds in the Southern California Current System[208] reiterate the importance of the link between changes in oceanographic conditions and the performance of resident animal populations. Understanding resultant changes in the productivity of California's marine fisheries will also be an important consideration under future climate change scenarios.[209]

It will be important to verify the migratory periods and any persistent or seasonally-occurring oceanic habitat features associated with fish species of commercial interest and/or ecological importance that may occur within the Call Areas. Information about timing and location of these habitat features may be used to mitigate potential impacts to fisheries. For example, by adopting temporal closures to windfarm vessel traffic and/or cessations in windfarm activity during important fish-related events such as spawning, migration, and aggregation, developers can minimize impacts of offshore wind development to commercial fisheries. NOAA has established BIAs for cetaceans and HAPC for groundfish – establishing a similar concept for CPS and HMS would be useful to help guide wind farm siting decisions. New and

[206] BOEM has also noted the need for a more thorough review of catch records, "*BOEM is continuing with its outreach efforts to the fishing industry and requesting additional information regarding recreational and commercial fisheries that operate within the Call Areas, particularly related to fishing gear types, seasonal use of areas and general recommendations for reducing conflicts. BOEM will consider new information at the Area Identification stage of its planning process as a result of essential fish habitat consultations under the Magnuson Stevens fishery Conservation and Management Act."*
[207] Snyder et al. Future climate change and upwelling in the California Current System, Geophysical Research Letters, 2003.
[208] Sydeman et al. Climate change, reproductive performance and diet composition of marine birds in the southern California Current System 1969-1997. Progress in Oceanography, 2001.
[209] Sumaila et al. climate change impacts on the biophysics and economics of world fisheries. Nature Climate Change 2011.

better methods of population estimation and stock assessments will be invaluable and should be targeted at species of importance in Call Areas.[210]

Any future field surveys must be conducted at spatial and temporal scales relevant to the Call Areas and the species and habitats of interest. The community turnover rates that account for local biological variability should also be studied to help ensure statistical robustness of conclusions drawn from such studies.[211]

Acoustic and EMF effects and thresholds for fish species of interest and particular concern need to be established. These noise levels should then be compared to the levels of each that will occur when the windfarms are being built and when they become operational. These studies can occur as laboratory-based experiments and should be completed before offshore windfarms are established.[212]

Seabirds

There are abundant vessel-based survey data on seabird occurrences from many sources. Much of the data are widely available, and provide extensive information on seabird occurrence, abundance, and community structure in the California Current at large spatial scales. Yet, there remain significant data gaps of seabird distributions in the three Call Areas at the spatial and temporal resolution needed to design efficient and effective development and mitigation plans to minimize negative impacts on seabirds in the Call Areas. Baseline data at the appropriate spatial and temporal resolutions on all relevant seabird species is a critical data need. The information generated from the *Seabird and Marine Mammal Surveys Near Potential Renewable Energy Sites Offshore Central* study and the *Southern California* and *Pacific Marine Assessment Partnership for Protected Species* (PACMAPPS) study should influence siting decisions.[213]

Further, the transition of the CCE from a subarctic system toward a subtropical system is influencing shifts in species ranges and at-sea distributions, seabird community compositions, and species distributions.[214] It will therefore be important to consider not just current overlap in species ranges with OWEI areas, but also predicted overlap in different climatic scenarios.

As a first approach to evaluating species-specific risk to OWEI, planners and managers should familiarize themselves with the work of Kelsey *et al*. (2018) and Adams *et al*. (2016) which uses a generalized framework to rank seabird species of the CCE based on population vulnerabilities as well as vulnerabilities to wind-turbine collision and displacement.[215] It is then critical that subsequent studies model precise species-specific risks to bird-turbine collision risk using empirical data collected at each site,[216] incorporating wind and wave conditions, seabird behavioral state and detailed flight characteristics, and turbine features. Measurements of flight behavior at sites should also occur in each season, since seasonality will influence behavior and wind and wave conditions, and, accordingly flight

[210] Ralston et al. Predicting market squid (*Doryteuthis opalescens*) landings from pre-recruit abundance. Digital Commons at the University of Nebraska – Lincoln 2018.
[211] Bailey et al. Assessing environmental impacts of offshore wind farms: lessons learned and recommendations for the future Aquatic Biosystems. 2014.
[212] If time and or budgets are limited, an effective approach to understand these impacts would be to group functionally and biologically similar species and test individuals from each group. For example, one small CPS (sardine or anchovy), on common shark species, one rockfish and one benthic species could be tested.
[213] The PACMAPPS study has the potential to last for three years, which would dramatically bolster statistical integrity of the data. Having at least three years of monthly ship and aerial pre-development baseline data on the presence and abundance of key species, including marine mammals and seabirds, is an especially important component of setting a high environmental bar.
[214] Wolf et al. Predicting Population Consequences of Ocean Climate Change for an Ecosystem Sentinel, the Seabird Cassin's Auklet. 2010.
[215] Kelsey et al. (2018), "Collision and Displacement Vulnerability to Offshore Wind Energy Infrastructure among Marine Birds of the Pacific Outer Continental Shelf"; Adams et al. (2016), "Collision and Displacement Vulnerability among Marine Birds of the California Current System Associated with Offshore Wind Energy Infrastructure."
[216] Ainley et al. (2015), "Seabird Flight Behavior and Height in Response to Altered Wind Strength and Direction."

characteristics.[217] The deployment of bio-logging devices (such as Global Positioning System (GPS) devices, altimeters, and accelerometers) on targeted seabird species combined with sophisticated statistical methods can increase the accuracy of modeled flight heights, such as the error-corrected altitude measurements from GPS devices using Bayesian state-space modeling to model flight heights of black-backed gulls.[218] Flight reconstructions from bio-logging technology, such as GPS devices, altimeters, and accelerometers, can also provide information on fine-scale flight differences and regional use between day and night.

Seabird species' behavioral responses of attraction or avoidance to windfarms need to be: 1) quantified; and 2) used in models to evaluate population effects of both habitat displacement (avoidance species) and increased collision risk (attracted species).

Marine mammals
There is a need for additional studies on marine mammal distribution on the Central and North Coasts, and on the potential impacts of floating offshore wind development. Given the nascence of floating offshore wind technology, there is a need for empirical assessments of the impacts of offshore floating wind turbines. Studies to assess potential impacts to marine mammals in Scotland should be implemented and made publicly available as soon as possible. These studies will provide valuable information, yet should not supplant the marine mammal studies for the CCE that are needed.

Data on basic biological data including distribution, critical habitat, and migration data are lacking for a number of large whale species including North Pacific right whales and minke whales; this lack of basic data makes it difficult to access potential impacts to marine mammals. BIAs have been defined for grey whales (feeding and migration), blue whales (feeding), and humpback whales (feeding), and were explored for fin whales but not designated.[219] BIAs have not yet been defined for a variety of additional species, and need to be explored for additional species including minke whale (*B. acutorostrata*), killer whale (*Orcinus orca*), beaked whales (Ziphiidae), and sperm whale (*Physeter macrocephalus*).

Baseline data on noise levels is needed in offshore Call Areas, with 'control' sites for future monitoring. It is critical to understand sound propagation at varying distances from lease sites to understand how sound moves in certain areas, and across different frequencies. Per the fish recommendations above, there is also a need to understand the impacts of noise on marine mammal prey species (i.e. krill and small schooling fish) – particularly the impact from operational use of turbines, for which data are severely lacking.

VIII. MONITORING AND MITIGATION RECOMMENDATIONS

We urge BOEM to prioritize siting and leasing decisions that <u>avoid</u> areas that have the highest potential for deleterious environmental impacts.

Any new offshore energy development may have impacts on the marine environment. Recognizing that even with the most conservation-oriented siting decisions there may still be wildlife and habitat impacts, we offer some preliminary mitigation and monitoring recommendations in the Appendix of this letter. Pre-construction monitoring and subsequent monitoring will be essential to ensuring that offshore wind

[217] Id.
[218] Ross-Smith et al. (2018), "Modelling Flight Heights of Lesser Black-Backed Gulls and Great Skuas from GPS: A Bayesian Approach."

development proceeds in a manner that maximizes benefits and reduces impacts. This preliminary list is not exhaustive, and we anticipate many other mitigation measures would be proposed that are tailored to the location, scale, and other project specifics.

VIII. CONCLUSION

Our organizations believe that offshore wind resources in California can and must be developed in an environmentally sound manner that reflects the vital importance of California's unique marine environment. Californians are acutely aware of the high price of climate change and our organizations believe that offshore wind along the Pacific Coast may be an important part of shifting away from dirty fossil fuels and fighting carbon pollution. The proposed Call Areas are key habitat for a host of marine resources including large baleen whales, fragile sponges and corals, commercially-valuable fish, and iconic albatrosses. While floating technology offers some advantages over fixed offshore wind projects with respect to potential ecosystem impacts, both the ecological importance of the proposed Call Areas and novelty of the technology require an abundance of caution as BOEM considers the Humboldt, Morro Bay, and Diablo Call Areas for WEA designation.

As BOEM evaluates these Call Areas for OCS leasing, we urge the agency to follow an inclusive, transparent, and science-based process, and to work quickly to identify areas of high environmental importance and/or sensitivity, as well as areas of potential conflict, so as not to delay the offshore wind planning progress. We believe that BOEM has sufficient time to incorporate the baseline studies and data analysis that we have described in this letter into the OCS leasing process, and in so doing, advance the industry in an expeditious manner while also minimizing risks to California's unique and valuable marine environment. Ensuring that leasing decisions in the proposed Call Areas are guided by comprehensive baseline research and full consideration of potential impacts to protected marine areas will lay the groundwork for the ultimate expansion of offshore wind energy.

We thank you for the opportunity to comment.

Respectfully submitted,

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Natural Resources Defense Council

Linda Krop
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Appendix – Preliminary Monitoring and Mitigation Recommendations

We recommend a precautionary approach to development, in a phased manner to allow for a robust assessment of impacts to both the immediate and surrounding areas. This preliminary list is not exhaustive, and we anticipate many other mitigation measures would be proposed to reflect the location, scale, and other project specifics of any new offshore wind development. Some recommendations for monitoring and mitigation follow.

Baseline surveys and ongoing monitoring

- Comprehensive pre-installation and ongoing monitoring should be implemented to assess individual species present and relevant biophysical processes.[220]
- Seasonal and inter-annual monitoring of site-specific seabird occurrence and abundance should occur.
- Conduct digital surveys to: facilitate more robust and accurate wildlife monitoring methods through digital video aircraft surveys conducted in both manned[221] and unmanned aircraft;[222] enable higher flight altitudes; and decrease observer and distance biases and increase the number of identifiable bird sightings.[223]
- OWEI design needs to include systems for continual monitoring of bird collisions with multi-sensor array and central on-board processing systems integrated into the turbines themselves.

Design considerations

- Design should include high-tech safeguards, such as deterrence systems, and/or detection systems (e.g. thermal cameras, radar, artificial intelligence software for identifying species). Already existing land-based avoidance and detection systems can auto-detect species of special concern (e.g. eagles, condors) in turbine areas and subsequently communicate a signal for temporary cessation of turbines; it is important that funding is available to support research and development to adapt this technology to offshore wind infrastructure.
- Evaluate "snagging risk" of derelict fishing gear on cables within the mooring system of floating turbines.
- Incorporate tracking data into site planning and to help reveal spatiotemporal dynamics of seabird occurrence in or near Call Areas, particularly for species of conservation concern and those that have higher collision and/or displacement risks.
- Place anchors and mooring cables in areas of relatively lower ecological importance and avoid setting anchors during important ecological events (i.e. fish spawning).
- Time construction and maintenance to occur during periods of relatively lower ecological importance (seasonality).
- Use acoustic dampening devices/techniques to minimize noise (and for vessels).[224]
- Calculate most efficient vessel use within areas to reduce vessel duration and noise within areas and vessel transits.
- Design/use electromagnetic shielding technologies and/or insulations on transmission cables and turbine platforms.
- Use wave dampening technologies to reduce turbine movement and subsequent sea bottom scour.

[220] Biophysical processes encompass abiotic and biotic conditions which include the chemical, biological, physical and ecological components present. This type of monitoring will allow for assessment of impacts from installation and operation including those associated with exclusion zones for fisheries that will be established around the platforms.
[221] Žydelis et al. (2019), "Comparison of Digital Video Surveys with Visual Aerial Surveys for Bird Monitoring at Sea."
[222] Gray et al. (2018), "A Convolutional Neural Network for Detecting Sea Turtles in Drone Imagery."
[223] Žydelis et al. (2019), "Comparison of Digital Video Surveys with Visual Aerial Surveys for Bird Monitoring at Sea."
[224] Robertis and Handegard, Fish avoidance of research vessels and the efficacy of noise-reduced vessels: a review, ICES J. of Mar. Sci. 2013

- Use ecologically "friendly" biocides for the antifouling of structures.
- Use wire-walker[225] cleaning devices for cables and manual cleaning of turbine bases.
- Use of lower risk mooring systems, such as taut configurations, or catenary with chain and/or polyester configurations instead of nylon.[226] Consider the use of risk assessments similar to those described in Benjamins *et al*. to assess entanglement risk of various turbine configurations, and with respect to the structure of oceanographic conditions in the region (e.g., currents).
- Use of color on mooring and other lines should be considered as a means of reducing entanglement. (For example, sea turtles respond to varying UV wavelengths.)

Operations

- Consider cessation of operations during ecologically important times (e.g. migrations, spawning etc.)
- Conduct regular and indefinite surveys of structures for lost/discarded gears (visually and/or acoustically) noting that the potential for net pollution will increase if biofouling increases over time. Derelict gears may snag on moorings presenting an increase in entanglement risk; autonomous underwater vessels could be used to regularly check for attached gear. The frequency and type of monitoring, and how derelict gear would be removed should be included in all environmental assessments; derelict gears could potentially be detected using tension monitors.
- Employ divers, ROVs or wire-walker-type apparatus to clear fouled gears.
- Consider the use of biodegradable or ropeless fishing gears in neighboring fishing grounds.
- Near real-time dynamic management tools such as Whale Alert,[227] WhaleWatch,[228] and EcoCast,[229] or the development of dynamic management tools,[230] can be used to determine when whales and turtles are or are likely to be present, allowing for either cessation or slowing of construction or maintenance vessel traffic.
- Monitor tension of lines to detect entanglement of large marine species; wireless tension monitors can be connected wirelessly to remotely alert to the presence of a potentially entangled species.[231] Similarly, wireless video can potentially also be used to monitor for potential entanglement at key parts of the turbines, such as the cables; video can be used in conjunction with tension monitoring to ground truth potential entanglements remotely.
- A reporting structure should be in place to report entanglement of marine species in mooring lines and associated gears, giving NOAA the ability to trigger emergency procedures similar to Biological Opinions that occur in other industries, such as fishing.
- Biological risk assessments similar to those described in Benjamins *et al*[232] could be conducted to determine what local species have the greatest probability of entanglement. Mitigation responses could be tailored to those species using suggested mitigation techniques herein or beyond.

[225] e.g. http://delmarocean.com/wirewalker/ - but adapted for cleaning of cables
[226] Benjamins et al. (2014).
[227] Wiley, D., Hatch, L., Schwehr, K., Thompson, M., and MacDonald, C. (2013). Marine Sanctuaries and Marine Planning. *Proceedings of the Marine Safety & Security Council, the Coast Guard Journal of Safety at Sea* 70(3)**,** 10-15.
[228] Hazen et al. (2016).
[229] Hazen, E.L., Scales, K.L., Maxwell, S.M., Briscoe, D.K., Welch, H., Bograd, S.J., et al. (2018). A dynamic ocean management tool to reduce bycatch and support sustainable fisheries. *Science advances* 4(5)**,** eaar3001.
[230] Maxwell, S.M., Hazen, E.L., Lewison, R.L., Dunn, D.C., Bailey, H., Bograd, S.J., et al. (2015). Dynamic ocean management: Defining and conceptualizing real-time management of the ocean. *Marine Policy* 58**,** 42-50. doi: 10.1016/j.marpol.2015.03.014.
[231] Personal communication, Caroline Carter, Scottish Natural Heritage
[232] Benjamins et al. (2014).

October 10, 2017

Dr. Craig Shuman
Marine Region Director
California Department of Fish & Wildlife
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109

RE: Readying California's Fisheries for Climate Change Through the MLMA Master Plan Update

Dear Dr. Shuman:

Please accept the following comments on priority actions the California Department of Fish and Wildlife (CDFW) should take to ready California's fisheries for climate change.

Ocean Science Trust (OST) prepared a report, Readying California Fisheries for Climate Change, as an information gathering project in support of the Marine Life Management Act (MLMA) Master Plan amendment. It outlines the risks and management challenges California fisheries will face in coping with a changing ocean environment. The report provides sound scientific background on the potential impacts of, and feasible management responses to, these risks and challenges. We concur with the report's core findings and recommendations, and believe CDFW can and must implement several of its key recommendations. At least two of the report's climate scenarios—increased variability and range shifts—will occur, and require adaptation and response in California fisheries management.

We provide below suggested priority actions that CDFW should take to ready state-managed fisheries for climate change. These suggestions are intended to highlight several of the OST recommendations and explain why they should be prioritized. We appreciate that California has limited resources with which to manage its fisheries, and may not be able to pursue all of the suggestions in the OST report simultaneously. Yet the Department can take action in several tangible ways, and it is important to do so now; climate change is already underway and affecting California's fisheries. To the extent possible, we also provide a discussion of how these recommendations fit within the draft Amended Framework for MLMA-based Management (draft MLMA Framework).

1. Partner with NOAA to Conduct Climate Vulnerability Assessments for California Stocks

Recommendation 1.4 from the OST report is to evaluate the vulnerability of managed fish stocks. This recommendation should be a top priority for CDFW. Evaluating a stock's vulnerability to climate change is a necessary first step to creating climate-ready fisheries; without a sense of which stocks will be most affected by climate change, it is hard to know where to start.

NOAA has developed a Climate Vulnerability Assessment Methodology, which qualitatively evaluates species' exposure and sensitivity to climate change. NOAA's methodology yields an overall assessment of vulnerability to climate change, as well as vulnerability to specific stressors, which can be useful in targeting management responses. This methodology has recently[1] been applied to a number of West Coast fish stocks, some of which overlap with California management.

NOAA's climate vulnerability assessment methodology provides a good template, which should be adopted for use in California fisheries management. Specifically, CDFW should pursue a partnership with NOAA to get further climate vulnerability assessments done for California-managed species, using the NOAA methodology. Resource constraints may preclude doing a climate vulnerability assessment for all California-managed species, in which case CDFW could choose a subset of priority stocks to receive climate vulnerability assessments. Priority should be given to stocks for which experts believe climate change will be a relevant consideration, and that have high commercial, recreational, or ecological importance.

2. Integrate Climate Vulnerability Into the Draft MLMA Framework

The results of a climate vulnerability assessment for California-managed species can and should be integrated into the risk assessment structure proposed in the draft MLMA framework. The draft framework currently uses Productivity-Susceptibility Analysis (PSA) and Ecological Risk Analysis (ERA) to evaluate the risks in each fishery. We recommend incorporating climate vulnerability assessment as an additional tool to be used in this first-round evaluation of fisheries.

The results of a climate vulnerability assessment are qualitative, like the results of a PSA and ERA, and should be fairly straightforward to incorporate into a final evaluation of risk for a fishery. While not all California-managed stocks may receive a climate vulnerability assessment, those that do should have the results factored into their overall risk evaluation under the MLMA framework. Doing so will help identify fisheries likely to require special management measures and approaches—which are discussed below—to help them meet the challenges of a changing ocean climate.

[1] The Northwest and Southwest Fisheries Science Centers have completed this climate vulnerability assessment. The results are being written up, and are expected to be released soon; overview slides are available through the Pacific Fishery Management Council's briefing book.

3. Manage for Population Structure

Recommendation 1.3 from the OST report is to manage for population structure. This should be a centerpiece of CDFW's management for climate-vulnerable species. CDFW can enhance fish stocks' resilience by using management measures that maintain and strengthen the reproductive capacity of fish populations. Reduced harvest pressure on larger, older individuals in fish populations is critical, since these fish generally play an outsize role in a stock's overall spawning potential. Reduced harvest pressure on older fish can be accomplished through measures such as maximum size limits, gear restrictions, and closed areas, along with measures that promote the retention of smaller mature fish. These management measures will help to mitigate the potential for evolutionary changes favoring smaller or slower-growing fish, which tend to reduce reproductive capacity.

Ensuring a diverse age structure is a recommendation for a specific type of management approach. As such, it is probably best located in the "management scaling component" portion of the draft MLMA framework, and particularly in the step currently entitled "what should management strategies be?" The Data-Limited Toolkit uses an age-structured operating model and can evaluate the effects of changing age structure in a population, to the extent it affects model outputs such as long-term average biomass and yield levels. Several of the existing management procedures in the Toolkit directly affect age structure (primarily via size selectivity control rules), and customized management procedures can be coded in order to achieve particular age structure goals (for example, various size limit control rules, including slot limits, were coded for Barred Sand Bass during the Toolkit demo run). It is important to note, however, that the Toolkit itself cannot directly quantify the amount of climate resilience created by restoring/improving the age structure of a population; that estimation will have to rely on expert opinion.

4. Apply Additional Precaution in Management of Climate-Vulnerable Species

Recommendation 1.2 from the OST report is to apply the precautionary principle in stock management. This means stocks assessed to be of greater climate-vulnerability should receive one or more forms of additional management precaution. This is a very important recommendation, which can be implemented relatively easily within the draft MLMA framework.

In general, climate-vulnerable stocks will tend to experience higher variability in abundance and spawning success, greater uncertainty in recruitment projections, and more risk of crossing tipping points from which recovery will be difficult and costly. To mitigate this risk, larger buffers should be applied between knife-edge overfishing estimates (i.e., the level of removals calculated to have a 50% probability of overfishing) and the operative catch limits.

A few points bear mentioning about buffers. First, precautionary buffers are warranted for many reasons, including to account for scientific uncertainty, management uncertainty, and vulnerable life-history traits. Climate vulnerability is simply one further—but important—reason to increase the size of

buffer for a stock. Second, buffers should be additive, such that each conceptual reason to have a buffer corresponds to a further reduction in catch. It is not appropriate to set a buffer for one reason (for example, climate vulnerability) and then argue that the same buffer serves to account for a different reason (for example, scientific uncertainty). Third, although buffers are commonly thought of in terms of catch limits, they can be applied in some non-catch limit situations. For example, if a fishery is managed with time and area closures and managers want to increase the level of precaution to account for climate vulnerability, it may be possible to increase the time and/or area closures by a certain amount, to buffer the amount of fishing pressure on the stock.

Applying precautionary buffers to climate-vulnerable species is a management strategy and should be addressed at the "what should management strategies be?" step of the draft MLMA framework. For climate-vulnerable species, we encourage CDFW to specify one or more possible climate-vulnerability buffer approaches prior to running the Data-Limited Toolkit, and to add these custom management procedures to the Toolkit to the extent possible.[2] As noted above with population structure, the Toolkit is not able to provide a quantification of the climate resilience created by any particular buffer approach, but it can at least provide an evaluation of the effect of each buffer approach on long-term biomass and yield levels. The specific degree of climate resilience created by a particular increase in biomass should be evaluated through expert opinion, and treated as a qualitative performance metric when selecting a management procedure.

5. Consider Climate-Responsive Management Strategies

The previous two sections recommend ways of improving the health of a fish population generally, thereby setting it up to be more resilient in the face of climate change. CDFW also should consider using specific climate-responsive management strategies for fisheries that have been determined to be particularly vulnerable to climate change, as suggested in Recommendation 3.1 of the OST report. This means managing a fishery in a way that is dynamic and responds to changing conditions.

One type of dynamic management involves integrating ecosystem indicators into harvest control rules. In some fisheries, a connection can be drawn between a climate or oceanographic variable (sea surface temperature, upwelling, el Niño conditions, etc.) and a stock's ability to withstand fishing pressure. When this connection is established, harvest control rules can be designed that incorporate the ecosystem indicator and produce tailored estimates of available harvest—allowing increased catch when productivity is high, and reducing catch when conditions worsen. The identification and use of ecosystem indicators as a method to understand, anticipate and manage ecosystem effects on fisheries is a rapidly growing and promising area for managing fisheries in the face of climate change. Ecosystem indicators can benefit management by helping match fishing activity with the ecological context in which it occurs.

[2] The Toolkit's current version contains a few pre-set management procedures that incorporate buffers (e.g., curE versus curE75), but most of the pre-set management procedures do not have a buffered version and will need to be customized.

Establishing a connection between a species' productivity (or other characteristic) and an ecosystem indicator can be difficult, and Recommendation 3.5 in the OST report discusses the extensive research and monitoring necessary to establish these linkages. It may be that most California stocks do not have a sufficiently clear relationship with environmental conditions (or lack the research needed to establish it), but CDFW should at least consider the possibility and review available data sources for each stock to see if this type of dynamic climate-based management is possible. Furthermore, CDFW should remain actively engaged with federal partners—such as NOAA's National Centers for Environmental Information—and others in developing ecological indicators for California species.

A different type of dynamic management involves responding to changes that are internal to the stock. Harvest control rules can be designed that adjust fishing pressure in response to a stock's biomass level (for example, stopping fishing when biomass declines below a certain threshold), or distribution (reducing harvest in a particular area when observations are down), or some other attribute of the stock. This type of control rule in some situations can be thought of as climate-based management: when the stock responds in some way to a changing climate, the control rule in turn responds to the changed stock. Whether these are truly "climate-based" control rules depends on the situation, as factors other than climate change may drive the changes in the stock. Either way, though, control rules that respond to changes in the target stock are worthy of consideration—simply as a matter of good fisheries management.

Dynamic harvest control rules[3] are a management strategy, and fall clearly in the "what should management strategies be?" step of the draft MLMA framework. It may be possible to evaluate these control rules with the Data-Limited Toolkit, to the extent the control rule's independent variable is part of the Toolkit's operating model. When it is not possible to evaluate a climate-responsive management strategy through the Toolkit, we recommend CDFW still give it consideration, even if this means evaluating it in a qualitative manner independent of the Toolkit.

6. Manage for Social and Economic Resilience

One of the broad approaches identified in the OST report is to manage fisheries for social resilience. We agree that social—and economic—resilience should be a goal for CDFW in managing fisheries to be ready for climate change. Climate change is expected to alter ocean conditions and population dynamics in fish stocks, and the human side of California's fisheries needs to be ready to respond to these changes by potentially reducing effort, modifying target areas, or exploring new types of fishing. Adaptive responses by fishery participants require capital investment, risk management, and social cohesion and cooperation. For this reason, the more socially and economically resilient a fishery is, the better able it will be to pivot and respond to changed circumstances. Conversely, the more socially

[3] Note that while the discussion above uses the term "harvest control rule," which is usually associated with catch limits (output controls), the concept of dynamic climate-responsive management can also be incorporated into other types of management.

fragmented and economically marginal a fishery is, the more difficulty it will have in responding and adapting to new conditions.

To promote this type of climate resilience on the human side of the fishery, we recommend CDFW conduct several reviews at a relatively high level (i.e., not limited to a particular fishery or FMP) and consider their implications. First, CDFW should evaluate permit transferability in California fisheries, including how permits are retired and how new permits are issued. Permit transferability is important for economic resilience because it affects fishery participants' ability to adapt to changed conditions by entering and exiting fisheries, or shifting fishing between different geographic regions.

Second, CDFW should evaluate the gear switching potential in California fisheries. This is relevant not only in fisheries that already have multiple gear sectors, but also in fisheries that only have one gear sector; the latter may see gear innovation or the introduction of new gear in response to changed conditions. Note that gear switching is related to permit transferability, because in some fisheries different permits are required to fish with different gears.

Third, CDFW should evaluate the potential of creating a fisheries insurance program—including both policy design issues and feasibility considerations. Recommendation 2.3 from the OST report mentions this idea and provides background references; we agree it is a topic that merits investigating. A key concern would be to avoid creating perverse incentives or subsidizing unsustainable fishing behavior, while still managing to buffer severe short-term costs for members of industry.

As a general matter, cost-spreading and low barriers to entry/change are desirable, as these things tend to improve stability and adaptability within fisheries. At the same time, however, extreme flexibility in permitting and gear requirements can make it difficult to keep fishing effort under control. Any policy improvements in these areas will have to be nuanced in order to balance tradeoffs between the desired level of fishery diversity and regulatory control, which is why these topics merit thorough investigation before changes are made in specific fisheries.

Once CDFW is ready to consider making changes in specific fisheries, those changes should be considered in both the prioritization component (likely the economic opportunities section) and in the management scaling component (both in evaluating management strategies and in writing the relevant scaled management document) of the draft MLMA framework.

7. Get Ready To Manage Changing Stocks

While some of the recommendations above will help fishing fleets and communities adapt to range shift in their targeted stocks, range shift also needs to be dealt with on a biological level. Range shift interfaces with management in three broad ways: emerging fisheries, moving fisheries, and declining fisheries.

Emerging fisheries are when previously non-target and unmanaged stocks become attractive to harvest. This can occur due to range shift (for example, a species showing up in newly high concentrations), as well as economic reasons. The California Fish & Game Commission's Emerging Fisheries Policy provides criteria that CDFW should follow in identifying when a previously unfished stock is becoming an established fishery, and what additional or new measures are needed to manage the fishery effectively. Changes in the distribution of populations, combined with fishing fleet dynamics and needs are likely to result in more application of the Emerging Fisheries Policy than in years past, which may place additional pressure on CDFW resources. To get ahead of this problem, CDFW should consider fleshing out the Commission's Emerging Fisheries Policy by laying out a clear, science-based pathway for evaluating, experimenting and permitting such fisheries. This permitting framework should be designed with the goals of fleet flexibility, agency workload and capacity, and above all, resource sustainability. There is no dispute that new targeting of fish populations should proceed slowly and with careful monitoring, in order to avoid overfishing, overcapitalization, or rapid depletion of fish stocks. As such, CDFW should include clear mechanisms to protect against overly-rapid exploitation, when designing this permitting framework. This recommendation appears to fall outside the draft MLMA Framework, and may best be incorporated into CDFW's 5-year work plan.

Moving fisheries are when an existing fishery undergoes spatial or temporal shifts. This creates vulnerability at both the leading edge and the trailing edge of the species' range. At the leading edge, populations are relying on dispersal events and subsequent reproductive success to colonize new areas, and conditions may be close to the species' limits on survival.[4] Leading edges may need to be managed with reduced fishing pressure to allow for maximum viability of the local population. At the trailing edge, populations may be experiencing pronounced climate effects (e.g., temperature stress, pH stress), which may cause reduced recruitment or growth rates.[5] Trailing edges may need to be managed with reduced fishing pressure to avoid compounding existing threats to the population's viability. In addition to these direct population viability concerns, a species' overall capacity for adaptation can be jeopardized by excessive mortality at its leading and trailing edges. This is because range edges may contain differentiated genotypes—with leading edges favoring individuals within a species that respond successfully to new conditions, and trailing edges selecting for individuals that are most robust to adverse conditions.[6] Fishing pressure on these range-edge populations can cause the loss of important genetic reserves, severely limiting the species' evolutionary capacity going forward and increasing the

[4] See, e.g., Evan M. Rehm et al., Losing Your Edge: Climate Change and the Conservation Value of Range-Edge Populations, 5 Ecol. & Evolution 4315, 4317 (2015); A. Hampe & R. Petit, Conserving Biodiversity Under Climate Change: the Rear Edge Matters, 8 Ecol. Letters 461, 462 (2005).

[5] See, e.g., Rehm et al. at 4316; Hampe & Petit at 464.

[6] See, e.g., Rehm et al. at 4316, 4318; Lee Hannah et al., Fine-Grain Modeling of Species' Response to Climate Change: Holdouts, Stepping-Stones, and Microrefugia, 29 Trends in Ecol. & Evolution 390, 395 (2014); Hampe and Petit at 461-64; C.D. Thomas et al., Ecological and Evolutionary Processes at Expanding Range Margins, 411 Nature 577 (2001).

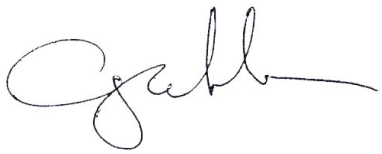
risk of extinction. This provides another important reason to limit fishing pressure on leading and trailing edge populations. CDFW should consider these issues when evaluating management strategies and creating scaled management documents under the draft MLMA framework, for species undergoing range shift. Existing tools to manage spatial aspects of harvest include the use of conservation zones and closures, modified fishing seasons, and regional management arrangements such as those contemplated in the Nearshore Fishery Management Plan.

Declining fisheries are when a fish stock starts to exhibit reduced viability due to changed conditions. This may manifest in increased natural mortality, lower recruitment, slower growth, or lower maximum size/age. Declining fisheries should be managed similar to trailing edge populations, with reduced fishing mortality. Reducing or stopping fishing entirely can help the species persist as long as possible, increasing the possibility of recovery or migration to a more suitable habitat. And as with trailing edge populations, the remaining individuals in declining fisheries can contain the most robust genotypes, making them important for potential recovery. CDFW should lay out a framework for identifying declining fishery situations and applying specific ramp-down harvest policies. This framework should be articulated in a higher-level policy document, and potentially added to CDFW's 5-year work plan.

* * *

Our organizations recommend the foregoing management approaches as priorities in readying California fisheries for the challenges posed by climate change-induced ocean change. Thank you for the opportunity to provide comment on this important subject.

Sincerely,



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Vice President
Heal the Bay

Cc: Debbie Aseltine-Neilson, CDFW; Huff McGonigal, Fathom Consulting; Kelly Sayce, Strategic Earth Consulting

Wade Crowfoot
Secretary for Natural Resources
Chair, California Ocean Protection Council
California Resources Agency
1416 Ninth Street, Suite 1311
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April 19, 2019

Comments on *Strategic Priorities to Protect California's Coast and Ocean 2019-2024*

Dear Secretary Crowfoot and Members of the Ocean Protection Council:

The Natural Resources Defense Council appreciates the Ocean Protection Council's (OPC) leadership in marshaling and coordinating state resources to protect marine and coastal ecosystems. We support the broad goals outlined in OPC's five-year strategic plan and submit these comments to highlight key principles we hope OPC will take into account as it finalizes and implements its strategic plan.

1. **Safeguarding Coastal and Marine Ecosystems and Communities in the Face of Climate Change**

We support OPC's goal of safeguarding coastal and marine ecosystems from the effects of climate change (Objectives 1.1 to 1.4). Like OPC we believe that advancing scientific research, enhancing resilience in natural and built environments, and coordinating state and local policy responses are all important for meeting that goal.

As OPC determines what measures to invest in, we encourage OPC to carry forward the actions identified in California's ocean-climate contribution, which was released during last year's Global Climate Action Summit.[1] That document identified an array of actions within state control, among them: promoting seagrass and wetland restoration, working with state agencies and local governments to ensure key decisions account for climate change, investing in ocean acidification and hypoxia research, and managing California's fisheries and marine protected areas to ensure their long-term health as ocean conditions change. We hope OPC will continue to support these actions through strategic investments.

2. **Protecting and Restoring Coastal and Marine Ecosystems**

[1] Sandy Aylesworth, *COP 24: California Announces its Ocean-Climate Contribution,* NATURAL

We strongly support OPC's goals to ensure the long-term success of California's marine protected area (MPA) network (Objectives 2.1 and 2.2). OPC has served as a leader in championing the State's MPA network and provided critical support to the California Department of Fish and Wildlife (CDFW), as well as to other agencies and nongovernmental organizations working to secure the success of the network. The state has made really strong progress – for example, the legislature passed AB2369 last year, CDFW has created a new Marine Enforcement Division, and is rolling out a new electronic records management system – but more resources and capacity will be needed.

We urge OPC's continued leadership both for the benefit of California's ocean habitats and marine species – and the human communities that depend upon and treasure them – and to continue to promote California's MPA network as a model for global MPA design and implementation. MPAs are increasingly viewed as a critical strategy to shelter ocean resources and to provide resilience in the face of changing ocean conditions. In 2020, parties to the Convention on Biological Diversity will gather in Beijing to consider global biodiversity targets, including proposals to expand global MPA targets and increase the effectiveness of these areas. California's MPA network – both in its design and its implementation – can serve as an important model to help shape these international commitments, thus playing a role in preserving ocean ecosystems beyond our state waters.

We urge OPC to continue its leadership role, with special attention to:

- Ensuring that OPC continues to invest resources in MPA management, with a focus on research and monitoring, outreach and education, enforcement and compliance, and policy and permitting;
- Supporting CDFW—both through investment of OPC-guided funds and through OPC's policy leadership—to ensure that the agency has adequate resources to manage and safeguard the MPA network;
- Improving MPA enforcement – Helping fund additional CDFW wardens, as well as improving monitoring technology will assist in deterring poaching and protecting MPA ecosystems;
- Habitat restoration – Marine and coastal habitats like kelp forests, eelgrass beds, and coastal wetlands, provide crucial habitats for fish and invertebrates. Supporting projects that restore these habitats will enhance the health and diversity of MPAs;
- Shellfish restoration – OPC flagged the need to counterbalance the effects of power plants using once-through cooling (OTC) technology. OTC power plants can have significant impacts on adjacent shellfish populations and it would be useful to direct funding to scientifically-based projects that seek to enhance affected shellfish populations;
- Invasive species eradication – Invasive species threaten the balance in MPA ecosystems, and dedicating OPC funding to eliminating these species will help foster healthy MPAs;
- Improving MPA water quality through upstream projects – Enhancing coastal water quality improves overall ecosystem health, supports healthy habitats, and species diversity and productivity. Projects like removing dams and other stream barriers,

restoring natural riparian habitat, improving circulation in wetlands and bays, and enhancing pollution controls will all improve coastal water quality.

3. **Ensuring Thriving and Sustainable Marine Fisheries**

California has one of the world's most productive marine ecosystems and a robust fishing industry. We appreciate OPC's support of science-based and collaborative management approaches, and we highlight here the management practices we have advocated for in other forums and that we hope OPC will keep in mind as it implements its strategic plan.

Regarding Objective 3.5, the Marine Life Management Act (MLMA) Master Plan is meant to guide CDFW in achieving the act's goals of conserving the marine environment in state waters and the sustainable use of state fisheries. Comments we have previously made regarding the MLMA Master Plan are also applicable to OPC's work, and we highlight the main points made in our letters[2]:

- Ecological Risk Analyses (ERAs) are crucial tools for identifying species and ecosystem risks. OPC should support CDFW in developing a clear timetable for completing ERAs and ensuring robust public participation in the process.
- We encourage the use of Management Strategy Evaluations (MSE) in identifying optimal management procedures for stocks managed by the state, particularly when evaluating how best to manage stocks for which little data is available and when climate change might be affecting the resource. Current staffing levels at CDFW do not provide sufficient capacity for use of MSE and OPC could support building capacity to use these quantitative management tools.
- Rebuilding overfished stocks is an essential part of sound management, and OPC should support rebuilding, including by assisting CDFW in: identifying reference points for key fisheries, regularly evaluating the status of stocks relative to those reference points using Enhanced Status Reports (ESRs), evaluating the status of data-limited stocks, and prioritizing the management of stocks in need of rebuilding.
- Climate change is already affecting California fisheries, and it must be accounted for when managing state fisheries. For example, researchers predict particularly dramatic latitudinal shifts in fish stocks along the West Coast of the U.S., and the state must take measures to monitor these changes and manage stocks accordingly. In addition, robust management strategies must be identified given uncertainties caused by climate change. OPC should support CDFW in incorporating climate change into its planning. The following are some of the strategies OPC could support:
    - Conducting climate vulnerability assessments for California stocks;
    - Integrating information gleaned from those assessments into the MLMA framework and prioritization processes;

[2] *See* Letter from Natural Resources Defense Council to California Fish & Game Commission, *Re: Comments on Draft Marine Life Management Act Master Plan* (April 18, 2018)(attached).

- Supporting dynamic management strategies (i.e., inclusion of ecosystem indicators into harvest control rules), and;
- Fostering economic and social resilience in the fishing industry (i.e., evaluating the feasibility of transferring fishing permits, gear switching potential, creating a fisheries insurance program).[3]

We also support OPC's objective of reducing marine life entanglement in fishing gear off California's coasts and supporting projects aimed at that goal (Objective 3.6). Entanglement in fishing gear can be deadly for whales, sea turtles, and other marine life.[4] Entanglements off the West Coast are on the rise,[5] and have included humpback whales, blue whales, and Pacific leatherback sea turtles. These entanglements are primarily caused by fixed gear vertical lines between the trap and the surface float, such as those found in Dungeness crab, spot prawn, and spiny lobster fisheries. Warming ocean temperatures, shifting food sources, and marine population dynamics have all contributed to an increase in co-occurrence between wildlife and fishing gear.

We ask that OPC add to its strategic plan a specific commitment to testing "ropeless" gear systems, with the goal of developing viable strategies to reduce entanglement. Ropeless fishing systems have been deployed for assorted marine operations, including by the Department of Defense and the oil and gas industry for over twenty years. As such, they are mature technologies with great promise in reducing entanglement risks. For ropeless gear to be successful, a number of carefully planned pilot tests and field trials need to be conducted. Initial trials of ropeless systems in the Dungeness crab fishery in the State of California were conducted in May 2018 by fishing and conservation members of the Dungeness Crab Fishing Gear Working Group.[6] Building on these efforts by supporting additional pilots and field trials of those systems in collaborating with fishermen, and other projects recommended by the Dungeness Crab Fishing Gear Working Group, will help pave the way for broader adoption of ropeless systems.

Further, the settlement in *Center for Biological Diversity v. California Department of Fish and Wildlife*, specifies that only ropeless fishing gear may be used in certain fishing districts

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[3] Letter from Heal the Bay, Natural Resources Defense Council, *et. al.* to California Department of Fish and Wildlife (October 10, 2017)(attached).

[4] *See, e.g.,* Michael Moore, *How we can all stop killing whales: a proposal to avoid whale entanglement in fishing gear*, ICES JOURNAL OF MARINE SCIENCE (2019); R.S. El-Mallakh, and M. Hartman, *The curious case of the missing face: Death of California sea lion by Dungeness crab trap*, INTERNATIONAL JOURNAL OF AQUATIC BIOLOGY, 6(4), pp.198-201 (2018); Kayla Hamelin, Michael James, *et. al.*, INCIDENTAL CAPTURE OF LEATHERBACK SEA TURTLES IN FIXED FISHING GEAR OFF ATLANTIC CANADA, AQUATIC CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS, 27(3), pp.631-642 (2017).

[5] *See* NOAA FISHERIES, *2017 West Coast Entanglement Summary, Figure 1* (May 2018), https://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/5.2.2018_wcr_2018_entanglement_report_508.pdf

[6] *Initial Trials Exploring Ropeless Fishing Technologies for the California Dungeness Crab Fishery: July 30, 2018 Update to the California Dungeness Crab Fishing Gear Working Group*, Compiled by Geoff Shester, Oceana; http://www.opc.ca.gov/webmaster/_media_library/2018/08/ropeless-trials-update7-30-18.pdf

after April 1, 2021 (until related applications and rulemakings are completed).[7] This impending closure underscores the importance of moving forward with additional testing of ropeless systems, which could allow more fishermen to remain on the water. In addition, there is the need to support the development of technologies to assist in the detection, enforcement, and data sharing of ropeless fishing systems to support regulators and enforcers and reduce potential gear conflicts.

While designing or awarding funds to a ropeless gear pilot project, we encourage OPC to keep several key principles in mind:

- A pilot project must have a clear plan as to how it will be carried out in partnership with the fishing community and set forth the parameters of those partnerships;
- It must allow for practical modifications to previously validated ropeless systems to improve efficiency and reduce costs for fishermen (i.e., improving efficiency of deployment, engineering adjustments to improve compatibility with specific fishing vessels, and assessing other potential economic benefits such as gear loss reduction);
- It must specify a detailed and robust methodology that describes the data that will be collected during the project and how it will be used to advance the viability of ropeless systems;
- It must have an adequate sample size and replication to ensure that the results of the project can be interpreted in a meaningful way;
- It must include components that focus on solutions to the gear conflict and enforcement challenges associated with ropeless fishing systems (i.e., developing electronic tracking systems that allow for gear detection and protect sensitive business information); and
- It must have a plan for collaboration and knowledge sharing with federal and state entities working on the issue, including, the National Marine Fisheries Service, and California Department of Fish and Wildlife.

There have been a number of successful pilot projects and field trials of ropeless fishing systems conducted off the U.S. East Coast and in Canada, which could provide useful models for any pilots sponsored by OPC.

In Canada, l'Association des Pêcheurs Profesionnels Crabiers Acadiens based in the Gulf of St. Lawrence is in the process of testing four different ropeless fishing systems and work to date has included a number of pilot tests, off-season at-sea trials, and in-class and at-sea fishermen training. This collaborative process with fishermen led to the redesign of one of the systems, improving both handling and efficiency.[8] The Coldwater Lobster Association has undertaken

[7] Stipulation and [Proposed] Order Staying Case and Terms of Agreement*, Center for Biological Diversity v. California Department of Fish and Wildlife, et. al.*, Case No. 3:17-cv-05685-MMC (Mar. 26, 2019), Dkt. No. 71; https://www.biologicaldiversity.org/campaigns/fisheries/pdfs/whale-entanglement-settlement-agreement.pdf

[8] M. Noël, l'Association des Pêcheurs Profesionnels Crabiers Acadiens, *Panel presentation at Seafood Expo North America. Sustainability in Crisis – The importance of science, industry & government in protecting right whales and fishing livelihoods* (Mar. 18, 2018); *see also*,

phased trials of one fishing system to date, that comprised 1-2 training days at-sea for each fisher followed by unsupervised sea days and, subsequently, coordinated multi-boat operations with three boats setting and hauling trawls in the same area. A mobile application developed for this purpose was used to aid fishermen in detecting where ropeless traps from each fishing boat had been deployed.[9] The Grand Manan Fishermen's Association is also in the process of testing two ropeless systems, with a specific focus on deepwater fishing in areas with fast tidal currents.[10] Pilot tests and field trials have also been conducted off the U.S. East Coast by the Massachusetts Lobstermen's Association[11] and the South Shore Lobster Fishermen's Association,[12] and plans are in place for a pilot with the offshore lobster fishery in summer 2019[13], among others. We recommend that trials of ropeless fishing systems in California build off the significant efforts already underway in order to expedite the commercial viability of ropeless fishing systems.

Finally, in addition to supporting ropeless gear pilot projects, it could also be useful to have OPC support in developing innovative economic strategies to support eventual gear transition, for example, allowing fishermen to access ropeless gear without bearing the full costs of ownership (i.e., state-owned gear that fishermen could rent on a time-limited basis).

4. **Protecting the Ocean and Encouraging Sustainability in the Blue Economy**

We commend OPC for its commitment to ensuring that marine renewable energy projects minimize impacts to the coastal and marine environment, recreation, and fishing communities (Objective 5.1); and for its sensitivity to working with stakeholders to maximize ocean protection and safeguard sensitive habitats, while developing sustainable energy sources. In these comments we would like to emphasize that OPC is well-positioned to advance the science needed to ensure environmentally responsible marine renewable energy development and to advocate for the highest level of marine protections as offshore energy developments proceed.

Marine renewable energy projects have great potential to provide clean energy, and as the state considers developing such projects, it must also ensure that they are sited to prioritize avoiding harmful impacts to marine ecosystems then developed with a full understanding of

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https://www.andersoncabotcenterforoceanlife.org/blog/scientists-regulators-industry-talk-right-whales-at-seafood-expo/

[9] M. Flagg, Desert Star Systems, LLC, *An 'endless season' of ropeless fishing trials (June-November 2018), Presentation at the Ropeless Consortium* (Nov. 6, 2018), https://ropeless.org/wp-content/uploads/sites/112/2018/11/Marco-Flagg-Endless-Season-of-Ropeless-Fishing-1.pdf

[10] *Id.*

[11] D. Casoni, Massachusetts Lobstermen's Association, CT Harry, IFAW, *Massachusetts Lobstermen's Association & IFAW working hard to preserve right whales. Presentation at the Ropeless Consortium*, (Nov. 6, 2018), https://ropeless.org/wp-content/uploads/sites/112/2018/11/10.-Casoni-Harry-Ropeless-Consortium-Presenatation-1.pdf

[12] M. Lane, South Shore Fishermen's Association, *Panel presentation at Seafood Expo North America. Sustainability in Crisis – The importance of science, industry & government in protecting right whales and fishing livelihoods* (Mar. 18, 2018); *see also,* https://www.andersoncabotcenterforoceanlife.org/blog/scientists-regulators-industry-talk-right-whales-at-seafood-expo/

[13] https://www.bycatch.org/news/new-award-evaluate-ropeless-fishing

their potential environmental impacts and with plans to monitor and mitigate any harmful impacts. We have previously commented on offshore energy proposals before OPC and other bodies, and highlight our recommendations again here:

- As we commented in our letter to the Bureau of Ocean Energy Management, on its Call for Information Regarding Commercial Leasing for Wind Power Development on the Outer Continental Shelf, offshore wind development can be developed responsibly, provided that projects are sited to avoid sensitive habitat, protect wildlife throughout the development process, and monitor and mitigate any impacts to wildlife and habitat throughout construction and operation.[14] Siting decisions must be made in a transparent manner, with full stakeholder engagement.[15]
- OPC should advance the science that is needed to guide siting decisions and fill existing data gaps. As an important first step, the data sets contained in the Data Basin Gateway should be fully analyzed, and at a minimum, the various data layers should be integrated into an environmental sensitivity layer that can be used to assist decision-making.[16] Additional studies are needed on potentially affected fish, marine mammal, and seabird species and habitats in the areas under consideration for leasing.[17]
- As we pointed out in our letter to OPC on the Proposition 84 Competitive Grant Program and offshore wind priorities, safeguarding our marine environment requires any support for renewable energy projects to be based on a precautionary and scientific approach.[18] In particular, it is essential to ensure that: available data (such as information in the Data Basin Gateway) is fully analyzed before siting projects, stakeholders are fully engaged through an inclusive and transparent process allowing full discussion of environmental concerns, and that initial projects start small and are scaled up gradually to allow monitoring and evaluation of the effects of renewable energy projects.[19]

5. **Strengthening Organizational Effectiveness**

We support OPC's goal of strengthening its organizational effectiveness, and in particular, we support its objective of integrating environmental justice and social equity into its conservation work. Marine and coastal protection are of interest to a diverse array of

[14] Letter of Natural Resources Defense Council, Environmental Defense Center, Surfrider Foundation, *et. al.* to Bureau of Ocean Energy Management, *Re: Comments on the Call for Information and Nominations for Commercial Leasing for Wind Power Development on the Outer Continental Shelf Offshore California* (January 28, 2019) at 2 (attached).
[15] *Id.* at 4.
[16] *Id.* at 36.
[17] *Id.* at 37-39.
[18] Letter from Audubon Society, Defenders of Wildlife, Natural Resources Defense Council, *et. al.* to Ocean Protection Council, *Re: California Ocean Protection Council Proposition 84 Competitive Grant Program and NGO Offshore Wind Priorities* (October 25, 2018); *see also,* Letter from Audubon Society, Natural Resources Defense Council, *et. al.* to California Energy Commission, *Re: Environmental Considerations and Goals for California Offshore Wind* (December 17, 2017)(attached).
[19] *Id.*

communities, and it is essential for OPC and other state agencies to keep the full range of stakeholder interests in mind and to ensure broad engagement in the regulatory process.

We appreciate your consideration of these comments. Should OPC require any additional resources or have any follow up questions, we can be reached with the contact information below.

Sincerely,

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April 19, 2019

Jenn Eckerle
Deputy Director, Ocean Protection Council
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Subject: Comments on OPC's 2019-2024 Draft Strategic Plan

Dear Deputy Director Eckerle,

I am writing to provide comments on the Ocean Protection Council's (OPC) draft strategic plan for 2019-2024, *Strategic Priorities to Protect California's Coast and Ocean*. The American Chemistry Council's (ACC) Plastics Division appreciates the opportunity to work with the OPC on the development of the Ocean Litter Strategy and the opportunity to provide comments on the draft Strategic Plan.

ACC is actively engaged in the marine debris issue, including the development of The Declaration of the Global Plastics Associations for Solutions on Marine Litter[1] (Global Declaration), announced at the 5th International Marine Debris Conference in 2011. As of the 2018 Progress Report, signatories to the Global Declaration initiated or completed 355 projects to address marine debris.

Plastics do not belong in our environment. Durable and lightweight, plastics provide important benefits to society including significant greenhouse gas and energy reduction and resource savings, reducing food waste, improving healthcare, and helping to protect consumers from many risks of injury. These benefits are diminished when improperly disposed plastics pollute our environment. In support of sustainable use of plastics, ACC's Plastics Division member companies adopted circular economy goals[2] to reuse, recycle or recover all plastic packaging used in the United States by 2040 and to further enhance plastic pellet stewardship by 2022. In California, ACC actively supported SB 1335 in 2018, legislation authored by Senator Ben Allen that requires state facilities and those operating on state property to utilize only recyclable or compostable food service packaging.

ACC strongly supports Goal Four: Improve Coastal and Ocean Water Quality and Objective 4.1 of the Strategic Plan. Within the proposed actions, ACC agrees with the OPC's call to 'catalyze innovation in products, business practices, and policies'. Focusing on innovation, ACC encourages OPC to consider ways to bring value to used plastics, which will result in less plastic in the environment. However, potential supporters of any proposed reductions in plastic use need to first consider the impacts of alternatives and other potential adverse impacts. Numerous studies, such as by Franklin and Associates[3] and Trucost[4], have found increased environmental impacts associated with the use of alternatives to plastic packaging. Therefore OPC should consider the environmental impacts of alternatives in

[1] https://www.marinelittersolutions.com/about-us/joint-declaration/
[2] https://www.americanchemistry.com/Media/PressReleasesTranscripts/ACC-news-releases/US-Plastics-Producers-Set-Circular-Economy-Goals-to-Recycle-or-Recover-100-Percent-of-Plastic-Packaging-by-2040.html
[3] https://plastics.americanchemistry.com/LCI-Summary-for-8-Coffee-Packaging-Systems/
[4] https://plastics.americanchemistry.com/Plastics-and-Sustainability.pdf

developing policies and focus on ways to increase capture of used plastics for reuse, recycling, or recovery.

ACC agrees with the focus on comprehensive waste management approaches and policies. We also support the use of reusable packages, where appropriate. ACC welcomes the opportunity to work with OPC and other segments of the plastics value chain to help catalyze innovations and support development of reusable products and delivery systems.

Regarding global policies, the OPC should consider the potential unintended consequences of polices to reduce reliance on plastics globally, especially in developing countries that lack access to safe drinking water, sanitation, and other services often taken for granted in developed countries. Plastics play a vital role in protecting food from spoilage, delivering clean drinking water, and ensuring health and safety. ACC encourages the OPC to support infrastructure development and innovative mechanisms to capture the value of used plastics globally. Many of ACC's member companies have joined the Alliance to End Plastic Waste[5], a new CEO led, cross-sector, not-for-profit organization with a clear mission to develop, accelerate and deploy solutions, catalyze public and private investment and engage communities to help end plastic waste in the environment. The Alliance to End Plastic Waste has committed to raise and spend $1.5 billion over the next 5 years to address plastic waste in the environment, especially in areas where there is greatest need. Projects will focus on four key pillars, including infrastructure, innovation, education and engagement, and clean-up. ACC would be pleased to facilitate a discussion between the OPC and the Alliance to End Plastic Waste, if there is interest within OPC to engage in global actions to address plastic waste in the environment.

ACC also supports key elements of Objective 4.2 regarding microplastics and microfibers. In particular, the proposed actions point to the need for the microplastics strategy to be scientifically robust; for scientific research to be risk-based; and to the need to develop standardized test methods to detect and quantitate microplastics. We agree that a scientifically sound foundation to this strategy is paramount, and encourage the OPC to focus its resources first on test method development as a necessary prerequisite to any follow-on work. Standards organizations globally are working on a variety of relevant test methods that may inform the state's strategy, and we encourage the OPC to consider participating in standard development in these venues.

Objective 4.2 also indicates that the OPC will coordinate with industry and other stakeholders to implement solutions. As this letter outlines, industry and stakeholder coordination is indeed a key component of any effective solution. We also believe that industry and stakeholder coordination is essential to every step of this objective – from test method development to research to risk assessment. We encourage the OPC to engage and involve relevant scientific and technical experts in all aspects of the strategy, and to ensure that fundamental science is published and peer reviewed.

We believe the private sector has an important role to play in helping to address the sources of marine debris in California. ACC is partnering with NGO and environmental groups to reduce waste and litter that results in marine debris, educate the public on the sources and impacts of marine debris, support infrastructure projects to increase recycling, and partner on marine debris removal efforts. We also support academic research on marine debris.

Please let me know if you have any questions and thank you for considering our comments.

[5] https://endplasticwaste.org/

Sincerely,

Stewart Harris
Director, Marine and Environmental Stewardship
American Chemistry Council, Plastics Division

April 11, 2019

To: Whomsoever It May Concern

Comments

The document does not mention beneficial algae / phytoplankton.

I would like to suggest that the policy should include

- study of various types of phytoplankton / micro-algae such as Cyanobacteria, Dinoflagellates, Diatom Algae, etc,
- identification of the best phytoplankton and
- support research into growing the best phytoplankton and
- study the impact of growing the best phytoplankton on water quality and fish growth.

In my opinion Diatom Algae are the most beneficial micro-algae / phytoplankton, since in nature they account for about 50% of primary production / photosynthesis in water and growing them improves water quality, since Diatoms consume CO2, N and P and produce O2 and Diatoms are consumed by Zooplankton, Fish, Oysters, etc., hence they do not accumulate in the water and cause problems.

Solutions to achieve a controlled growth of Diatom Algae in fresh waterways and in coastal water should be developed. We should be able to determine which algae grows, when and to what extent and we should not allow nature to decide this.

Neglect of Diatom Algae is perhaps the main reason for decline in water quality and fish and restoration of Diatoms is perhaps the solution to keep waterways and oceans clean, well oxygenated and to restore fish in oceans and achieve sustainable fisheries.

A few new Objectives and Proposed Actions are suggested below.

GOAL ONE: SAFEGUARD COASTAL AND MARINE ECOSYSTEMS AND COMMUNITIES IN THE FACE OF CLIMATE CHANGE

Add New Objective 1.6 Understand the role of primary production / photosynthesis in oceans to mitigate Climate Change.

Proposed Actions:

- Study the natural growth of various types of phytoplankton, i.e., Cyanobacteria, Dinoflagellates, Diatom Algae, etc., in coastal water and understand the role played by each type of phytoplankton in mitigating Climate Change.

- Identify the best type of phytoplankton to grow in oceans.

- Develop solutions to achieve controlled photosynthesis in coastal water to grow the best type of phytoplankton.

GOAL TWO: PROTECT AND RESTORE COASTAL AND MARINE ECOSYSTEMS

Add New Objective 2.5: Promote the growth of healthy Diatom Algae in California's outer coast, bays, estuaries, and tidally influenced riparian habitat.

Proposed Actions:

- Fund research to grow beneficial Diatom Algae in all waterways

GOAL THREE: ENSURE THRIVING AND SUSTAINABLE MARINE FISHERIES

Add New Objective 3.7: Identify the natural feed for all types of fish, crustaceans, etc., and grow the best natural feed directly in the coastal waters in a controlled manner.

Proposed Actions:

- Research various types of phytoplankton that grow in coastal water to ascertain which type of phytoplankton is the best feed for zooplankton, fish, crustaceans, etc.
- Develop solutions to grow the best type of phytoplankton in the coastal water.

GOAL FOUR: IMPROVE COASTAL AND OCEAN WATER QUALITY

Objective 4.4: Cross-Cutting Objective: Reduce nutrient runoff and other pollution that impact water quality and exacerbate climate change impacts.

Proposed Actions:

Add one more action

- Fund research to grow beneficial algae in all waterways to consume the nutrients and thus reduce the amount of nutrients flowing out into the ocean.

Add New Objective 4.7: Develop solutions to achieve controlled photosynthesis in coastal waters, to grow beneficial algae and thus prevent uncontrolled bloom of harmful algal.

Proposed Actions:

- Develop solutions to achieve controlled photosynthesis in coastal waters, to grow beneficial algae to consume the nutrients in the water and thus prevent harmful algae from blooming.

I will be glad to answer any questions you may have and to provide further information / clarifications.

Yours Sincerely

Anil Nanda

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Central Coast Alliance United for a Sustainable Economy
CAUSE regional power in action

April 26, 2019

Dear Ocean Protection Council,

Thank you for the opportunity to submit comments on the draft Ocean Protection Council 2019-2024 Strategic Plan. The Central Coast Alliance United for a Sustainable Economy (CAUSE) is a nonprofit community organization working in Ventura and Santa Barbara Counties to advance social, economic, and environmental justice. We have worked on a broad range of coastal environmental justice issues including the impacts of coastal oil and gas development, toxic waste sites, ports and shipping, and sea level rise on coastal access and environmental health among working-class communities of color, particularly in the city of Oxnard.

We commend your inclusion of environmental justice in Objective 6.1 of the proposed OPC Strategic Plan and recommend the following additions:

- In Objective 1.2, we recommend OPC include some of the language from the Environmental Justice section of its Sea Level Rise Guidance Document adopted this year to address specific sea level rise issues most impacting environmental justice communities. This includes public health harms from potential flooding of coastal toxic sites and heavy industry, reduction of beach areas as low-cost recreational space and cooling centers, impacts on coastal-dependent employment particularly among immigrant workers who are often excluded from federal unemployment and disaster aid, and saltwater intrusion to groundwater aquifers which provide drinking water and agricultural livelihoods in rural communities. OPC support for research on impacts and adaptation strategies should prioritize measures that help mitigate these impacts to marginalized communities.
- In Objective 4.4, we recommend that OPC direct focused attention to agricultural areas such as the Oxnard Plain, Santa Maria Valley, and Salinas Valley where particularly heavy uses of toxic pesticides and synthetic fertilizers negatively impact the health and water quality of marginalized communities.
- In this section, OPC should also analyze the impacts of stormwater runoff in heavily industrialized coastal communities with both a higher propensity of toxic sites and low-income and residents of color, and the resulting effects on water quality and healthy coastal access.
- OPC should also examine the impacts of discharges from aging wastewater plants in communities like Oxnard which struggle financially to make needed infrastructure investments, where failures have resulted in raw sewage entering the ocean and closing beaches due to bacterial health hazards.

- In Objective 5.3 regarding decommissioning of oil and gas platforms, OPC should study options for ensuring equitable economic benefits to marginalized communities and workers of decommissioning platforms including physical removal and restoration work or potential conversion to artificial reefs.
- Similarly, in Objective 5.1, OPC should analyze the potential for ensuring economic benefits from ocean-related renewable energy projects like offshore wind platforms equitably benefit marginalized communities and workers.
- We recommend OPC analyze the expansion of West Coast ports due to growing imports and the impact on water quality, marine ecosystems, environmental health, and coastal access in port-adjacent communities, which are predominantly working-class communities of color in California.
- In some parts of the state such as Oxnard, operators of once-through-cooling power plants have abandoned their facilities after their mandated closure, resulting in continued negative impacts to marine environments and local communities. We urge OPC to study the status and ongoing risks of abandoned OTC power plants and possible solutions for their removal and cleanup.

Thank you for your consideration and your interest in greater inclusion of the needs and priorities of environmental justice communities in OPC's strategic planning.

With appreciation,

Maricela Morales, M.A.
Executive Director
Central Coast Alliance United for a Sustainable Economy (CAUSE)

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April 23, 2019

Deborah Halberstadt
Executive Director
California Ocean Protection Council
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Re: **Comments on the OPC's Strategic Priorities to Protect California's Coast and Ocean 2019-2024**

Dear Director Halberstadt:

The Coastal Commission staff appreciates the opportunity to offer comments on the Ocean Protection Council's (OPC) Draft Strategic Priorities to Protect California's Coast and Ocean (Strategic Plan). We have enjoyed our collaborative working relationship with the OPC as we carry out our complementary coast and ocean protection missions and moving forward, we hope to enhance this productive partnership and assist you in implementing the OPC's 2019-2024 Strategic Plan's goals and objectives.

To expedite review of these comments, they have been arranged by Goal and address specific Objectives and Actions whenever possible.

Goal One: Safeguard Coastal and Marine Ecosystems and Communities in the Face of Climate Change.

We greatly support the OPC's work to address climate change, its risks and vulnerabilities, and in particular, the proposed actions listed under Goal One related to proactive, precautionary, science-based coastal planning in the face of sea level rise. We thank the OPC for its statewide leadership on these issues, and its commitment to coordinating with, and supporting, state agencies such as the Coastal Commission on the front lines of regulatory and policy decision-making in this arena. We also support the OPC's commitment to playing a strong coordination and support role, in addition to its role as communicator and translator, around climate change impacts, and see a continued and growing need for this work at the state, regional, and local scale.

Goal One refers to sea level rise and coastal erosion as part of the suite of changes the coast and ocean are experiencing as a result of climate change. We recommend more clearly highlighting sea level rise as a *cause* of a number of associated impacts, rather than listing it separately and then noting one or two other associated impacts (e.g., coastal erosion and beach loss). For example, in the list at the top of page 8 we recommend including the suite of associated impacts, such as increased coastal erosion, beach loss, flooding, inundation, and saltwater intrusion,

resulting from sea level rise: "As a result, the ocean is experiencing a suite of biological, chemical, and physical changes, including but not limited to: sea level rise and associated impacts such as increased coastal erosion, flooding, inundation, and saltwater intrusion; ocean acidification; . . .." In this way, the Strategic Plan could be clearer that sea level is rising due to climate change, and as a result, we are experiencing a number of associated impacts. We also recommend the Strategic Plan acknowledge the role climate change will play in the increased frequency and intensity of storm events, and the impacts those will have on coastal ecosystems and communities. These distinctions could also be made clearer in the second and sixth bullet under Objective 1.2. Similar edits could be also made for the remaining items in the list on page 8 (e.g., rising sea temperatures are causing other associated impacts, such as hypoxia, changing ocean currents, and shifting species distributions.)

We respectfully observe that while the document articulates an overarching goal of safeguarding coastal and marine ecosystems (and communities), and even the importance of connectivity across the land-sea interface, much of the language focuses directly or even exclusively on marine ecosystems. We suggest that inland coastal ecosystems also warrant attention, as these too are subject to many of the same pressures imposed by climate change and coastal occupation. For example, dune and bluff ecosystems are vulnerable to coastal erosion and in many cases, may not have space to migrate as sea level rise progresses; however, mindful restoration and management practices in such areas can facilitate their resilience as well as that of the communities tucked behind them. Other relevant and sensitive coastal ecosystems include riparian corridors, seasonal wetlands, and coastal terrace prairie. Editing to specify *coastal and* marine ecosystems consistently will ensure these important places are included OPC's efforts.

Objective 1.2: Increase coastal and marine ecosystem and community resilience.
As resilience is a key goal for the state, we strongly support OPC's efforts to facilitate such; however, resilience for ecosystems and resilience for coastal human-defined communities may not look the same, nor will necessarily be achieved through a common avenue. The bullets listed in the draft focus on the human benefits of resilience – blue carbon, infrastructure, aquaculture, etc. – but resilience in the context of ecosystems irrespective of direct human value could be better emphasized. It may be helpful to parse Objective 1.2 into two separate objectives, with recognition of cross-cuts where relevant, so that efforts focused on improving ecological resilience receive due attention. Specific bullets could include recognition of nature's intrinsic value; facilitation of opportunities for habitat migration; preservation of natural processes such as sediment delivery and nutrient cycling, and promotion of biodiversity; management of threats to ecosystem health, such as invasive species and development pressures; and, developing design guidelines and/or best management practices to benefit ecosystems during coastal adaptation implementation, such as for beach nourishment programs or living shores.

We appreciate the OPC's commitment to encouraging use of state guidance documents and to working with local governments in completing or updating their Local Coastal Programs as highlighted in Objective 1.2. We recommend the Strategic Plan acknowledge the OPC's role in working specifically with the Coastal Commission and using its guidance to aid local governments in planning as a part of the fourth bullet: "Continue to coordinate with the California Coastal Commission in aiding local governments in completing or updating Local Coastal Programs to integrate sea-level rise and other climate impacts into local planning, consistent with the California Coastal Act and in line with the California Coastal Commission

Sea Level Rise Policy Guidance, 2018 Science Update.[1]" We also recommend OPC efforts to fund and promote nature-based adaptation measures (2nd bullet) acknowledge the critical need for monitoring such efforts so that the efficacy can be determined in the context of protection as well as ecological performance, and used to inform future work. Finally, in regards to the last bullet in this objective, we recommend that efforts to work with front line and disadvantaged communities be coordinated with other coastal agencies working in this arena. We also suggest changing the wording from "protect" in that last bullet to "*prepare* frontline and low-income communities *for* the impacts…" as to not imply any one adaptation strategy is being recommended in this case.

Objective 1.3: Raise awareness of climate change impacts to coastal and marine ecosystems and communities.

Climate change science, and the risks and vulnerabilities associated with it, are complex and often difficult to understand and apply at the community level. As a result we support the draft Strategic Plan's proposed action to take on some of this translation to assist affected communities and industries. We recommend this bullet clarify to whom this translation and communication work will be directed (e.g., which communities? Those that are most vulnerable, or all coastal communities up and down the state? Which industries? Fishing, oil and gas, transportation, etc.?). In addition, we suggest highlighting the OPC's role in collaborating with and supporting other state agencies (such as the Coastal Commission) that are doing this work, either as a part of an existing bullet or a new proposed action. OPC can also play in important in transferring the results of scientific research conducted under Objective 1.1 to other state agencies, policy/decision-makers and the public, and we suggest that an action could be added to the plan to reinforce this, which may fit here under Objective 1.3 or in Objective 1.1.

Objective 1.4: Integrate changing ocean conditions into California's state government policies, planning, and operations.

We acknowledge the strong role OPC can play in helping to coordinate messaging on climate change across the state, and recommend the first bullet under Objective 1.4 highlight this: "Ensure understanding of climate change and its significance, and coordinate messaging on these issues, among policymakers and leaders in California's legislature and public agencies through briefings, hearings, and at public OPC meetings."

The second and third bulleted proposed actions under Objective 1.4 are vague, and as a result difficult to consider the appropriate metrics under which the OPC could measure its progress in these areas. We recommend including some examples associated with these bullets and/or generally building them out to include more specifics to better understand the role OPC intends to play in these areas.

Objective 1.5: Improve coastal sediment management and increase understanding of coastal processes.

We appreciate OPC's ongoing efforts to improve sediment management, including its beneficial reuse, and strongly support this objective. As a partner, we recommend that in addition to consideration of physical processes, these efforts grow to incorporate insight concerning associated biological processes since the two are inextricably linked in nature as well as management. For example, the long-term impacts of dredging on nearshore ecosystems are

[1] https://documents.coastal.ca.gov/assets/slr/guidance/2018/0_Full_2018AdoptedSLRGuidanceUpdate.pdf

poorly understood, as are ecological community recovery patterns at beaches following nourishment with material of variable properties. We suggest that suites of best practices might evolve through more holistic discussions concerning sediment management.

Goal Two: Protect and Restore Coastal and Marine Ecosystems.

In many cases, the growing need for effective and meaningful restoration of coastal and marine ecosystems is challenged by the lack of established and proven restoration tools and methods for many of these ecosystems. Whereas methods of successfully restoring some types of habitat – such as salt marsh and eelgrass beds – have been developed and are well-documented in a variety of locations across the state, means of promoting the enhancement and recovery of other types of habitats – such as kelp beds and rocky intertidal areas – remain more uncertain and speculative. Nevertheless, these types of habitats are confronted by an increasing list of threats, including those associated with coastal development, sea level rise, and climate change, that need to be responded to. We therefore support the OPC's inclusion of Goal Two in its Strategic Plan and a variety of specific actions that focus on increasing and evaluating the suite of marine ecosystem restoration tools that can then be made available for use by regulatory and management agencies such as the Coastal Commission.

Objective 2.1: Ensure the long-term success of California's MPA network, consistent with the goals of the Marine Life Protection Act.

As noted in our comments in support of the OPC's 2012-2017 Strategic Plan, we believe the OPC is uniquely positioned to provide support for the effective implementation and management of California's MPA network. We strongly support the actions proposed to implement this objective, particularly those that call for the continuation of OPC's efforts to coordinate the MPA Statewide Leadership Team, develop policies for activities in MPAs not explicitly covered by existing regulations, and increase collaboration with tribal governments and tribal communities. Regarding activities in MPAs not explicitly covered by existing regulations, we request that the OPC evaluate other possible methods of addressing this situation like developing guidelines, outreach, or direct coordination with permitting and regulatory entities may be equally or more effective approaches. We also request that the OPC consider two additional actions under Objective 2.1. First, one that focuses on the identification of existing or ongoing sources of adverse impacts or stressors within MPAs – such as accumulations of marine debris, sources of poor water quality, pollution, or excessive sedimentation – and that could potentially be eliminated or ameliorated as part of an ecosystem restoration or enhancement effort. Second, shoreline change is inevitable, and while some fraction will occur through natural processes that we cannot directly manage, some will result from applied adaptation measures including use of both hard and soft solutions. To understand the effects such measures have on MPAs, OPC might seek to incorporate monitoring components that enable analyses to guide future shoreline management decisions.

Objective 2.4: Support coastal habitat restoration in California's outer coast, bays, estuaries and tidally influenced riparian habitat.

We observe that of the four objectives under Goal 2, two are dedicated to the MPAs, one to kelp forests, and that all other ecosystems are addressed under a singular objective. Moreover, the latter appears to limit attention to tidal reaches and thus, as iterated in our Goal One comments, does not include the multitude of sensitive inshore coastal ecosystems that are also an important

part of California's at-risk coastal mosaic. We suggest that restoration efforts throughout the coastal landscape should be supported, and recommend simplification of the objective title to 'Support coastal habitat restoration along California's outer coast, bays and estuaries' in order to be more inclusive. In addition, we recommend revising the final bullet to not *prioritize* sea level rise-addressing projects but rather to encourage *all* restoration efforts, where applicable, to account for sea level rise in their design process and ensure their relevance into the future.

Goal Five: Protect the Ocean and Encourage Sustainability in the Blue Economy

Please consider adding to and clarifying the introductory paragraph for this goal, as follows:

> *"The ocean economy is important to California, representing at least $44.2 billion of California's GDP, and spans sectors such as commercial and recreational fishing, ports and harbors, oil and gas development, aquaculture, tourism and recreation. California's ambitious energy policy aims to make the state carbon neutral by 2045. This transition includes consideration of offshore renewable energy facilities (wind turbines and wave energy systems) and the decommissioning of offshore oil and gas rigs. At the same time, there is growing interest in expanding marine aquaculture for fish and shellfish. The OPC is looking to identify and support "sustainable" aquaculture that minimizes impacts to marine life and habitats and has the potential to support coastal livelihoods and provide a local food source for California communities. Clean and healthy ocean and coastal ecosystems are essential to supporting important recreation and tourism activities, like beach-going, surfing, whale-watching, diving, and coastal hikes along the California coast. Pressures on the ocean as a resource will only continue to increase as we look to it as a source of food, energy, and resilience against climate change. It is essential for OPC to work with policymakers, industry, and other partners to maximize ocean protection and safeguard sensitive habitats, while transitioning to more sustainable energy sources and expanding or developing new industries at the interface of land and sea."*

Objective 5.2: Ensure aquaculture in state marine waters is sustainable and minimizes impacts to marine life and habitats.

As part of a comprehensive, statewide effort to address a range of Coastal Act and regulatory compliance issues that were present throughout the state's marine aquaculture industry, the Coastal Commission recently reviewed, approved, and issued new or amended permits for many of the marine shellfish aquaculture operations. Over the course of the next year, review and permitting of most of the remaining existing operations is expected to be completed along with the consideration of several new open ocean facilities. We strongly support the OPC's inclusion of Objective 5.2 in its Strategic Plan and believe that the proposed actions will provide essential information, tools, and strategies to help ensure that existing and future marine aquaculture operations in the state are carried out in sustainable manner. We want to work closely with the OPC staff over the coming years to share the lessons we learned during the course of our recent review and permitting process and to provide detailed input on information gaps, potential opportunities for new or improved management tools, and enhanced coordination opportunities.

Objective 5.3: Prepare local, state, and federal agencies for the eventual decommissioning of oil and gas platforms and their possible conversion to alternative uses.

We also support the inclusion of Objective 5.3 in the OPC's Strategic Plan and appreciate the ongoing efforts of OPC staff to convene the Interagency Decommissioning Working Group (IDWG). We request that the OPC consider adding to the list of proposed actions for Objective 5.3 working with staff of the California State Lands Commission (CSLC) in identifying "lessons learned" so far from the ongoing efforts to prepare Platform Holly and the lease 421 facilities for decommissioning and to identify, if any, strategies to respond to lessons learned. This type of assessment could assist the regulatory agencies in planning for and expediting the decommissioning process.

Marine Debris and Plastic Pollution

The issues of marine debris and plastic pollution are addressed by multiple goals and objectives (primarily Objectives 3.6, 4.1 and 4.2) within the draft Strategic Plan. For efficiency, comments on these Objectives are consolidated here.

The OPC, NOAA, and a broad range of stakeholders invested an enormous amount of time and energy in the development of the 2018 California Ocean Litter Prevention Strategy (OLPS). In that plan, the OPC committed to three priority goals and numerous actions supporting those goals. The goals themselves are adequately reflected in the draft Strategic Plan's Objectives 3.6, 4.1, and 4.2. However, given the variety of actions detailed under each of these goals in the OLPS, in our view it is critical that the Strategic Plan objectives be broad enough to encompass all potential actions listed as OPC priorities within the OLPS. We recommend, for example, that Objective 4.1 recommend specific policies to the legislature that will create changes to the marine waste stream and reduce plastic pollution that reflect OLPS OPC Goal 1. We recommend the OPC re-evaluate the objectives listed above through the lens of the OLPS to ensure that all of the priority actions to which the OPC has committed can be achieved under its new Strategic Plan.

Goal Six: Strengthen Organizational Effectiveness

Under Objective 6.3, with regards to educating the California Congressional delegation on issues and threats facing our coast and ocean, we suggest coordinating these efforts with other state coastal management agencies and through the Coastal States Organization.

Thank you again for your consideration of these comments and we look forward to a close partnership with the OPC. If you have questions, please call me at (415) 904-5244 and I will direct you to the appropriate staff member.

Sincerely,

SUSAN HANSCH
Chief Deputy Director

Cc: Jenn Eckerle, Deputy Director, OPC

16 April 2019

Dear Ocean Protection Council:

Our team at the Elkhorn Slough (encompassing both the National Estuarine Research Reserve and the Elkhorn Slough Foundation) recently reviewed the draft strategic plan. We were impressed with the breadth and thoughtfulness of the document, which should provide excellent guidance over its lifetime. Based on our expertise with estuarine ecosystems, we developed several suggestions to improve the document.

Increase explicit mention of salt marshes. The document in numerous places explicitly mentions seagrass beds. In all of these cases, we recommend also adding salt marshes, as they provide similar services of carbon sequestration and habitat for animals. Moreover, California has lost orders of magnitude more acres of salt marsh than seagrass, and so there are huge opportunities for restoration. Examples of where "salt marshes" and additional supporting text could be added include

- Page 3, where seagrass is mentioned in climate change paragraph;
- Page 8, Objective 1.2, first bullet, where seagrass restoration is mentioned (with the rather odd phrasing of "deploying living systems"), add "protection of existing and restoration of degraded salt marshes" or something like that; and
- Page 12, Objective 2.4, first bullet

Consider wetlands and estuaries as opportunities for social equity. We were glad to see equity as a core value for the OPC. One way of turning this into action is to consider ecosystem access and participation by members from disadvantaged communities in citizen science, or consider benefits to them from restoration projects. For instance, in our neighborhood, we bring local school children, which are largely from farmworker families where English is not the first language, to our site weekly for an "Estuary Club." While California's iconic kelp forests are generally only accessible to people through the use of boats, scuba, or visits to venues like the Monterey Bay Aquarium, locals and visitors with fewer resources can watch sea otters and shorebirds along our marshes. Urban estuaries such as San Francisco Bay and smaller ones in southern California similarly provide opportunities for education and recreation. Investment in community-based science or restoration in estuaries is therefore worth including for both these equity-related services, as well as carbon sequestration and other forms of biogeochemical regulation.

Incorporate and prioritize landward migration of coastal ecosystems. Under Objective 1.4, we consider it important to add a bullet about increasing understanding and enhancing support for landward migration of coastal habitats in the face of SLR, in particular, seeking opportunities for salt marshes to migrate (which are very limited due to urban and agricultural land uses around estuaries).

Enhance estuarine MPA monitoring. To date, very limited resources and attention have been directed to monitoring in estuarine MPAs. It is essential for California to invest in a consistent, statewide monitoring program for key estuarine indicators, including eelgrass, oysters, marsh vegetation, and key hydrological and sedimentary factors. (We have extensive monitoring experience with estuaries and would be glad to serve as advisors on this). Under Objective 2.1, a bullet could be added about supporting monitoring of the state's estuarine ecosystems.

Expand scope of Objective 2.4. This objective is focused on coastal ecosystems, including estuaries. One general comment is that this objective seems at least as cross-cutting as 2.3, since there are climate change, fisheries, and aquaculture linkages, so we'd suggest indicating this. We also felt that there were some vital bullets missing under this objective.

1) *Enhanced protection*. The phrasing of the overarching objective is about restoration, but we'd suggest the word "protection" or "conservation" be added, and a bullet be included indicating support for more land acquisition and working with local communities to improve management practices, to ensure that existing high quality wetlands and the immediately adjacent uplands are protected. Perhaps this is included implicitly in the second bullet, but explicit mention would be better.

2) *Restoration of hydrological processes and associated biological communities*. The single factor that has led to the most loss of salt marsh and the most impairment of water quality in California's estuaries is artificial restriction of tidal exchange with dikes, culverts, and tide gates. As such, supporting measures to restore tidal exchange (or at places where adjacent human land uses prevent this, at least to improve circulation or mitigate effects) should be included and highlighted as a bullet. As a separate or related bullet, restoring historic freshwater sources to estuaries should also be included. There have been dramatic changes in estuarine plant and animal community composition resulting from decreased freshwater inputs and loss of brackish conditions in many estuaries, and restoring more representatives of these sensitive communities should be an important OPC objective.

Include explicit mention of restoration aquaculture. In addition to commercial aquaculture conducted for food/economic reasons, we suggest you include restoration aquaculture, conducted to support declining native species or to restore functions provided by these species. For instance, oyster aquaculture is used extensively in Puget Sound for native oyster restoration, and has recently been piloted by our team in Elkhorn Slough, as the first example of this approach in California. Eelgrass, clams, rockweed, and other species might also benefit from aquaculture, and provide key functions in the ecosystems they inhabit. Restoration aquaculture might also be combined with assisted migration of species in the face of climate change. Exploring and supporting restoration aquaculture seems like a good niche for OPC.

Include "living shorelines" used for oyster restoration in consideration of artificial reefs. Under Objective 5.4, we suggest a bullet with explicit mention of evaluation of living shorelines as one type of artificial reef. Oyster reefs built like jetties have been very popular on the East and Gulf coast. It is not entirely clear that they are appropriate on this coast, because our native oyster doesn't naturally form high profile reefs, and grows at lower tidal elevations (which lends less shoreline protection from wind waves). A recent project proposed for San Diego Bay was denied permits out of concerns that this sort of higher profile artificial reef might not be a good fit for the ecology of this system. Horizontal levees of marsh vegetation may prove a better approach to green infrastructure protecting shorelines here. In any case, this is a timely issue for science/policy consideration by the OPC and fits well under this objective.

In addition to the above estuary-focused comments, we have a few general suggestions for your consideration.

Use more consistent levels of detail. Some bullets have great specificity, such as mention of supporting citizen science under the kelp forest objective 2.3, while citizen scientist efforts could be supported under almost every objective. In another example, under objective 4.4, there is mention of improving water quality in the Tijuana River watershed, while of course nearly every coastal watershed needs such efforts. In contrast to these very specific bullets, other bullets are very broad, such as the one under 4.1 about reducing global reliance on plastics. We suggest some form of organizational formatting to clarify the hierarchy of global to local concepts, components, and cases. More specifically, under each objective, there could be broader treatment of the issue, with specific highlighted examples (via indentation, boxes, different fonts or text colors, etc.) – but making clear these examples are not exhaustive. For instance, a broad objective might be to engage California's citizens in science, and then a few specific examples might be Reef Check, Beach Watch, shorebird monitoring, etc. Or a broad objective might be to design and implement plans for water quality improvement in the most impaired coastal watersheds, and then examples might include Tijuana River, Elkhorn Slough, and SF Bay.

Separate science from action. The bullets contain a mix of science priorities and management priorities. It might be clearer to call these out separately with subheaders. In addition to this being a formatting suggestion, it is important for a more logical and transparent presentation of the relationship between science and management. For each issue, we know enough to already recommend taking some sort of management or policy action, and can identify key next steps. But for each issue, there are also some data gaps that need to be filled for ever more effective management strategies to be developed and implemented.

Ensure the recommended science would lead to improved management. The OPC should ensure that science priorities within the Strategic Plan are ones that directly lead to improved management strategies or policies. Some of the current bullets currently seem more like pure science, and either their connections to management should be presented, or they should be deleted from this document. For instance under 4.6, "Evaluate the potential for climate-driven range expansions of marine invasive species" sounds like an interesting topic. But since the vast majority of marine invasives cannot be controlled or eradicated, it is hard to imagine how that information would be used to change management actions – with the possible exception of the development of new or expanded fisheries. If that is a connected management issue, it should be made explicit.

In summary, we welcome the development of this document and find it to be an excellent strategic plan in most regards. However, the sections on estuarine ecosystems could be strengthened in the ways we suggested, and the plan might benefit from some organizational improvements. We are glad to provide further assistance incorporating estuaries into OPC planning and action, and look forward to continue to partner with you in the future.

Cordially,

Dr. Kerstin Wasson, Research Coordinator, Elkhorn Slough NERR
Dr. Daniel Brumbaugh, Coastal Training Program Coordinator, Elkhorn Slough NERR
Dash Dunkell, Stewardship Director, Elkhorn Slough Foundation
Boyce Thorne-Miller, Elkhorn Slough NERR Volunteer, Bluecology Board Member,
The Ocean Foundation Senior Fellow

Note: we are writing as individuals; this letter does not represent an official review by NOAA, CDFW, or the Elkhorn Slough Foundation.

From:	CNRA COPC Public
To:	COPC Public Distro List
Subject:	FW: Feedback on strategic plan for OPC
Date:	Friday, April 19, 2019 4:06:29 PM

From: Mary Miller
Sent: Friday, April 19, 2019 4:06:11 PM (UTC-08:00) Pacific Time (US & Canada)
To: CNRA COPC Public
Subject: Feedback on strategic plan for OPC

Hello,
I am the Program Director for Environmental Partnerships at the Exploratorium and the board chair of CenCOOS.

Some feedback below for the strategic plan--

As has been recognized in OPC documentation previously, the Regional Associations (RAs) of IOOS play an important part in providing ocean information in California. For example, partners for delivery were noted in the MPA Action Plan including the RAs. It's two RAs CeNCOOS and SCCOOS have over 60 members and dozens of active investigators working on topics directly related to the strategic themes. Key activities include convening stakeholders, making in situ observations, assimilating data into ocean models, running nowcast, hindcast, and forecast ocean models, and adding value to data through a Federally accredited data management and digesting data into a diverse array of data products tailored to user needs (i.e. data collected by non-Federal partners is then treated as Federal including liability protection). They deliver not only fund and collect physics data, but also an increasing number of biogeochemical and biological data sets through our data management and portal system. The RAs are importantly independent from government and harness the power of individuals and teams around the regions to realize the power of 'big data' from many inputs, from local to state scales, through to California's contribution the Global Ocean Observing System.

The themes covered by the CeNCOOS and SCCOOS cover most of the themes in the strategic plan in one way or another. While it is appreciated to see reference to "California's Coastal Ocean Observing Systems" in reference to harmful algae, that comment could apply much more broadly. Referring to the RAs by name can help clarify what is being referenced.

It might be valuable to more explicitly highlight other significant partners for delivering the strategy as was done for the MPA action plan. While some state agencies are mentioned, the role of Federal partners is not clear and they will naturally contribute in many ways towards the desired outcomes. However we appreciate that this might become a longer list given the broader scope. Perhaps focusing on long-term collaborative efforts can help refine this.

Overall the format of the presentation at the moment is rather detailed and focused on actions. It may benefit from thought on ways to pull out the key themes in other more digested figures/boxes from several perspectives, perhaps helping the reader understand how the actions tie tougher. Here too providing signposting on how partnerships might work can help the reader understand how the landscape of agencies and actors in the

state does (or could) deliver. These strategies have multiple audiences and of these will be contributors to achieving the goals and helps for them to see where/how they might be able to contribute.

Thank you,
Mary

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April 19th, 2019

Ms. Jenn Eckerle, Deputy Director
California Ocean Protection Council
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RE: Ocean Protection Council's 2019-2024 Draft Strategic Plan

Dear Ms. Eckerle,

Heal the Bay is a non-profit environmental organization with over 30 years of experience and 15,000 members dedicated to making the coastal waters and watersheds of Greater LA safe, healthy and clean. On behalf of Heal the Bay, we respectfully submit the following comments in response to the Ocean Protection Council's 2019-2024 Draft Strategic Plan.

Heal the Bay's major organizational goals are to cultivate thriving oceans and healthy watersheds through adaptive and science-based management, and to promote smart water practices to increase local resilience. After careful review of the 2019 – 2024 Draft Strategic Plan (strategic plan), we recognize the following six revisions that would enhance the already comprehensive strategic plan document:

1. Inclusion of "**ocean deoxygenation"** in the list of climate change related phenomena where improved scientific understanding is needed
2. Recognition of **fishery bycatch** impacts and addition of risk reduction as a result of bycatch in the goal to improve sustainable marine fisheries
3. Additional recognition of **disadvantaged communities** that are increasingly and disproportionately affected by climate change impacts in the value of equity
4. Inclusion of additional language on the impacts of **desalination** and wastewater discharge and the value of **storm water recycling** as a smart water practice availability
5. Inclusion of **seafood traceability** in an effort to improve fisheries data efficiency, availability, and accessibility
6. Encouragement of **financial corporate responsibility** in the effort to prepare local, state and federal agencies for the eventual **decommissioning of oil and gas platforms**

These revisions are discussed in further detail below:

Inclusion of "ocean deoxygenation" in the list of climate change related phenomena where improved scientific understanding is needed

Goal One of the strategic plan is to "safeguard coastal and marine ecosystems and communicates in the face of climate change". (Page 7) This goal details a number of climate-change related phenomena that have the potential to cause significant changes and impacts to ocean conditions, including "sea-level rise, coastal erosion, ocean acidification, rising sea temperatures, hypoxia…" (Page 8). We would like to recommend the addition of "ocean deoxygenation" to this list of climate-change related impacts. It has been shown that "Oxygen concentrations in both the open ocean and coastal waters have been declining

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since at least the middle of the 20th century."[1] This oxygen loss, referred to as ocean deoxygenation, is primarily caused by warming temperatures as a direct result of increased greenhouse gas emissions. Rising ocean temperatures decrease oxygen solubility in ocean water, increase stratification of ocean layers leading to decreased mixing and oxygen circulation, and increase the consumption of oxygen by marine biota through increased respiration.[2] A distinct phenomenon from hypoxia, systemic ocean deoxygenation is predicted to have widespread consequences, as oxygen is fundamental for all aerobic marine life.[3]

Ocean deoxygenation is "one of the most important changes occurring in an ocean increasingly modified by human activities"[4] and, as such, we believe should be listed as a distinct climate-changed related impact in the strategic plan. We recommend that ocean deoxygenation be added both to the introductory portion of Goal One on page 8, and also be added to Objective 1.1 on Page 8 as a proposed action to fund scientific research assessing current and future impacts of ocean deoxygenation on California's biological resources, communities, and economies.

Recognition of fishery bycatch impacts and the addition of risk reduction as a result of bycatch in the goal to improve sustainable marine fisheries

Goal Three of the strategic plan is to "ensure thriving and sustainable marine fisheries". (Page 12) Objective 3.6 of this goal aims to "reduce risk of marine life entanglement in California fishing gear" and includes proposed actions to continue collaborative efforts to reduce whale and sea turtle entanglement. (Page 14) Bycatch is defined in the California Marine Life Protection Act (MLMA) as "fish or other marine life that are taken in a fishery but are not the target of the fishery. Bycatch includes discards" (§90.5). In addition to entanglement, bycatch of marine cetaceans, pinnipeds, sea turtles and sea birds has been documented in California's drift gillnet fisheries.[5] While the use of acoustic pingers, time-area closures, and other bycatch reduction technologies have shown great success in drift gillnet fisheries, we believe that continued funding and support of bycatch reduction is a necessary component of the strategic plan. The MLMA 2018 Master Plan for Fisheries includes a specific objective of "limiting bycatch to acceptable types and amounts"[6] and we therefore recommend the addition of a proposed action under Objective 3.6 of the strategic plan to include funding priority projects recommended by the Bycatch Working Group to continue improvements of bycatch management in California's fisheries.

Additional recognition of disadvantaged communities that are increasingly and disproportionately affected by climate change impacts in the value of equity

[1] Denise Breitburg et al., "Declining Oxygen in the Global Ocean and Coastal Waters," Science 359, no. 6371 (2018): , doi:10.1126/science.aam7240, 1.
[2] Ibid, 1.
[3] Ralph F. Keeling, Arne Körtzinger, and Nicolas Gruber, "Ocean Deoxygenation in a Warming World," Annual Review of Marine Science 2, no. 1 (2010): , doi:10.1146/annurev.marine.010908.163855, 1.
[4] Breitburg et al., 1.
[5] National Marine Fisheries Service. 2011. U.S. National Bycatch Report [W. A. Karp, L. L. Desfosse, S. G. Brooke, Editors]. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-117E, 508 p, pg. 34.
[6] Department of Fish and Wildlife. 2018. 2018 Master Plan for Fisheries, pg. 32.

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The organizational changes of the strategic plan include the incorporation of "Equity" as one of the organization's values. Objective 6.1 of Goal Six states integration of "environmental justice and social equity into OPC's conservation work." (Page 19) As part of this goal, the strategic plan recognizes the urgency of addressing the needs of tribes and frontline and disadvantaged communities. According to a California Environmental Protection Agency report, climate change will cause increased hurricane damage, energy costs, real estate losses and water costs and these price increases will "disproportionately impact groups that spend the highest proportion of their income on these necessities." [7] Disadvantaged communities are not only restricted by reduced access to information and technical assistance, but are and will be vastly more impacted by climate change than privileged communities. We respectfully ask that Goal Six of the strategic plan be revised to include language that recognizes this disparity, and states OPC's commitment to continue recognizing the disproportionate impacts of climate change on frontline, minority and disadvantaged communities. We would also like to thank OPC for including the already existing language on equity in the strategic plan, as we believe environmental justice to be a major priority of national and global environmental health.

Inclusion of additional language on the impacts of desalination and wastewater discharge and the value of storm water recycling as a smart water practice

Goal Four of the strategic plan is to "Improve Coastal and Ocean Water Quality". (Page 15) As part of this goal, Objective 4.4 aims to "reduce nutrient runoff and other pollution that impact water quality and exacerbate climate change impacts." (Page 16) We respectfully request that Objective 4.4 be revised to include language on reducing the impacts of discharge on ocean water quality and marine life health from treated wastewater discharge and untreated stormwater. We also ask that desalination be addressed as a last resort for meeting water supply needs, with local water supply sources prioritized. Desalination is known to have significant impacts on marine life through entrainment and impingement. Further, discharge effluent from desalination plants has been shown to "increase seawater temperature, salinity, water current and turbidity…harm[ing] the marine environment, causing fish to migrate [and] enhancing the presence of algae…"[8] Additionally, of particular interest in the Los Angeles area, stormwater discharge ,though regulated through NPDES permits and the California Water Boards, contains contaminants that threaten all water bodies, including the ocean. In LA County alone, 10 billion gallons of water are released into the ocean for every 1 inch of rainfall, threatening both wildlife and public health. We recommend the addition of language in Objective 4.4 to include the proposed action of prioritizing elimination of discharges from wastewater treatment plants and funding of stormwater recycling programs and monitoring of stormwater discharges across the state of California to both reduce marine pollution and increase water safe water availability for all Californians.

Inclusion of seafood traceability in an effort to improve fisheries data efficiency, availability, and accessibility

[7] California Environmental Protection Agency. 2009. *Environmental Health and Equity Impacts from Climate Change and Mitigation Policies in California: A Review of the Literature.* [Seth B. Shonkoff, MPH Rachel Morello-Frosch, Ph.D., MPH Manuel Pastor, Ph.D. James Sadd, Ph.D., authors]. CEC-500-2009-038-F. Pg 9.

[8] Ibrahim S. Al-Mutaz, "Environmental Impact of Seawater Desalination Plants," Environmental Monitoring and Assessment 16, no. 1 (1991): , doi:10.1007/bf00399594. Pg 1.

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Included in Goal Three of the strategic plan (sustainable marine fisheries) is Objective 3.4 which aims to "improve fisheries data efficiency and accessibility". (Page 14) A key component of this objective is the identification of opportunities to improve the efficiency of fisheries data collection, availability, and transparency. In a recent 2019 nationwide study, it was shown that one out of every five seafood products is mislabeled in the United States in spite of a federal task force designed to combat the issue.[9] A key component of fisheries data transparency is *traceability* and the ability to track seafood from boat to plate. As such, we recommend the addition of a proposed action to Objective 3.4 of the strategic plan to include prioritization of research and projects to improve seafood traceability in the state of California.

Encouragement of financial corporate responsibility in the effort to prepare local, state and federal agencies for the eventual decommissioning of oil and gas platforms

Goal Five of the strategic plan encourages "sustainability in the blue economy". (Page 17) Objective 5.3 of this goal prepares "local, state and federal agencies for the eventual decommissioning of the oil and gas platforms and their possible conversion to alternative uses". (Page 18) A major concern with the conversion of decommissioned oil and gas platforms and rigs to artificial reefs is the lack of consumer responsibility directed at the company originally responsible for the construction and management of the platform. We advise that additional language be included in this objective that encourages financial responsibility and ongoing mitigation from companies responsible for the task of decommissioning an oil or gas platform. We support the proposed action of developing studies that investigate the effect of reuse of recommission rigs as reefs, and we feel that accountability is an essential component to responsible and low-impact platform decommissioning.

We would like to thank the Ocean Protection Council for drafting an extremely comprehensive strategic plan that addresses all of the major threats currently facing our oceans. We would also like to express our gratitude to the council for its continued work for the last 15 years protecting, conserving, and maintaining healthy coastal and ocean ecosystems and economies. Thank you for the opportunity to comment on the 2019-2024 Draft Strategic Plan, and we look forward to the release of the final strategic plan document. Should you have any questions regarding the above comments, please contact me at eparke@healthebay.org or at 310-451-1500 x156.

Sincerely,

Emily E Parker

Emily Parker, MAS
Coastal and Marine Scientist
Heal the Bay

[9] Oceana et al., "Casting a Wider Net: More Action Needed to Stop Seafood Fraud in the United States," 2019, , doi:10.31230/osf.io/sbm8h.

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April 19, 2019

Ms. Jenn Eckerle, Deputy Director
California Ocean Protection Council
1416 9th Street Ste 1311
Sacramento, CA 95814
COPCpublic@resources.ca.gov

Re: Draft Strategic Priorities to Protect California's Coast and Ocean

Dear Ms. Eckerle:

Heal the Ocean, a Santa Barbara-based citizens' action group committed to stopping sources of ocean pollution, appreciates this opportunity to offer input on the State's recently released Draft *Strategic Priorities to Protect California's Coast and Ocean*. We hope these comments will serve to help the development of a complete 2019-2024 Strategic Plan that addresses a detailed assessment of threats to the ocean's health.

General Comment:
HTO agrees with the call to strategically plan a five-year roadmap to protect the irreplaceable ecosystems and communities that rely on the well-being of the ocean. We are concerned that the OPC Draft plan of establishing priorities might be a replicate of other such plans already further down the road, and we question the wisdom of spending OPC funds on strategizing how OPC can be more effective (see "Goal Six").

But to the point of commenting as we comment in many such plans that deal with Climate Change/Sea Level Rise Adaptation - we are finding a complete lack of mention of wastewater infrastructure that will be impacted by Sea Level Rise and its correlative groundwater rise. Any documents, or program, that is addressing Strategic Priorities to protect California's Coast and Ocean MUST address the issue of wastewater infrastructure. Because most Wastewater Treatment Plants (WWTPs) are on the coast, or at the edge of water, for ease in disposal - any protective plan for the Coast and Ocean must have an entire section devoted to a strategy for dealing with wastewater infrastructure in the face of a rising ocean.

Specific Comments:

1) **Wastewater Treatment Plants (WWTPs):** As a member of the Santa Barbara County Integrated Water Management (IRWM) Steering Committee and Climate Change Sub-

Committee HTO has done considerable work to include the subject of climate change and sea level rise in the Santa Barbara County IRWM Plan, for the purpose of identifying infrastructure work that may need funding because of coastal flooding.

We have in fact been presenting research in both letter and PowerPoint to various agencies – City, County, State – on the issue of sea level rise and the threat it poses to coastal infrastructure, especially wastewater treatment plants (WWTPs). We believe this issue requires more attention from municipalities and wastewater districts, not only across the State, but nationally and internationally.

California faces serious risks due to climate change, and it is critical that the State continue its track record of leadership on this issue to ensure adequate preparation for the hazards associated with a warming planet. The value of having a specific step by step process for planning and adapting to sea-level rise should not be understated. The draft Sea-Level Rise Policy Guidance fills this need and HTO is extremely encouraged by the potential for this Policy Guidance to better protect vulnerable WWTPs to estimated sea level rise in the decades to come.

Throughout history WWTPs have been constructed close to the coastline and other water bodies for ease of disposal of wastewater through outfalls; unfortunately, this has also made wastewater infrastructure susceptible to inundation and flooding from sea level and accompanying groundwater rise. The inundation of WWTPs due to the combination of sea level rise and more intense storms presents a serious public health concern as it increases the risk of untreated, or partially treated, sewage entering coastal waters. These risks were made reality on the U.S. East Coast when Hurricane Sandy hit and, along with other catastrophic damage, caused the release of 11 billion gallons of sewage from WWTPs.[1]

HTO is optimistic about the publicity already generated on the problem of climate change and sea-level rise. The National Academies Press Report, *Sea-Level Rise for the Coasts of California, Oregon, and Washington* gives coastal planners, State officials and citizens a greater degree of certainty regarding expected sea-level rise. In California, the very presence of the Coastal Commission's Draft Policy Guidance illustrates the seriousness with which the State is regarding this problem. HTO believes the Ocean Protection Council's Draft *Strategic Priorities to Protect California's Coast and Ocean* must at least include a mention of the need for assessing the vulnerability of coastal infrastructure, with specific attention to the vulnerability of WWTPs along with description of adaptation strategies to mitigate these risks.

2) Septic Systems: Septic systems MUST be addressed in the Draft Strategic Priorities to Protect California's Coast and Ocean - particularly those in coastal areas, or next to marshes, creeks, rivers and streams. Heal the Ocean conducted a 15-year campaign to push through the South Coast Beach Communities Septic-to-Sewer project on the Santa Barbara County south coast - which removed septic systems from 7 miles of beaches. During our work on this project, we saw the ocean literally come in, and go out, of septic systems.Any protection of the California coast has to include septic systems, because septic leach fields are already being inundated by sea level rise.

[1] Kenward, Alyson, Daniel Yawitz, and Urooj Raja. *Sewage Overflows from Hurricane Sandy*. Climate Central, April 2013, p. 1. <http://www.climatecentral.org/pdfs/Sewage.pdf>.

3) Dredging: As the Sea Level rises, dredging activities will become more widespread, both to build up shoreline defense to erosion, and also to dredge sediment from wetlands in danger of flooding. Many other agencies are tackling the subject Wetland Area Protection and Dredge and Fill Regulations, including the State Water Resources Control Board, the California Coastal Commission and others.

Wetlands are those areas where freshwater meets the ocean, and any dredge and fill operation in a wetlands area affects the ocean dramatically. The sudden release of sediments to the ocean causes smothering of bottom animals and/or the reefs in the near shore areas where dredge spoils are deposited. A shoreline area filled with suspended sediments renders that area unusable for human recreation (i.e. swimming).

Therefore, Heal the Ocean asks that **Objective 2-4** in the Draft Priorities document ("Support coastal habitat restoration in California's outer coasts, bays, estuaries and tidally influenced riparian habit) include a robust analysis of the effects of dredging on the ocean coastline/tidal zone.

Dredge and fill operations impact the ocean immediately offshore from Wetland Areas and these practices must be put on the list of Priorities**.** 4. BIOLOGICAL RESOURCES (Page 27 of 57):

4) **Goal Six: Strengthen Organization Effectiveness**: This section seems focused on prioritizing how OPC effectiveness could be more effective, which strikes us as strange. However, **Objective 6.2: Increase coordination of coastal and ocean policy and management decisions in California:** we couldn't agree more. A term used and heard widely these days is "analysis paralysis" - with state, regional, and municipal agencies all studying the same issues, repetitiously. We believe that resources and expertise should be leveraged and coordinated by some agency, whether it is OPC or another - so that we can get out of this "analysis paralysis" circle of endless repetition.

Thank you for this opportunity to comment.

Sincerely,

Hillary Hauser, Executive Director
Wendy Pelayo, Researcher

April 19, 2019

Wade Crowfoot, Secretary for Natural Resources
Chair, California Ocean Protection Council
California Resources Agency
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Deborah Halberstadt, California Ocean Protection Council
California Natural Resources Agency
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RE: California Ocean Protection Council's 2019-2024 Draft Strategic Plan

Dear Chair Crowfoot and Executive Director Halberstadt,

Magellan Wind welcomes the opportunity to provide comments on the California Ocean Protection Council's (OPC) 2019-2024 Draft Strategic Plan (Draft Plan). We applaud the OPC's effective leadership on ocean protection issues for California, throughout the US, and around the world. Magellan strongly supports the Goals and Objectives included in the Draft Plan. We will limit our comments to subjects related to OPC's Values, Goal Three: "Ensure Thriving and Sustainable Fisheries," and Goal Five: "Protect the Ocean and Encourage Sustainability in the Blue Economy."

Introductory Comments

Utility-scale offshore wind farms: a new use of the oceans

US coasts and the adjoining exclusive economic zone have historically supported a wide range of industrial, commercial, national defense, and cultural and recreational activities. These areas are coming under growing pressure from a variety of sources. Calls for expanded oil and gas drilling, new and expanded shipping lanes, increased military testing and training, and aquaculture activity raise concerns among commercial fishing businesses and recreational users. Offshore wind power, which has the potential to generate clean, renewable energy for millions of homes up and down our coasts, adds another use to the mix.

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Lease areas for offshore wind farms can be as large as 200 to 300 square miles. Distances between turbines, calibrated to limit turbulence and wake effects, range from a half mile to almost a mile. Since its inception, the offshore wind industry has consistently trended toward larger turbines and longer inter-turbine distances. This ensures that many other ocean uses are feasible at wind farm sites. We recognize, however, that advancement of the public interest in balanced, sustainable use of ocean resources will require better planning, better cooperation, and better management. Magellan believes that the OPC can play a vital role in achieving these outcomes.

Job creation

The offshore wind industry has the potential to create thousands of highly skilled jobs in the US. Offshore wind creates employment in the manufacture of wind farm components as well as in the development, installation and operation of the wind farms. To realize the full job-creating potential of offshore wind development, however, it will be necessary to build offshore wind farms at scale, as is occurring today on the US eastern seaboard, in Europe, and in the Asia-Pacific region. Manufacturers will invest in the US only if they have the orders needed to justify the investment. Factories for the manufacture of wind turbines, plants that manufacture submarine cable, and port infrastructure improvements will depend on state policies to spur development of these facilities so that US workers can join the world's growing offshore wind workforce.

OPC Values

Magellan appreciates OPC's approach to ocean stewardship, as described in the Draft Plan's statement of OPC Values, and is committed to working collaboratively with all stakeholders, including those who have sometimes lacked the resources to engage fully in policy discussions. As we continue to develop our projects, Magellan will design and implement a program of sustained and intensive outreach to address the concerns of and minimize conflicts with commercial fishing and shipping interests, Native American Tribes, ocean wildlife advocates, the Department of Defense, and environmental justice and other stakeholder groups. We believe OPC's leadership will serve to ensure that all interests have the opportunity to participate in state policy making discussions related to ocean protection issues.

Goal Three: Ensure Thriving and Sustainable Fisheries

Magellan recognizes that potential effects on fish and fisheries will be of great interest to the commercial fishing industry. We are committed to working closely with fishing representatives and fishing liaisons in an open and transparent process to identify and address their concerns throughout the leasing and permitting, construction, operations, and decommissioning stages of our projects. Our goal is for the wind and fishing industries to grow together off the California coast.

We support OPC's commitment to ensuring a thriving and sustainable fishing industry in the state and look forward to working with OPC on this critical issue.

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Objective 3.6: Reduce risk of marine life entanglement in California fishing gear

Magellan also recognizes the importance of protecting marine mammals and sea turtles that live off the California coast. Several national environmental groups have expressed concern that lost or abandoned fishing gear could become entangled in the mooring lines for floating wind turbines and create an entanglement risk. Magellan is committed to ensuring that this entanglement risk is properly addressed. We welcome input from OPC, environmental organizations, and other stakeholders as we develop our study and monitoring protocols for pre-construction, construction, and post-construction activities. And we will follow recommendations regarding mitigation measures supported by OPC and other state and federal agencies.

Goal Five: Protect the Ocean and Encourage Sustainability in the Blue Economy

Objective 5.1: Ensure marine renewable energy projects minimize impacts to the coastal and marine environment, recreation, and fishing communities

In addition to our support for sustainable commercial fishing and marine wildlife protections, Magellan is committed to full consideration and appropriate protection of recreational fishing and other marine recreational uses, archaeological and cultural heritage resources, especially those of interest to tribes, and interests in shoreline views. We will also work to ensure protection of marine birds and benthic resources. Magellan believes that stakeholders in California will be well-served by OPC's leadership on its Goal Five and, as related to offshore wind, its Objective 5.1.

Thank you for the opportunity to present these comments.

Sincerely,

James S. Lanard, CEO

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Comments on California Ocean Protection Council 2019-2024 Draft Strategic Plan

Michael Murphy
Founder and Principal, Eco-Econ Future
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My name is Michael Murphy and I am a policy and science consultant who has worked with California aquaculture businesses and the aquaculture research community. I also have experience with various ocean science topics and fishery communities through my former professional roles with the National Oceanic and Atmospheric Administration, education (MS in Marine Resource Management; and BS in Aquatic Biology) and personal experience as a recreational fisherman. The following comments reflect my **personal opinion** but incorporates my experiences working with stakeholders along the California coast; including state and federal agency staff, scientists and business representatives from ocean-dependent industries.

I have two general comments about the proposed strategic plan:

First, I am very supportive of the proposed actions stated in the draft strategic plan. It is ambitious and reflects forward-thinking on many important issues facing the state. However, I believe that it may be challenging to actually implement some of the proposed actions (e.g. habitat restoration, aquaculture, artificial reefs, fishing, etc.) due to conflicting mandates (explicit and implicit) in current state law, policies and agency priorities, or insufficient capacity (e.g., available staff, staff expertise and overall funding) in certain priority areas.

I hope that by releasing this strategic plan, the Ocean Protection Council can serve as a catalyst for state agencies to address overlapping/contradictory mandates in their respective jurisdictions, as well as areas where the state does not currently provide sufficient funding and dedicated staff to effectively manage these issues. All state resource agencies and commissions can benefit from funding increases.

Second, many of the proposed actions are focused on education and outreach activities to "ensure understanding" of the various issues among "policymakers and leaders in California's legislature and public agencies." This type of information-sharing work is done most effectively through collaborations among subject matter experts and professional communication staff.

In Goal Six (Organizational Effectiveness), there are proposed actions about the need to "implement communications approaches" and "identify gaps in [organizational] capacity. It is my recommendation that the OPC create a communications staff position to help it achieve its communication objectives. In addition, it will be helpful to assess the current communication staff capacity within other state agencies. As a long-time communications and constituent relations professional, I can tell you that organizations are more effective when they have sufficient professional communication expertise available to meet their communication and constituent relations (e.g., working with stakeholder groups like fishermen) needs.

My specific comments will focus on three main topic areas: aquaculture, artificial reefs and fisheries.

Goal One: Climate change

1) Under Objective 1.1, a proposed action states*: "Assess current and future risks to ocean-dependent industries, including aquaculture, fisheries, and coastal tourism.*

Although climate change is certainly a concern among the very small California aquaculture industry, the most important "threat" to the aquaculture industry is not climate change but regulatory uncertainty, followed by water quality and challenges associated with sharing space with other ocean users (e.g. commercial fishermen, recreation, etc.). Climate change is certainly a long-term risk that has shellfish growers (only shellfish is currently grown in CA) attention but regulation compliance is what is currently most affecting growers abilities to adapt or expand their growing practices to changing ocean conditions and consumer demand.

For recreational fisheries, the biggest threat is the continued decline in the number of people who participate in recreational fishing. This has a direct impact on DFW's budget through declines in license fees and funding received through fishing & hunting equipment purchases. This funding decline affects all DFW conservation and management programs.[1] The OPC should be aware of the state's efforts to increase angler participation as many of the strategic plan's proposed actions (e.g. habitat restoration, artificial reefs, rigs to reefs) can have a positive impact on recreational fisheries participation and health of sportfish populations.[2]

I believe undertaking this proposed action on climate change is important but the OPC should understand the perspective of affected stakeholders on current issues that most affect their abilities to operate and test new aquaculture species. Perhaps addressing these challenges could be incorporated into work proposed under Objective 5.2?

2) Under Objective 1.2, a proposed action states*: "Build on existing efforts to develop, test, and apply coupled aquaculture production systems by integrating seagrasses or kelps to locally ameliorate ocean acidification."*

I just want to make sure that the OPC is clear that there are currently not existing efforts (with one very small exception that I am aware of) within California that are testing coupled shellfish-seaweed aquaculture production systems. There are systems elsewhere in the U.S. (e.g. Maine) and globally but not in California. This proposed action as currently worded might give impression that more coupled aquaculture is currently being done in California than the reality. There is very strong interest within the aquaculture industry and research and community to test and implement coupled systems but regulatory uncertainty and perceived approval costs are currently dissuading growers from submitting proposals to add marine algae to their shellfish grow-out leases.

[1] https://cdfgnews.wordpress.com/2019/02/07/cdfw-magnifies-efforts-to-recruit-hunters-and-anglers/
[2] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=165196&inline

3) Under Objective 1.2, a proposed action states*: "Identify and implement actions to protect frontline and low-income communities from the impacts of climate change, including sea-level rise and coastal flooding."*

Artificial reefs are currently being used in other countries as an effective way to ameliorate the climate risks to coastal property through reducing storm wave energy. I know there is a previous action item focuses on "nature-based" infrastructure but I want to recommend that OPC consider mentioning artificial reefs explicitly as an option for ameliorating climate risks. If not explicitly in the plan, then OPC should be aware that artificial reefs should be considered as a potential option. It is important to consider all tools in the toolkit as the characteristics of each coastal area are unique, and nature-based options or managed retreat may not be feasible. (E.g., there is a proposal to place a small reef in Goleta Bay to reduce wave energy which will allow the beach to reform.)

Goal Two: Protect and restore coastal and marine ecosystems

4) Objective 2.1 & 2.2, proposed actions states: *"Increase engagement of commercial and recreational fishing communities in MPA management."*

I mentioned the importance of having staff with constituent relations expertise in my general comments but this is especially true when it comes to working with fishing communities. In particular, the recreational fishing community is generally still upset about the establishment of MPAs so working with them on MPA management should be done with a deft touch. I have worked closely with the recreational fishing industry and believe they can become some of the strongest advocates for MPA management and funding. But engagement should be done thoughtfully.

5) Objective 2.3: Promote healthy kelp forest ecosystems along the California coast.
I am very supportive of this objective and its proposed actions. This is really important work and should take high priority. I should note that kelp forest ecosystem restoration also aligns with artificial reefs objectives in Goal Five, as artificial reefs can be an excellent way to restore and create new kelp forest ecosystems.

Goal Three: Promote resilient fishing communities

6) A general comment that there are lots of proposed actions related to science and climate change but very little focus on what most affect fishing community resiliency, keeping costs lower while getting the best price for their catch. Many seafood species caught off the California coast could be sold at higher prices if local demand for their catch could be increased by higher value customers (retail, restaurant, direct to consumer).

I would love to see the state invest more in assisting fishermen create greater local market opportunities for their catch. This "value-added" (think "fresh" vs "frozen or canned") approach is a great way to increase fisherman's income without significant changes to their fishing practices. Alaska is a great model for how a state can support its fishing communities. There are also many NGO partners that can assist in this effort.

Goal Five: Blue Economy

7) I am very supportive of proposed actions in Objective 5.2: "Ensure aquaculture in state marine waters is sustainable and minimizes impacts to marine life and habitats." Aquaculture, compared to other food production systems, has the ability to produce healthy food[3] with relatively little to no other inputs such as water, fertilizer or pesticides. Compared to land-based industrial agriculture, it is a low-impact food production system that produces healthy food while also creating other ecosystem services (in the case of shellfish and marine algae).

8) Objective 5.4 states: "Investigate unresolved and ongoing scientific issues surrounding the creation and management of artificial reefs." We actually know quite a bit about the creation and management of artificial reefs. NOAA has done a lot of work on this subject. There was a National Artificial Reef Workshop held in 2016[4] and there is a 2007 National Artificial Reef Plan on siting and construction guidelines[5]. We have also learned a lot here in California through research conducted by Milton Love on fishery production on oil platforms[6] and research conducted at the SONGS reef off San Clemente, CA.[7]

I recommend striking the phrase "unresolved and ongoing." Compared to the wording of other Objectives, this phrase seems subjective and repetitive. "Investigate scientific issues" speaks for itself in terms of the process used to assess an issue, and it also matches the language used in other Objectives referenced in the draft plan. The new version can read: "Investigate scientific issues surrounding the creation and management of artificial reefs."

In addition, I am supportive of all the proposed actions except for "improving scientific understanding of the trade-offs between replacing soft-bottom habitats with hard-bottom habitats…" The ecosystem impacts of artificial reefs on <u>all</u> habitats/species can be explored via new studies or conducting a literature review. This proposed action should not be a priority compared to all the other proposed actions.

9) Lastly, the one thing I see missing from this plan is improving our science understanding on the socioeconomic impacts of past and current management/regulations on our ability to recreate and produce food. We are good at studying the ecological impacts of our management actions but we should also be able to understand how coastal communities are impacted as well. I am not making presumptions here…"impacts" can be positive and negative, depending on your perspective. It will just help us inform future management proposals, especially when this plan speaks to the importance of having healthy commercial fisheries and other coastal-dependent industries.

Thank you for the opportunity to comment. I hope you find them helpful. Please do not hesitate to reach out to me if you have any questions or seek further information.

Best, Michael Murphy

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[3] https://www.hsph.harvard.edu/nutritionsource/fish/

[4] https://www.fisheries.noaa.gov/national/recreational-fishing/national-artificial-reef-workshop

[5] https://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/noaa_artificial_reef_guidelines.pdf

[6] https://www.pnas.org/content/111/43/15462

[7] http://marinemitigation.msi.ucsb.edu/index.html

AQUARIUM OF THE PACIFIC
A non-profit institution

Public Comment on the OPC 2019-2024 Draft Strategic Plan
By Aquarium of the Pacific
April 19, 2019

We greatly appreciate the California Ocean Protection Council's (OPC) efforts to leverage research and collaboration to support a healthy ocean. Here are some comments for your consideration:

Conclusion: *The mounting challenges to California's coast and ocean represent an existential threat both here and globally, so the time for bold, science-based innovation is now.*

This is one of the last lines in the document, but it should be one of the guiding statements for the OPC's Strategic Plan. Meeting the fundamental food, water, and energy needs of the growing population in a rapidly changing climate is putting immense pressure on the ocean and land systems. While land-based ecosystems bear the brunt of the impact from production, the impacts don't stop at the shoreline. The land and sea are connected. Terrestrial actions can result in irreparable impacts to the shared commodity that is our global ocean. These impacts are the product of cumulative global consumption, which California's 40 million citizens and fifth largest economy in the world contribute to.

We have one global ocean and the larger impacts – including climate change, ocean acidification, and sea level rise – will affect the health of California's ocean. California relies on imports to fulfill its food and energy demands and hundreds of thousands of Californians (mostly in impoverished areas) don't have access to a consistent supply of safe drinking water. We have an ethical responsibility to ensure all of our citizens have consistent access to a safe and secure source of food, water, and energy and to take on some of our consumption costs in our own backyard. In doing so, we can leverage California's strong environmental ethic to ensure that these practices are informed by the best available science, use appropriate technologies, and are adequately regulated to meet the foundational needs of the growing population in a changing climate without compromising the health of the ocean. **This is where the bold, science-based innovations will play an important role in "protecting" or conserving oceans and coasts in California and around the world. It is one of the most important roles California should play to support a healthy ocean.**

GOAL ONE: SAFEGUARD COASTAL AND MARINE ECOSYSTEMS AND COMMUNITIES IN THE FACE OF CLIMATE CHANGE

Objective 1.1: *Quantify the role of aquatic vegetation in mitigating ocean acidification and storing carbon while mapping current and projected future habitat space for seagrass meadows, salt marshes, and kelp forests along the California coast.*

This action should include farmed seaweed as part of the portfolio of aquatic vegetation resources to mitigate ocean acidification and store carbon. Farmers can provide important knowledge and resources to help researchers and contribute to the development of solutions. Also, aquaculture mapping exercises to site farms are already underway so it would be valuable to collaborate to reduce redundancies and maximize efficiencies and effectiveness.

GOAL TWO: PROTECT AND RESTORE COASTAL AND MARINE ECOSYSTEMS

Objective 2.1: *Partner with fishermen, academia, citizen/community scientists, non-profit organizations, foundations, and local MPA Collaboratives to integrate diverse perspectives, resources, and expertise into management and decision-making.*

This group should include marine aquaculture producers. They will be an important stakeholder in future efforts to expand MPAs. Farmers can also provide important knowledge and resources to help with monitoring and research. It would also be beneficial to work with current aquaculture mapping and siting efforts, such as those underway at NOAA's National Ocean Service, to maximize efficiencies and ensure that future efforts to site and manage aquaculture sites offshore are better able to navigate and support the MPA process and California's efforts to conserve its ocean resources.

GOAL THREE: ENSURE THRIVING AND SUSTAINABLE MARINE FISHERIES

All of the objectives and actions proposed in this section should include fisheries and marine aquaculture as an integrated California seafood production entity, not separate. We have marine aquaculture operating in the state and they should be seen as a complement to our wild-capture fisheries. They should get research and market access support. While the details and scales may vary, climate change and resiliency, working waterfronts, and incidental catch are areas that affect the farmed sector as well as the wild sector. In some cases, technology and knowledge transfer may be valuable for both sectors and achieving California's ocean conservation goals.

GOAL FOUR: IMPROVE COASTAL AND OCEAN WATER QUALITY

Objective 4.2: *Fund scientific research to assess the risk of microplastics to humans, marine life, and habitats; the sources and pathways of microplastic pollution; and the development of standardized monitoring methods for sampling, detection and characterization.*

It would be beneficial to understand if and how microplastics impact farmed shellfish. Farmers can provide important knowledge and resources to help researchers and contribute to the development of solutions and California's ocean conservation goals.

Objective 4.3*: Continue coordinating with fishermen, public health and resource agencies, and scientists to minimize the impacts of harmful algal blooms and ensure effective seafood testing of harmful algal toxins and public health notifications.*

This group should include marine aquaculture producers. Shellfish producers are particularly sensitive to harmful algal toxins. They can provide important knowledge and resources to help researchers and contribute to the development of solutions to reduce the impact of HABs. It would also be beneficial to work with current mapping and siting efforts, such as those underway by NOAA's National Ocean Service and The Nature Conservancy, to maximize efficiencies. Including these voices in the discussion could result in valuable knowledge transfer to support California's ocean conservation initiatives.

GOAL FIVE: PROTECT THE OCEAN AND ENCOURAGE SUSTAINABILITY IN THE BLUE ECONOMY

Objective 5.2: *Ensure aquaculture in state marine waters is sustainable and minimized impacts to marine life and habitats.*

In addition to ensuring that aquaculture is done sustainably, we also need to facilitate getting farms in the water so we can test and adapt science-based best practices and resources as needed. While there are some unknowns specific to marine aquaculture in California (due to a very limited sample of working farms to test), the state of the science is strong regarding siting and science-based best management practices to reduce the risk of potential impacts and the efficacy of our foundational environmental regulations (e.g. Clean Water Act, National Environmental Policy Act, Endangered Species Act, etc.). Siting some pilot operational farms that adhere to globally tested and vetted best practices, coupled with appropriate science-based monitoring and testing locally is the only way we will be able to instill confidence in the efficacy of appropriate best practices and monitoring protocols for California.

GOAL SIX: STRENGTHEN ORGANIZATIONAL EFFECTIVENESS

Objective 6.1: *Research and implement communications approaches and tools that help improve OPC communications and outreach to reach a wider audience and constituency, such as outreach in other languages.*

California's population is one of the most diverse in the world. Well-intentioned efforts to conserve and protect the environment can leave some groups feeling marginalized if outreach is not inclusive. We commend the OPC for taking steps to recognize diverse audiences. OPC could also consider **including efforts to engage in a proactive learning and listening capacity** in addition to reaching these audiences with content that has already been developed and decisions that have already been made on their behalf.

April 19, 2019

Wade Crowfoot, Secretary for Natural Resources
Chair, California Ocean Protection Council
California Natural Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Sent via: COPCpublic@resources.ca.gov

RE: Draft Strategic Priorities to Protect California's Coast and Ocean

Dear Secretary Crowfoot and members of the Ocean Protection Council:

On behalf of California Coastkeeper Alliance and Environmental Action Committee of West Marin, we thank you for the opportunity to provide the following comments on the California Ocean Protection Council (OPC)'s Draft 2019-2024 Strategic Plan. Our groups work closely with OPC across its priorities and have witnessed its incredible progress toward securing more resilient marine environments through improved ocean policies and advanced scientific understanding of our ocean resources and threats. OPC is particularly effective due to its collaborative and transparent decision-making processes, and our groups and the environment have benefited from OPC's willingness to engage and coordinate with stakeholders.

California's ocean and coast face unprecedented threats from climate change, and OPC serves a critical role in addressing these threats as a leader in preserving our ocean and coastal environment, communities, and economy. Global carbon emissions are driving changes not only to the Earth's climate, but also to the chemistry of the world's oceans. The oceans are acidifying because they are absorbing a significant share of the carbon dioxide (CO_2) released primarily by the burning of fossil fuels and changing land uses. Ocean acidification (OA) is accelerating rapidly, with enormous implications for the health and productivity of California's coastal and ocean ecosystems and the communities and industries that depend on them. From corroding shells and skeletons of marine organisms to disrupting normal fish behaviors, OA has the potential to alter marine food webs and ecosystems and the benefits they deliver to society, including California's $45 billion ocean-based economy. The U.S. West Coast is exposed to some of the lowest and most variable pH waters, and it is likely to be among the first places to experience the biological and economic effects of OA. In California, several top coastal fishery resources and the industries they support are at risk, including West Coast Dungeness crab, market squid, and shellfish aquaculture species (e.g., oysters, mussels). Addressing this threat requires a sustained, multipronged approach to both mitigate acidification at a local and statewide scale and manage the resulting disruptions.

With a new Administration in place, it is critical that the OPC use this Strategic Plan as a pivot point to take a more active, aggressive approach to protecting our ocean and coast. OPC has been an international leader on scientific research, funding, and planning, but it's time the OPC take the lead with sister

agencies to put science to action. To strengthen the Strategic Plan, the OPC should:

(1) Support the prioritization of a revised Areas of Special Biological Significance (ASBS) program and engage the State Water Board to ensure ASBS water quality is not degraded;
(2) Encourage the Water Boards to begin designating new State Water Quality Protection Areas (SWQPAs) that protect MPA water quality;
(3) Support the Kelp Recovery Working Group by assisting in implementation of the group's final recommendations and provide briefings to raise awareness of the group's efforts to the Council and the Legislature;
(4) Elevate the visibility of California's new beneficial reuse program and encourage the Legislature to provide continuous appropriations to make the program permanent;
(5) Assist the California Air Resources Board (CARB) and coastal air districts in evaluating a permanent voluntary vessel speed reduction incentive program;
(6) Provide research support to assess the reduction of acoustic impacts of slowing ships down to 10 knots;
(7) Recommend receiving water monitoring protocols to the State Water Board to ensure stormwater permittees are complying with the Trash Amendments' Water Quality Objective of no trash present in our waterways;
(8) Encourage that all new washing machines sold in California be equipped with microfiber capture devices by 2023;
(9) Implement the OA Action Plan as a priority action;
(10) Provide scientific guidance to set an ocean acidification and hypoxia (OAH) Water Quality Objective;
(11) Engage early in the State Water Board's process for adopting a nutrient water quality objective within the Biostimulatory Amendment;
(12) Convene experts to develop a robust constituents of emerging concern (CEC) monitoring program to minimize the likelihood of CECs impacting aquatic life and our marine ecosystems; and
(13) Encourage the State Lands Commission to establish an Independent Expert Panel to provide recommendations and develop a report to the U.S. EPA on levels of discharge standards that could be met by shipboard treatment systems and onshore treatment plants.

A. Objective 2.2, Proposed Action 3: The OPC should support a more stringent Areas of Special Biological Significance program and encourage the Water Boards to adopt new State Water Quality Protection Areas that overlay Marine Protected Areas.

1. Support the prioritization of a revised ASBS program and engage the State Water Board to ensure ASBS water quality is not degraded.

Objective 2.2, Proposed Action 3, states that the OPC will "[a]dvance policy that improves water quality within MPAs." The OPC should provide more specificity as to policies that will improve water quality for MPAs. We would recommend that the OPC focus on improving water quality for MPAs by supporting a more stringent ASBS program and encouraging the Water Boards to adopt new SWQPAs for MPAs. Scientific evidence suggests that well-designed MPA networks can contribute to the protection and resilience of marine species as ocean conditions change. California has invested significant resources in establishing a globally recognized MPA network, which protects marine species and habitats, and safeguards California's coastal resources and economy. It is time we better protect the water quality of MPAs to act as 'hope spots' in the face of climate change.

The ASBS program was developed in the 1970s to protect the water quality of California's most special, biologically diverse marine ecosystems. The State Water Board created 34 ASBS, a type of SWQPA, in order to preserve and protect especially valuable biological communities. Although waste discharges are

prohibited in ASBS, the State Water Board provided an exemption for outfalls as long as they achieve natural water quality. A 2015 analysis by CCKA of ASBS Compliance Plans revealed evidence of widespread non-compliance and dysfunction with the ASBS program. CCKA submitted a Public Records Act (PRA) request to the State Water Board to obtain the monitoring and compliance documentation required by the Ocean Plan ASBS Exception Policy for permittees in San Diego, Los Angeles, Orange County, Monterey, and Humboldt. A review of the Board's response to the PRA, in addition to draft compliance reports subsequently made available online, showed a series of Draft Compliance Plans in various stages of incompleteness. Permittees generally failed to submit complete monitoring results or propose best management practices (BMPs) and, in many cases, included sample results that demonstrated violations of the ASBS Exception.

According to CCKA's review, none of the permittees had even acknowledged that their discharges were altering natural coastal water quality, and therefore were not undertaking measures to address those violations. The monitoring results also showed that none of the permittees used, applied, or demonstrated compliance with the standards for pollution control set out in the ASBS Exception. In addition, none of the plans proposed BMPs beyond those already required under other existing programs. This review confirmed that non-compliance is widespread throughout the ASBS network, and that the exemptions allowing stormwater discharges that do not alter natural water quality are technically difficult to evaluate for compliance.

Our organizations have urged State Water Board action to compel compliance with the ASBS Exception through its Triennial Review of its Ocean Plan. The State Water Board needs to change the point-of-compliance with natural background levels at the end of pipe, no mixing zone should be allowed, non-compliant dischargers should be required install BMPs to address exceedances, and BMP effectiveness monitoring needs to be required to demonstrate compliance with natural water quality. To ensure exempted discharges do not degrade ASBSs, we recommend the OPC support the prioritization of a revised ASBS program and engage the State Water Board to ensure ASBS water quality is not degraded.

2. *Encourage the Water Boards to begin designating new SWQPAs that protect MPA water quality.*

California's coastal environment is an important ecological and economic resource. It is home to diverse and abundant marine life and has some of the richest habitats on earth. To protect this diversity, the state has designated 124 MPAs, which have been shown to serve as ocean 'hope spots' or climate reserves in a changing ocean. However, only 45 of the 124 MPAs currently have at least some geographic overlap with ASBS. All MPAs would benefit from the additional water quality protection granted by SWQPAs.

One way to build on MPA protections to improve and protect coastal water quality is to designate a SWQPA. As defined in the State Water Board's Ocean Plan, SWQPAs are specific protective overlays created to guarantee the integrity of ocean water quality. While only allowed over ocean waters, SWQPA regulations require adjacent land uses to take specific steps to ensure that the water quality of a designated site is not degraded. The SWRCB 2012 update of the Ocean Plan created two separate categories of SWQPA designation. A SWQPA-ASBS provides the highest level of protection, prohibiting all waste discharges into a designated area. The SWQPA-GP designation was created for the express purpose of overlaying water quality protections in MPAs. While allowing for some discharges, SWQPA-GPs come with higher water quality objectives than normally associated with NPDES permits. All current SWQPAs are SWQPA-ASBS designations.

No new SWQPA sites have been created since their original creation in the 1970s. Our organizations have been advocating for the Water Boards to re-initiate the designation of SWQPAs for MPA water quality protection. However, Water Board staff has been resistant, arguing that they don't see the need for MPA water quality protections and that they don't have the resources to designate new SWQPAs. The OPC

needs to encourage the Water Boards to begin designating new SWQPAs that protect MPA water quality.

B. Objective 2.3, Action 6: Support the Kelp Recover Working Group by assisting in implementation of the Group's Final Recommendations and provide briefings to raise awareness of the Group's efforts to the Council and the Legislature.

Living systems like kelp forests, seagrass beds, and salt marshes play multiple roles in mitigating the effects of climate change on marine ecosystems: they have the potential to protect shorelines from sea level rise, sequester carbon, and locally ameliorate ocean acidification by removing nutrients and organic carbon from runoff. At the same time, they serve as critical nursery habitat for valuable fishery species and provide numerous other ecosystem services. Unfortunately, these habitats have continued to shrink during a century of net loss. It is critical that we protect kelp, sea grass, and wetlands to preserve their valuable ecosystem functions and buffer our coastline against the effects of climate change.

In order to pursue kelp mariculture in the state's waters, it is important to bolster efforts underway at the California Department of Fish and Wildlife (CDFW) to determine optimum methods to restore the state's kelp forests. More than 95 percent of the kelp forests off of Northern California have been decimated in recent years – largely by an explosion in the population of purple urchins in the wake of a massive sea star die-off. The recreational abalone fishery was closed as a result and that fishery is important economically to coastal areas. Science shows these formerly forested areas can remain denuded of kelp for decades without intervention. CDFW participated in the Kelp Recovery Working Group organized by the Greater Farallones National Marine Sanctuary to develop a plan including research and pilot projects to move forward. The final Working Group recommendations[1] were recently released and incorporate CDFW's efforts. CDFW's initial work has shown promise, but it needs further and dedicated resources to make further progress. The OPC should support the Kelp Recovery Working Group by assisting in implementation of the group's final recommendations and provide briefings to raise awareness of the group's efforts to the Council and the Legislature.

C. Objective 2.4: Elevate the visibility of California's new beneficial reuse program encourage the Legislature to provide continuous appropriations to make the program permanent.

Wetlands are a critical natural line of defense from sea level rise, but they are not immune to its effects. According to the California Climate Change Center, 350,000 acres of California's critically important coastal wetlands will be inundated by rising sea levels if not protected. It is critical that California invest in restoring our wetlands before they are a forgotten memory beneath the waves. Restored wetlands will not only buffer our coastline from sea level rise but will help to ameliorate the effects of OA by sequestering carbon and reducing the flow of nutrients to the ocean. Wetlands have among the most efficient carbon sequestration rates of all habitat types, allowing for both effective and extensive carbon sequestration. Healthy coastal and Delta wetlands provide important and irreplaceable benefits to the human population and to fish and wildlife.

Over the last 16 years, the Bay Area alone has used 23 million cubic yards of dredged sediment for wetland restoration. From existing projects, agencies have noticed that restoration sites using dredged sediment – instead of natural sedimentation – have a much higher and faster success rate for habitat development. A site that receives dredged sediment creates an actual marsh in about 10 - 15 years verses 50 - 60 years for natural sedimentation. Increasing the quality and quantity of key wetlands in California will provide measurable benefits consistent with the most recent climate change mitigation strategies.

[1] See Final Kelp Recovery Group Recommendations, *available at* http://farallones.org/wp-content/uploads/2019/01/Kelp-Recovery-Recommendations_Clean_Sanctuary-Advisory-Council.pdf.

Wetlands restoration requires a lot of nutrient-rich soil. The statewide demand for such soil is expected to grow to 170 million cubic yards in the next 4 years, with a large demand for dredged material. The Bay Area has two active beneficial reuse sites, and it is in the process of adding three additional sites. Other regions have similar needs, including Humboldt Bay; the Los Angeles, Long Beach and San Diego Harbors; and the Tijuana Estuary.

The U.S. Army Corps of Engineers (ACOE) conducts most of the dredging in the San Francisco Bay and other coastal areas in California for navigational and flood control purposes. Yet its regulations impose strict spending limits dictating that only the least costly dredged material disposal or placement alternative is pursued. In practice, this means the majority of dredged sediment is disposed 55 miles offshore, even when habitat restoration sites in need of sediment are available. If state funding were available to pay the incremental cost over ocean disposal – often a few dollars per cubic yard difference – this valuable resource could sequester carbon while increasing shoreline resilience to sea level rise.

California's new beneficial reuse program, with an initial $6 million to the Coastal Conservancy, leverages federal funding for dredging and in return helps wetland restoration projects that simultaneously reduce GHG emissions through reduced transport of sediment, improve carbon storage through wetland restoration, and provide increased resilience to sea level rise.

It is important that the state's new beneficial reuse program be highlighted and evaluated so that we can maximize the program while ensuring the necessary resources to make the program permanent. The OPC should elevate the visibility of California's new beneficial reuse program encourage the Legislature to provide continuous appropriations to make the program permanent.

D. Objective 3.6: Assist CARB and coastal air districts in evaluating a permanent voluntary vessel speed reduction incentive program – specifically providing research support to assess the reduction of acoustic impacts of slowing ships down to 10 knots.

California is home to iconic, keystone marine species that provide both cultural and economic value to its communities. Whales along the California coast enhance the predictability and stability of marine ecosystems, while fueling the state's vibrant coastal tourism economy and a multi-million-dollar whale watching industry. Each year, thousands of large container ships travel to and from California ports through shipping lanes that are shared by at least three endangered whale species. Slowing ship speeds reduces the risk of fatal ship strikes on whales, while cutting air emissions.

In 2017, a partnership between NOAA Channel Islands National Marine Sanctuary, Santa Barbara County Air Pollution Control District, Ventura County Air Pollution Control District, Bay Area Air Quality Management District, and the National Marine Sanctuary Foundation started an initiative to cut air pollution and protect endangered whales continued to expand the Vessel Speed Reduction (VSR) incentive program, including speed-reduction zones in the San Francisco Bay Area and the Santa Barbara Channel Region. The program built on the foundation of the 2014 VSR Trial, the 2015 Marine Shipping Working Group process, and the 2016 VSR Program. The OPC should assist CARB and coastal air districts, in consultation with the National Marine Sanctuary program, in evaluating a permanent voluntary vessel speed reduction incentive program – specifically providing research support to assess the reduction of acoustic impacts of slowing ships down to 10 knots.

E. Objective 4.1: Recommend receiving water monitoring protocols to the State Water Board to ensure stormwater permittees are complying with the Trash Amendments' Water Quality Objective of no trash present in our waterways.

Eighty percent of marine pollution starts on land. It gets blown by wind or carried by rain into storm drains, which flow to our bays, rivers, and ocean. Once in the water, it breaks down into smaller pieces that can persist in the environment for decades, polluting the water and harming fish and animals that mistake it for food. The State Water Board's Trash Policy went into effect in January 2016, setting a goal of no refuse to be present in our waterways by 2030, and requiring cities to prevent refuse from entering waters by placing trash catching devices on storm drains.

The Policy generally enjoyed strong support, including from the OPC and California businesses. The OPC passed a resolution supporting the Policy and committing to submit a support letter with recommendations on how to improve the monitoring program. The OPC letter expressed its interest in the use of scientific measures to track and verify program effectiveness. Currently there is no agreed-upon scientific method to monitor for trash in water and receiving stormwater channels. This makes assessing permittees' compliance and general progress on reducing trash in state waters difficult. This project would provide the research needed to develop scientific measures to monitor trash.

The OPC, in close partnership with the State Water Board, has recognized the importance of standard methods for trash monitoring and has funded this project. The Southern California Coastal Water Research Project (SCCWRP) and San Francisco Bay Estuary Institute (SFEI) have partnered up to test multiple trash monitoring methods with a goal of developing a library of methods with known levels of precision, accuracy, and cross-comparability of results, and linking these methods to specific management questions. Beyond developing a library, the OPC should recommend receiving water monitoring protocols to the State Water Board to ensure stormwater permittees are complying with the Trash Amendments' Water Quality Objective of no trash present in our waterways.

F. Objective 4.2: Encourage that all new washing machines sold in California be equipped with microfiber capture devices by 2023.

Each year, an estimated one million tons of microfibers are discharged from wastewater treatment facilities into the world's oceans, rivers, and lakes. Ninety four percent of the drinking water in the United States now contains microfibers. Microplastics are found in ocean fish and wildlife, causing starvation and reproductive consequences, with unknown impacts to the communities who depend on the ocean for sustenance. Despite the profound impacts of microplastics, the issue has a relatively low profile, with few solutions currently on the table.

The OPC should encourage all new washing machines sold in California be equipped with microfiber capture devices. Ultra-fine particle capture devices (similar to lint traps in dryers) already exist and have demonstrated their efficacy in laboratory and field trials, meaning that there are no significant technical barriers to implementation. Previous initiatives have shown that microfibers are too small to be captured at wastewater plants, and garment manufacturers have proved unable or unwilling to reformulate fabrics so that they no longer shed. Washing machine manufacturers represent a single point of entry where we can significantly reduce the flow of microplastics to people and the environment. The OPC should encourage that all new washing machines sold in California be equipped with microfiber capture devices by 2023.

G. Objectives 4.3 & 4.4: Pursue precautionary, no-regrets policy and restoration measures to increase the overall resilience of our oceans to acidification and climate change.

Nutrient pollution is one of the greatest consequences of human-accelerated global change on coastal oceans. OAH is increasingly present in coastal waters, as global carbon dioxide emissions have rapidly increased over the past centuries. The fundamental changes we are seeing in the chemical composition of seawater threaten the health of coastal ecosystems, as well as the communities and industries that depend on the marine environment.

1. *The OPC should implement the OA Action Plan as a priority action.*

We urge OPC to prioritize practicable and tangible solutions to mitigate and adapt to OA impacts. Our organizations have been long time supporters of the strategic use of OPC resources for critical research projects to understand the causes and long-term impacts of acidification and changing ocean conditions. This research should continue, but parallel to that effort, we can and must pursue precautionary, no-regrets policy and restoration measures to increase the overall resilience of our oceans to acidification and climate change. The OPC's OA Action Plan and the West Coast OAH Panel Report, for example, outlines specific policy solutions and concrete recommendations. The OPC should implement the OA Action Plan as a priority action.

2. *The OPC should provide scientific guidance to set an OAH Water Quality Objective.*

Research suggests that the West Coast of North America will face some of the earliest, most severe changes in ocean chemistry, underscoring the need for OPC to take immediate and effective action to mitigate OAH, where possible, and assist communities in adapting to changing ocean conditions. Emerging studies suggest that terrestrial, anthropogenic nutrients affect primary productivity, increase nearshore algal blooms and contribute to OAH. Specifically, California's urban wastewater has historically been treated solely as waste – used once, treated, and then disposed of through offshore dumping. As a result, approximately 12 billion gallons of treated water are wastefully discharged into the ocean or California estuaries each day, contributing to nutrient pollution that exacerbates harmful algal blooms and OA hot spots. California can better manage and treat its wastewater to prevent unnecessary pollution. The OPC should encourage, support, and provide scientific guidance to the State Water Board to adopt an OAH Water Quality Objective using the best available science.

3. *Report recommendations for ocean wastewater treatment facilities to optimize the incorporation of denitrification into their treatment operations.*

Nationwide, approximately 25 percent of all water quality impairments are related to nutrient pollution,[2] of which phosphorus, often found in human waste, and nitrogen are the primary contaminants. Sources of nitrogen include fossil fuel combustion, agricultural fertilizers, stormwater discharge, groundwater pollution, and urban, agricultural, and industrial wastes.[3] This nutrient pollution harms both recreational water use and aquatic life by increasing algae growth and toxic cyanobacteria (i.e., harmful algal blooms), low dissolved oxygen that reduces habitability of aquatic ecosystems, murky water (i.e., turbidity), and the loss of valuable plants and wildlife – including the loss of seagrass, which plays a critical role in mitigating OA.

Denitrification and nutrient removal can be used to treat sewage and municipal wastewater, and to remove

[2] U.S. EPA, Biological Nutrient Removal and Costs (2007) [U.S. EPA 2007], *available at* https://www.nj.gov/dep/wms/bears/docs/EPA%20-Biologicl%20nutrient%20removal%20processes&costs.pdf.
[3] Hans W. Paerl and J. Thad Scott, Throwing Fuel on the Fire: Synergistic Effects of Excessive Nitrogen Inputs and Global Warming on Harmful Algal Blooms (2010), *available at:* https://pubs.acs.org/doi/pdfplus/10.1021/es102665e.

excess nitrate from groundwater often caused by the over-use of fertilizers. In treating surface wastewater, nitrification and denitrification are biochemical processes used together to convert nitrogen to nitrogen gas in order to remove the original nitrogen from wastewater.

There are a variety of physical and operational modifications that can be made to a wastewater treatment system to improve nitrogen removal. Depending on the site and facility, wastewater treatment plants can make relatively minor, low-cost operational and physical modifications at existing facilities, or can pursue significant infrastructure modifications, such as building new reactors. The efficiency of the nutrient and nitrogen removal method imposed – whether it be a process improvement or upgrade in physical infrastructure – depends largely on the existing facility and the improvements needed to reduce the amount of nutrient pollution in its wastewater.

Operational and physical improvements can be made to an existing facility without building new infrastructure. No- or low-cost modifications can be made at existing wastewater treatment plants (WWTPs) to significantly reduce effluent nutrient discharges with minimal negative impacts on operations. In fact, modifications often have positive secondary impacts such as energy efficiency, lower operational costs, and improved process stability. No- to low-cost modifications fall under five general categories:[4]

- Aeration modifications are changes to physical aeration equipment, controls, operation, and function of aeration equipment to optimize anoxic (i.e., no oxygen) conditions to support denitrification.
- Process modifications include adjustments to process control characteristics, such as new screens or grit removal equipment to improve the performance of the treatment process.
- Configuration modifications are changes to, or the addition of, flow streams to enhance denitrification within the existing system.
- Chemical modifications are changes to, or additions of, supplemental alkalinity and organic carbon to support biological nitrogen removal.
- Discharge modifications are made at the end of the treatment system to further reduce nutrients prior to delivery to receiving surface waters. They generally use natural systems and might include soil-based treatment systems or wetland assimilation discharge.

The amount of nitrogen that may be removed by a facility depends on the exact capacity and presence of nitrogen at a specific facility. To evaluate the possible reductions in nitrogen that may be achieved through no- to low-cost modifications, the table below lists sample reductions achieved in pilot studies conducted throughout the U.S.[5]

Modification Type	Pre-Modification Nitrogen Level (mg/L)	Post-Modification Nitrogen Level (mg/L)	Percentage Change (Reduction)
Aeration	17.8	10.5	41%
Chemical	7.85	3.63	54%
Discharge	5.67	0.94	83%

One of the primary barriers to removing nitrogen is the perceived cost of upgrading and building new wastewater treatment infrastructure. However, cost differs between new infrastructure and a retrofit, and updating existing infrastructure is often an effective way to reduce nitrogen and improve the plant's

[4] U.S. EPA, Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants (2015) [U.S. EPA 2015), *available at* https://www.epa.gov/sites/production/files/2015-08/documents/case_studies_on_implementing_low-cost_modification_to_improve_potw_nutrient_reduction-combined_508_-_august.pdf.
[5] U.S. EPA 2015.

performance at minimal cost. For example, modifications to the operational processes of a wastewater plant in Virginia required an investment of $6,000 compared to a system upgrade costing $800,000. Similarly, another plant spent $1.1M on modifications rather than an estimated $80M for a new treatment system. The total cost for a modification or upgrade varies widely based on the size and needs of the plant with average costs ranging from $28,000 to $448,000 for a small plant operating at 4,000 gallons per day. The cost per gallon for a new plant or retrofit also decreases as the size of the plant increases, as shown below:[6]

Component	4,000 gpd	10,000 gpd	25,000 gpd	50,000 gpd	100,000 gpd
New Plants with Increased Nutrient Removal Capability					
Construction	$70.97/gal.	$34.66/gal.	$19.34/gal.	$14.58/gal.	$8.50/gal.
O&M	$7.86/gal.	$3.70/gal.	$2.10/gal.	$1.43/gal.	$0.94/gal.
Retrofits for Increased Nutrient Removal Capability					
Construction	$16.25/gal.	$7.25/gal.	$3.72/gal.	$2.20/gal.	$1.47/gal.
O&M	$3.71/gal.	$1.54/gal.	$0.67/gal.	$0.44/gal.	$0.25/gal.

Retrofit costs are site-specific and vary considerably given the capacity of the facility. As one example, a case study performed for the Maryland Department of the Environment found the cost per pound of total nitrogen removed can range from $0.55 to $7.69 and equates to approximately $1.46 per gallon of treated wastewater.[7] The exact modifications and system upgrades that may be pursued in California will vary by facility to achieve the nitrogen effluent limit determined by the State Water Board to be protective of recreational water uses and aquatic life throughout the state.

The OPC should report recommendations to the State Water Board for ocean wastewater treatment facilities to optimize the incorporation of dentification into their treatment operations.

4. *Engage early in the State Water Board's process for adopting a nutrient water quality objective within the Biostimulatory Amendment.*

Water discharges from agricultural operations in California pose a significant threat to water quality by transporting pollutants – ranging from toxic pesticides, sediment, nitrate, and salts – pathogens, and heavy metals from cultivated fields into surface and groundwater. These pollutants flow from inland waters to the coast, leading to harmful algal blooms, and, in turn, exacerbating localized hypoxia and acidification. Increased sediment pollution due to the destruction of natural riparian zones by intensive farming also eventually makes its way to California's coastline, smothering the marine plants that sequester carbon and provide nursery habitat for valuable fish species. California must develop policies that protect our waterways from pollution while supporting our thriving agricultural economy.

California Water Code section 13050(f) describes the beneficial uses of surface and ground waters that may be designated by the State or Regional Board for protection, and includes: beneficial uses of the waters of the state that may be protected against quality degradation include, but are not necessarily limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Additionally, beneficial uses for surface waters are designated under the federal Clean Water Act section 303 in accordance with regulations contained in 40 CFR 131. In 1972 and 1994, the State Water Board adopted a uniform list and description of beneficial uses to be applied throughout all basins of the state; twenty-three beneficial uses are now defined statewide and these beneficial uses include

[6] U.S. EPA 2007.
[7] U.S. EPA, Wastewater Management Fact Sheet, Denitrifying Filters, *available at* https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100IL79.TXT.

everything from "municipal and domestic supply" and "water contact recreation" through warm and cold "fresh water habitat." The "objectives" required to protect a beneficial use can be numeric or narrative or some mix of both, often leading to confusion.

In the Central Coast Region, beneficial uses of the lower Salinas River include the following: municipal water supply, agricultural water supply, cold freshwater habitat, warm freshwater habitat, fresh water replenishment, water contact recreation, non-contact water recreation, commercial and sport fishing, wildlife habitat, and migration of aquatic organisms. Yet, with all these beneficial uses, the Regional Board allows removal of water that would otherwise enter the river to be treated for agricultural use and groundwater recharge, instead of requiring agricultural pollutant source control, treatment of water, and return of that water to the Salinas River. In summary, only human-beneficial-uses are considered.

In the Eastern San Joaquin, the Central Valley Board is even more cavalier, entirely disregarding any discharge of nitrogen unless it is in excess of the drinking water standard, even though the "aquatic life" standard (cold and warm habitats, commercial and sport fishing, wildlife habitat, migration of aquatic organisms and more, such as rare, threatened or endangered species) is generally a small fraction of the municipal supply limit for nitrogen.

The State Water Board is proposing to adopt a statewide water quality objective for biostimulatory substances along with a program of implementation as an amendment (Biostimulatory Substances Amendment or project) to the Water Quality Control Plan for Inland Surface Water, Enclosed Bays and Estuaries of California (ISWEBE Plan). The Biostimulatory Substances Amendment could include: a statewide numeric objective or a statewide narrative objective (with a numeric translator), and various regulatory control options for point and non-point sources.

It is anticipated that a comprehensive program to implement the water quality objective for biostimulatory substances will be established in three phases as three amendments to the ISWEBE Plan. Each phase would reflect implementation unique to three different water body types. If the Biostimulatory Substances Amendment establishes a numeric water quality objective, rather than a narrative water quality objective, then potentially each subsequent phase would also establish a new numeric water quality objective. The latter depends on whether the numeric water quality objective is developed from factors unique to the different types of waterbodies. The Biostimulatory Amendment would be the first phase, applicable to wadeable streams. The second phase will focus on lakes and the third phase will focus on estuaries, enclosed bays, and non-wadeable rivers. This project will also now include a water quality control policy to establish and implement biological condition assessment methods, scoring tools, and targets aimed at protecting the biological integrity in wadeable streams.

The State Water Board's Biostimulatory Amendment will require an immense about of scientific research to develop a legally defensible water quality objective for nutrient discharges. However, once adopted, California can properly regulate nutrient discharges into our water ways that flow into the ocean and create harmful algal blooms and OAH hot spots. We recommend the OPC engage early in the State Water Board's process for adopting a nutrient water quality objective within the Biostimulatory Amendment.

H. Objective 4.5: Convene experts to develop a robust CEC monitoring program to minimize the likelihood of CECs impacting aquatic life and our marine ecosystems.

The discharge of CECs to California's receiving waters occurs daily. As recycled water becomes an increasingly important part of California's water supply portfolio, the state faces the challenge of monitoring and regulating the discharge of CECs into surface and groundwater. Many streams in Southern California are effluent-dominated streams with 80-95 percent of dry weather flows coming from recycled water discharges, and many Northern California streams receiving recycled water effluent

interact regularly and closely with groundwater. It is important to monitor the potential risks of CECs to both humans and the environment, but to date the State Water Board's CEC monitoring protocols are solely focused on public health and not on threats to aquatic life.

It is critically important to include monitoring recommendations for those CECs that potentially pose a risk to aquatic life and ecosystems. The OPC should continue to convene experts to develop a robust CEC monitoring program to minimize the likelihood of CECs impacting aquatic life and our marine ecosystems.

I. Objective 4.6: Encourage the State Lands Commission to establish an Independent Expert Panel to provide recommendations and develop a report to the U.S. EPA on levels of discharge standards that could be met by shipboard treatment systems and onshore treatment plants.

Ocean and coastal ecosystems have the potential to sequester carbon and to assist California in its efforts to mitigate and adapt to climate change. These valuable resources – such as kelp, tidal marshes, and seagrass meadows – are historically threatened throughout California due to changing ocean conditions and invasive species transported by ballast water from international trade. California has some of the most stringent ballast water standards in the nation, but Congress recently enacted the Vessel Incidental Discharge Act (VIDA), which requires Trump's U.S. EPA to set new standards. Given the state's longstanding interest in ballast water standards, the state has an interest in applying the strongest standards possible. California should be advocating that its existing ballast water standards (Public Resources Code Section 71200 et al.) shall not backslide to conform with the federal Vessel Incidental Discharge Act (S. 140). The OPC should encourage the State Lands Commission to establish an Independent Expert Panel to provide recommendations and develop a report to the U.S. EPA on levels of discharge standards that could be met by shipboard treatment systems and onshore treatment plants.

***

The most determinative factor of OPC's efficacy over the next five years will be the vigor with which the Council implements its final Strategic Plan. We continue to support the OPC in its efforts to recommend new policies and facilitate the implementation of existing policies that offer solutions to the biggest challenges that threaten ocean health in our state.

Thank you for the opportunity to provide these comments. We look forward to continued work with the OPC and its staff to craft and implement a bold and focused final Strategic Plan.

Sincerely,

Sean Bothwell
Executive Director
California Coastkeeper Alliance

Morgan Patton
Executive Director
Environmental Action Committee of West Marin

The Nature Conservancy
Protecting nature. Preserving life.™

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April 19, 2019

Deborah Halberstadt
Executive Director, California Ocean Protection Council
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

RE: Ocean Protection Council 2019-2024 Draft Strategic Plan

Dear Ms. Halberstadt:

Thank you for the opportunity to comment on the Ocean Protection Council's (OPC) 2019-2024 Draft Strategic Plan. The Nature Conservancy's (TNC) mission is to conserve the lands and waters upon which life depends. TNC seeks to support thriving ocean ecosystems and coastal communities, and thus we are writing to express our strong support for and provide comment on the OPC 2019-2024 Draft Strategic Plan. OPC plays a critical role in the protection of California's coastal and ocean resources through the promotion, exploration, and implementation of leading edge, science-based solutions on a range of conservation challenges.

First and foremost, we would like to applaud OPC for the addition of a climate change lens to its priorities, and in particular, the expansion of actions pertaining to climate impacts on fishing communities and fisheries. Climate-driven changes are threatening California's dynamic and biodiverse marine and coastal ecosystems, and these ocean impacts have translated into critical threats to California fisheries which provide food, jobs, and recreation for hundreds of thousands of people across California. Addressing the numerous threats to California ocean ecosystems and ensuring California fisheries can meet the dual objectives of providing for nature and people will require advancing current fisheries management toward a new adaptive, 'climate-ready' management model. We are pleased to see that OPC is prioritizing several key enabling factors for climate-ready management, such as advancing fisheries and climate science, modernizing fishery information systems and promoting adaptive management and decision-making frameworks.

With regards to specific goals and objectives, we offer the following feedback and recommendations:

Kelp forests:

We agree that under Objective 1.1 the mapping of current and future aquatic vegetation habitat is critical to improving scientific understanding of how climate change alters critical coastal and marine ecosystems. We appreciate that via Objective 2.3 OPC recognizes the need to prioritize kelp forests as a critical marine ecosystem and recommend that OPC make explicit the mutually cross-cutting nature of

Objectives 1.1 and 2.3: where improved understanding of climate change impacts will be fundamental to the effective promotion of healthy kelp forest ecosystems.

With OPC's support TNC has initiated a kelp conservation strategy to restore and protect kelp forests in a changing ocean. A primary goal of this strategy is mapping and visualizing kelp dynamics to support adaptive management and restoration efforts. To strengthen actions pertaining to mapping under Objective 2.3, we recommend that OPC include language to underscore the importance of mapping (via aerial surveys) the extent of kelp coverage in 2019, particularly in regions of known loss. We also suggest that bullet 3 of Objective 2.3 should speak specifically to both current and future (on-going) mapping and monitoring efforts.

Sustainable fisheries:

Under Objective 3.1, we recommend highlighting how the coordinated identification of priority science needs and data gaps can guide proposed activities of future Experimental Fishing Permits (EFPs) through the state program created by The California Fisheries Innovation Act of 2018.

TNC supports efforts to incorporate market-based approaches to fisheries management under Objective 3.3 and is pleased to see OPC's support of the California Fisheries Fund revolving loan fund. We see opportunities for the Northern California Community Loan Fund to expand its fisheries-focused lending to support innovative, sustainable business models and fishing community resilience.

TNC supports efforts to improve fisheries data efficiency and accessibility recognized in Objective 3.4. Particularly in the face of rapidly changing ocean conditions, we must work to integrate modernized information systems and technologies to increase the timeliness, quality, and quantity of data available to inform management. A focus on modernizing our information systems can support better and more timely science to support resource management in a changing climate, it can improve efficiency by reducing data collection time and costs while increasing transparency, and it can support a stronger ocean economy by increasing opportunities for adaptive management to ensure long-term access to ocean resources.

TNC is pleased to see the inclusion of Objective 3.6 including ongoing prioritization of continued collaboration with the California Dungeness Crab Fishing Gear Working Group and improvements to the Risk Assessment and Mitigation Program (RAMP). We agree with bullet three seeking further reductions in risk of whale and sea turtle entanglements, and further concur that collaborative and adaptive strategies are essential in addressing this complex issue, particularly in the context of a changing climate and dynamic marine environment.

Reducing fisheries related plastics pollution:

We would like to reinforce the relevance of fishing gear in meeting Objective 4.1 to reduce plastic pollution at its source. Fishing gear may account for an estimated 18% of plastic in the ocean, and many of the types of plastic employed in fisheries are expected to persist around 600 years in the ocean[1]. Of the 79,000 metric tons of plastic in the Great Pacific Garbage Patch, 46% of it by mass is abandoned fishing gear[2]. Lost and abandoned fishing gear plastics may entrap animals, be eaten as microplastic particles, or

[1] Andrady, A. L. (2011). Microplastics in the marine environment. Marine pollution bulletin, 62(8), 1596-1605; Marine Stewardship Council (2018). "Managing the impacts of abandoned, lost or discarded fishing gear". News and Opinion. Published October 31, 2018.

[2] Lebreton, L., Slat, B., Ferrari, F., Sainte-Rose, B., Aitken, J., Marthouse, R., ... & Noble, K. (2018). Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. Scientific reports, 8(1), 4666.

cause habitat degradation. To address this threat, it is critical to seek both prevention of fishing gear pollution and swift recovery of abandoned and lost gear. OPC has already recognized the importance of abandoned fishing gear as the third prong to its 2018 Ocean Litter Prevention Strategy, and in this plan is taking a timely step to prioritize scalable and innovative strategies.

Coastal Habitats:

TNC and the California State Coastal Conservancy (SCC) share a commitment to conserving, restoring, and enhancing California's coastal habitats, now and in the future with sea level rise. We commend OPC's leadership to guide actions towards the conservation and restoration of California's coastal and marine ecosystems and specifically support the inclusion of Objectives 1.2 and 2.4.

We offer that OPC may use the results of TNC's recent assessment: *Conserving California's Coastal Habitats: A Legacy and a Future with Sea Level Rise*[3] to inform where conservation, restoration, and adaptation opportunities could be funded and supported throughout the coast of California to increase coastal ecosystem and community resilience. Similarly, we recommend OPC revisit its 2018 *Resolution of the California Ocean Protection Council to Adopt and Advance a Vision for California's Coastal Future* for wording to be included in the Strategic Plan.

In conclusion, TNC is strongly supportive of the draft Strategic Plan outlined by OPC and appreciates the opportunity to provide input on this strategic roadmap and priorities moving forward. This plan outlines an ambitious body of work that will promote long-term conservation and management of California's marine and coastal resources, and we look forward to continuing to collaborate on many fronts. Please feel free to contact us if you have any questions.

Sincerely,

Tom Dempsey
Oceans Program Director
California Chapter
The Nature Conservancy

[3] Heady, W. N., B. S. Cohen, M. G. Gleason, J. N. Morris, S. G. Newkirk, K. R. Klausmeyer, H. Walecka, E. Gagneron, M. Small. 2018. Conserving California's Coastal Habitats: A Legacy and a Future with Sea Level Rise. The Nature Conservancy, San Francisco, CA; California State Coastal Conservancy, Oakland, CA. 143 pages.

PORT of SAN DIEGO
Waterfront of Opportunity

VIA EMAIL

April 19, 2019

Jenn Eckerle
Deputy Director
Ocean Protection Council
1416 Ninth Street, Suite 1311
Sacramento, CA 95814
Email: jenn.eckerle@resources.ca.gov

Dear Ms. Eckerle,

The Port of San Diego (Port) appreciates the opportunity to provide comments in response to the Ocean Protection Council's (OPC) draft Strategic Priorities to Protect California's Coast and Ocean 2019-2024 (Strategic Plan) dated March 2019. The Port is a regional, public benefit agency created in 1962, through the California State Legislature's adoption of the San Diego Unified Port District Act (Port Act). The Port is entrusted with managing and protecting the tidelands and diverse waterfront uses in and around San Diego Bay in a manner that promotes navigation, commerce, fisheries, recreation, and environmental stewardship. The Port Act recognizes the Public Trust Doctrine and states that tidelands and submerged lands are only to be used for statewide purposes. As stewards of San Diego Bay, the Port's mission and strategic goals include protection and improvement of the Bay's environmental resources and the Port is directly working to assess, manage, and adapt to current and future ocean and coastal opportunities and challenges.

The Port recognizes and appreciates the value of a comprehensive plan, like OPC's Strategic Plan, that provides scientifically-based guiding principles to protect California's marine and coastal resources. The Port is supportive of the OPC's Strategic Plan and its interdisciplinary approach to "protect ocean ecosystems and the coastal communities and economies that rely on them". Specifically, the Port greatly appreciates that OPC's Strategic Plan includes language and objectives that specifically distinguish the unique needs of ports and harbors. In recent years, the Port has increased its communication and engagement with OPC on its goals and initiatives, including sea level rise and ocean acidification, and is grateful for past and future opportunities to collaborate with OPC.

The goals and objectives detailed in the Strategic Plan align closely with the Port's mission and values. The Port directly supports the Strategic Plan's six overarching goals through programs and projects that plan for climate adaptation, protect and restore coastal and marine ecosystems, promote healthy fisheries, improve water quality,

encourage a sustainable blue economy, and strengthen organizational effectiveness. The Port is actively implementing these goals and objectives into its Port Master Plan Update (PMPU) process. A public hearing on the PMPU will take place on April 30, 2019, along with a release of the draft PMPU followed by a 90-day comment period.

The Port has also identified areas of opportunity to increase our collaboration and support the mission of the Strategic Plan. Our recommendations include:

- **Expand strategies focused on coastal community resilience to more broadly incorporate the unique needs of ports, harbors, and working waterfronts and their associated infrastructure for Public Trust uses.**

- **Coordinate efforts with state and federal agencies, industry, academia and others to ensure sustainable development of aquaculture in California.**

- **Include wetland and blue carbon mitigation banking as a tool to protect and conserve coastal environments while simultaneously allowing for economic growth.**

The comments below offer descriptions of several key efforts that align with the objectives listed in the Strategic Plan, as well as, explanations of our recommendations.

Marine Ecosystem and Coastal Community Resilience

The Port supports the proposed actions of Objective 1.2: increase coastal and marine ecosystem and community resilience. The Port has been a champion of several environmental and climate change-focused initiatives. Currently, the Port is developing a sea level rise vulnerability assessment including an adaptative management and monitoring framework and financial impact analysis pursuant to California Assembly Bill 691. In addition, the Port is currently incorporating sea level rise and coastal resiliency into its Port Master Plan Update, which will inform current and future planning for Port projects, initiatives, and strategies on how climate change may impact Port tidelands, including working harbors and fisheries-dependent infrastructure. The Port believes that our resiliency initiatives will support the long-term sustainability of San Diego Bay and protect beneficial uses.

To increase climate change resilience that extends beyond jurisdictional boundaries, the Port formed partnerships with the U.S. Navy, academia, non-profits, businesses and other agencies. As a member on the Steering Committee of the San Diego Regional Climate Cooperative, the Port is actively working to advance comprehensive solutions to facilitate

climate change planning throughout the San Diego region. On a statewide level, the Port is committed to continued collaboration with the public, local, state and federal agencies and organizations to support coordinated efforts to advance coastal and marine policy and management decisions.

Nature-based climate adaptation

The development and enhancement of living systems and natural infrastructure, such as eelgrass beds, wetland habitats, and living shorelines, is one strategy the Port is exploring to adapt to coastal climate change impacts (Objective 1.2) and support coastal habitat restoration (Objective 2.4) in San Diego Bay and the surrounding tidelands. For example, the Port is restoring and creating coastal wetlands and shallow submerged lands, to improve shoreline resiliency and accommodate future sea level rise. Specifically, the Port and partner agencies are exploring opportunities to implement living shoreline systems, such as oyster reefs, and the removal and/or revamping of hard coastal armoring in order to improve habitat functions and ecosystem services, reduce coastal erosion, and dampen shoreline-damaging waves caused by climate change-driven storm surge and sea level rise.

In addition, the Port collaborated with multiple agencies, including U.S. Fish and Wildlife Service Refuges, to restore approximately 300 acres of coastal wetland and eelgrass habitat. These conservation projects restored ecosystem function and now concurrently provide multiple climate adaptation benefits such as carbon sequestration, coastal buffering, water quality enhancement and ocean acidification amelioration.

Waterfront-dependent infrastructure

While nature-based adaptation measures are effective and utilized by the Port, it is important to recognize that alternative adaptation strategies are needed to support the continued use and function of working waterfronts, such as those within the Port's jurisdiction. The Port appreciates that the Strategic Plan encourages the utilization of the State of California Sea-Level Rise Guidance, which the Port has applied throughout its sea level rise vulnerability assessment process, and acknowledges the unique characteristics, constraints, and values of existing water-dependent infrastructure, ports, and Public Trust uses. This is well-supported by other action items relating to fisheries-dependent infrastructure in Objective 3.2: Promote resilient fishing communities. However, other Public Trust uses should also be included in order to maintain the continued function and public access to these Trust uses such as navigation, recreation and commerce. For example, the existing infrastructure necessary for maritime commerce and operations will need to employ unique sea level rise adaptation strategies to maintain continuous function. ***The Port recommends the Strategic Plan expand its***

strategies focused on coastal community resilience to more broadly incorporate the unique needs of ports, harbors, and working waterfronts and their associated infrastructure for Public Trust uses.

The Blue Economy

Fisheries and Aquaculture

The Port provides essential working waterfront infrastructure that supports vibrant commercial and recreational fisheries and the livelihoods and communities that depend on them. As a complement to our fisheries mission, in 2015, the Port created an Aquaculture and Blue Technology Program to explore environmental and economic opportunities in and around San Diego Bay, as well as created a Blue Economy Incubator (BEI) program to assist in the creation, development and scaling of new business ventures focusing on aquaculture and blue technology. Since its inception, the Port has been conducting studies, planning, and pre-development work to support and inform aquaculture opportunities including using a variety of marine spatial planning tools to identify constraints (user conflicts) and opportunities to inform future aquaculture development in and around San Diego Bay.

The BEI program is focused on developing innovation partnerships with businesses who can deliver multiple social, environmental, and economic benefits to the Port and the region. The program acts as a launching pad for innovative projects by removing barriers to entrepreneurs and providing key assets and services focused on pilot project facilitation. To date, pilot projects supported through this program range from shellfish nursery operations, to copper remediation technology, a drive-in boatwash, a smart marina application, a marine debris removal vessel, and seaweed aquaculture. As the state-legislated trustee of tidelands around San Diego Bay, fostering sustainable domestic aquaculture and Port-related blue tech innovation helps fulfill the Port's public trust responsibility to promote fisheries and commerce, as well as aligning with our mission to enhance and protect the environment.

Aquaculture is a growing opportunity for California and our Nation. The U.S. currently imports over 91 percent of the seafood it consumes, 50 percent of which comes from aquaculture. In economic terms, these imports consistently contribute to over a $14 billion domestic seafood trade deficit each year. In environmental terms, the carbon footprint or energy used to import seafood far exceeds the energy required to harvest and deliver seafood to U.S markets. Furthermore, many of the countries that we import from do not have the same stringent environmental regulations as the U.S. Today, only three percent of U.S. domestically produced seafood comes from aquaculture, and just over six

percent from commercial fisheries. Seafood is a critical source of protein for Americans and it is clear that the domestic seafood trade deficit is not only unsustainable but presents a serious food security issue. In agricultural terms, California already supports the 5th largest economy in the world, which can and should be further bolstered by supporting sustainable fisheries and the development of a sustainable, domestic marine aquaculture industry to meet the growing demand for seafood and to ensure our nation's food security. While there is a clear food production component to this demand, aquaculture offers multiple co-benefits, such as fisheries enhancement, ecosystem restoration and services, mitigation banking, bioremediation, carbon sequestration, bio-fuel/medical purposes and education and outreach.

The Port appreciates that the Strategic Plan discusses sustainable aquaculture development, specifically in Goal five, to ensure aquaculture in state marine waters is sustainable and minimizes impacts to marine life and habitats. Indeed, the Port also supports the efforts of the California Fish and Game Commission and the California Department of Fish and Wildlife toward the completion of the Programmatic Environmental Impact Report (PEIR) for marine aquaculture in California. We also appreciate the inclusion of aquaculture as a tool to increase coastal and marine ecosystem and community resilience, support fisheries, provide environmental benefits such as bioremediation/ecosystem services to improve water quality conditions in the Tijuana River Watershed, and avoid impacts to marine life and habitat — goals that directly align with Objectives 1.2, 3.2, 4.4 and 5.2 of the Strategic Plan.

Environmental Conservation, Restoration, and Mitigation Banking

The Port is actively pursuing wetland and eelgrass mitigation banking as a beneficial tool for conserving and restoring coastal ecosystems while concurrently supporting economic stimulation and local communities. Coastal wetlands and eelgrass habitats have demonstrated a natural capacity to store carbon dioxide at highly efficient rates that surpass those of other ecosystems, including terrestrial forests. Under-utilized and degraded wetlands are ideal for restoration and generating long-term carbon storage, but the high cost associated with restoration and competing land uses can hinder conservation efforts. Currently, the Port is in the process of restoring 85 acres of a former salt evaporation pond, known as Pond 20, to create a wetland mitigation bank. Creation of wetland mitigation banks like Pond 20, and potentially blue carbon banks, would allow the cost associated with creating, managing and maintaining banks to be offset through the sale of banking credits. Following the mitigation banking process provides financial incentive, along with ecological and social benefits, for third parties to invest in restoration. Most importantly, because mitigation ratios favor mitigation acreage over development

acreage, the result is a net gain in functional habitat over development. Based on the multiple benefits of mitigation banking, ***the Port recommends OPC's Strategic Plan include wetland and blue carbon mitigation banking as a tool to protect and conserve coastal environments while simultaneously allowing for economic growth.***

Thank you for the opportunity to respond to the draft Strategic Priorities to Protect California's Coast and Ocean 2019-2024. The Port offers continued support of the Ocean Protection Council's strategic planning process, as well as, other state and federal policies to protect ocean ecosystems, coastal communities and economies that rely on them. Ports do play and are increasingly playing a critical role in protecting these resources, given their familiarity and expertise in the permitting and entitlement process for a variety of coastal and ocean uses, and the unique role they often provide as landlord, operator and/or regulator, and as champions of the environment and blue economy. We appreciate OPC specifically including ports and the unique challenges and opportunities that ports face within the Strategic Plan.

The Port will continue to share our progress on our efforts on climate change planning and adaptive management, aquaculture, and mitigation banking. We look forward to future collaboration with OPC on research, development, assessment, and implementation of new strategies and technologies to support sustainable marine fisheries and strengthen the resilience of coastal communities and marine ecosystems in the face of climate change.

If you have any questions or require additional information please do not hesitate to contact Eileen Maher, Director Environmental Conservation, at (619) 686-6254 or emaher@portofsandiego.org, or Paula Sylvia, Aquaculture Program Manager, at (619) 686-6491 or psylvia@portofsandiego.org.

Respectfully,

Jason H. Giffen
Assistant Vice President
PORT OF SAN DIEGO
3165 Pacific Highway,
San Diego, CA 92101

SURFRIDER FOUNDATION

Wade Crowfoot
Secretary for Natural Resources
Chair, California Ocean Protection Council
California Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814
COPCpublic@resources.ca.gov

April 19, 2019

RE: Strategic Priorities to Protect California's Coast and Ocean 2019-2024

Dear Secretary Crowfoot and Members of the Ocean Protection Council,

Surfrider Foundation commends OPC for successfully advancing management goals, scientific understanding and legislative policies that have measurably improved California's marine environment over the past 15 years. Other states and countries regard California as a leader in ocean protection largely because of these advances.

The Strategic Priorities document excels at identifying both large-scale goals and specific actions to address California's ocean and economic health going forward; we offer a few suggestions below to maximize momentum over the next five years.

Partnerships and Sea Level Rise

As noted, OPC is poised to play a leading role in coordinating state agencies tasked with regulating ocean and coastal resources in California. As a nonprofit advocacy group focused on ocean protection, beach access, water quality, plastic pollution and coastal preservation, Surfrider engages with multiple state agencies on a wide variety of issues. While OPC's leadership is evident in regards to certain topics, such as plastic pollution and and sea level rise, we see both need and opportunity for OPC to impel partner agencies to work together more effectively and efficiently in addressing the myriad threats to our coast and ocean.

We particularly encourage OPC to expand upon partnerships with the California Coastal Commission and the Department of Parks and Recreation to unify around climate change adaptation. OPC's Sea Level Rise Planning Guidance provides an excellent tool for agencies to use, but it must be implemented to be meaningful. The state must aggressively pursue climate change adaptation; according to a UGSS study released this past March, damage to California from sea level rise will likely be more severe than earthquakes or even the horrific wildfires we've seen in recent years[1]. We also know that our frontline, marginalized communities will be the hardest hit by the physical and economic impacts of sea level rise[2].

[1] New US Geological Survey-led Research Helps California Coastal Managers Prioritize Planning and Mitigation Efforts Due to Rising Seas and Storms

[2] Advancing Climate Justice in California: Guiding Principles and Recommendations for Policy and Funding Decisions, August 2017,

Unfortunately, because sea level rise does not move with the same alacrity, political action has similarly been incremental. Protecting our coast, ocean and blue economy will take concerted, committed and expedient action by the state as a whole.

To that end, we specifically acknowledge OPC's goal of safeguarding coastal and marine ecosystems from the effects of climate change as outlined in Objectives 1.1 to 1.4.

- Regarding Objective 1.2: Increase coastal and marine ecosystem and community resilience, we urge rapid implementation of the proposed actions.

- Regarding Objective 1.4: Integrate changing ocean conditions into California's state government policies, planning, and operations, we strongly suggest expanding efforts to assist (compel) local governments in completing or updating Local Coastal Programs to integrate sea-level rise and other climate impacts into local planning, consistent with the California Coastal Act; and encourage efforts related to community resilience to focus, as outlined, particularly on the frontline communities most at risk.

Marine Protected Areas

We appreciate OPC's dedication to highlighting and defending California's network of Marine Protected Areas. Our priorities related to MPA stewardship are well aligned with those outlined in this draft strategic plan; we suggest particular attention to the following:

- Investment of resources in MPA management, research, monitoring, education and enforcement as all are required to support MPA success;
- Ensuring California Dept. of Fish & Wildlife has sufficient resources to manage and enforce the state's 124 MPAs;
- Prioritize habitat restoration likely to enhance MPA effectiveness;
- Implement upstream water quality projects to benefit MPAs.

Offshore Energy

While Surfrider Foundation supports renewable energy conceptually, we require that individual projects minimize impacts to the coastal and marine environment, particularly in regards to ocean life and recreational opportunities. With a nod to our partners at NRDC, we suggest OPC continue and/or implement the actions below:

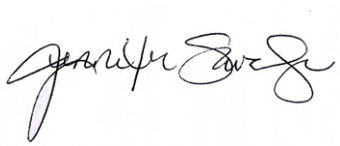
- Convene the California Marine Renewable Energy Working Group to improve agency coordination and address data gaps and regulatory uncertainty related to marine renewable energy projects in the state;
- Collaborate with the U.S Bureau of Ocean Energy Management and the California Energy Commission on priorities and operation of the Intergovernmental Renewable Energy Task Force related to offshore shore wind energy and marine kinetic energy;
- Provide information on the permitting process for marine renewable energy projects through workshops, legislative hearings, webinars, and written materials;
- Collaborate with research institutions to develop and fund studies and projects that investigate the impacts of deploying and operating marine renewable energy technologies on the marine and coastal environment.

We also appreciate the well-researched and successful steps OPC's partners at the State Lands Commission have taken in decommissioning Platform Holly in the Santa Barbara Channel. Platform Holly is one of seven offshore oil platforms in the Santa Barbara Channel scheduled to

be permanently shut down and possibly removed; this must be accomplished with all due care for the environment and with the public fully informed each step of the way. The proposed actions in Objective 5.3 provide a clear path forward.

We appreciate your consideration of these comments and are available to discuss any concerns further.

Sincerely,



Jennifer Savage
California Policy Manager
Surfrider Foundation

From:	Richard James
To:	Posting-OceanPublic
Cc:	Eckerle, Jenn@CNRA
Subject:	Re: OPC"s 2019-2024 Draft Strategic Plan Now Available for Public Comment
Date:	Tuesday, March 26, 2019 12:06:16 AM

Hello OPC (and Jenn),

Something that I see almost every time I walk on Point Reyes beaches, and do not ever recall hearing addressed at a CFGC meeting is lost and abandoned crab fishing gear.

Looking at the draft document you have sent, reducing the huge amount of ropes, buoys, bait jars, tags, crab pots, and ground up pieces of all the items just mentioned would address the following sections:

Objective 3.2: Cross-cutting Objective: Promote resilient fishing communities

Objective 3.6: Reduce risk of marine life entanglement in California fishing gear.

Objective 4.1: Reduce plastic pollution at its source to protect coastal and marine ecosystems.

Objective 4.2: Minimize the impact of microplastics and microfibers on coastal and marine ecosystems.

Having reached out to Dick Ogg who is a member of the whale entanglement group and asked him if crab fishermen would help clean up the beaches of the mess they make each year (and been told NO, they will not help - he asked them, they said no),
I suggest that the fishermen fund a group that patrols the coast of california to pick up the enormous amount of trash from the crab fishery. One can only imagine how much gear is floating out at sea, being ground into micro-plastics (toxic fish and bird food).

As far as the section on aquaculture, my comments are as follows

1 Fix the broken clean-up escrow fund - a work in progress that has been in progress for too long.

2 Implement Best Management Practices (BMP) - again, a work in progress for nearly four years now. (The cannabis industry has BMP, yet the shellfish industry that has been around since the 1870's has none)

3 Ensure that ALL legacy debris in all state waters is fully cleaned up before any new leases are issued, or current leases are expanded.

Thank you for the work you all are doing to protect the ocean/coast.

Thank you too, for taking time to read my comments.

richard james
coastodian

A small fraction of the crab gear I have pulled off Point Reyes beaches.

Go here to see more - https://coastodian.org/commercial-crab-fishing-why-so-much-trash-in-the-sea/

and here - https://coastodian.org/dungeness-crab-season-is-here-how-do-i-know/

On Mar 25, 2019, at 11:42 AM, Ocean Protection Council <posting-oceanpublic@RESOURCES.CA.GOV> wrote:

OPC's 2019-2024 Draft Strategic Plan Now Available for Public Comment

OPC is pleased to release its draft Strategic Priorities to Protect California's Coast and Ocean, which will guide OPC's priorities and investments over the next five years.
We welcome feedback on this draft plan. Public comments should be submitted to COPCpublic@resources.ca.gov by 5pm on April 19, 2019.
A revised draft, based on public comment, will be released on May 3, 2019 for consideration by the Ocean Protection Council at its May 15, 2019 meeting.
Questions can be directed to OPC's Deputy Director, Jenn Eckerle, at jenn.eckerle@resources.ca.gov.

*Please note that this draft has not yet been formatted by a designer. The final document will include photographs and graphics.

From:	CNRA COPC Public
To:	COPC Public Distro List
Subject:	FW: Comments on OPC Strategic Plan
Date:	Wednesday, March 27, 2019 6:11:47 PM

From: Bruce E Watkins
Sent: Wednesday, March 27, 2019 6:11:39 PM (UTC-08:00) Pacific Time (US & Canada)
To: CNRA COPC Public
Subject: Comments on OPC Strategic Plan

Dear COPC,

I am engaging you to express my support for your Strategic Plan, specifically Objective 2.3: Promote healthy kelp forest ecosystems along the California coast.

As you likely are aware, the once healthy inshore reefs of nearly all of Sonoma and Mendocino Counties, and much of Monterey County have been reduced to urchin barrens—vast stretches of reef with purple sea urchins and little else. This is due to a number of changes in our ocean, but global warming seems to be at the root of it all.

While we will never have the resources to actively restore the entire affected area, it is possible to restore select coves that will preserve a few healthy kelp beds, and act as " islands of diversity" that will permit the vast number of species that are found in a healthy kelp bed to repopulate our reefs when ocean conditions improve.

The North Coast Kelp Recovery Project is working to restore a few select sites in Sonoma and Mendocino Counties, and a collaborative effort between Reef Check and the University of California at Santa Cruz is working in Monterey. These are a good first steps to restore a few areas, but are limited in scope.

I encourage you to consider funding commercial urchin divers to restore select sites in these three counties. Your program seems to be an ideal mechanism to bring funding, science, and restorative programs together to do good.

Thank you for you time and consideration.

Sincerely,

Bruce Watkins, Ph.D.
925-337-4089