Staff Recommendation
September 30, 2025

Item 6

Action Item:
Consideration and Approval of Competitive Solicitation for Research Related to Ocean Acidification, Hypoxia, and Marine Harmful Algal Blooms

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Recommended Action: Authorization and approval of a competitive solicitation with a funding amount of up to $6,000,000 for Ocean Acidification, Hypoxia (OAH), and Marine Harmful Algal Blooms (HAB) projects to enhance the State's ability to understand and respond to biological vulnerability to OAH, as well as to the drivers and early indicators of toxic marine HABs.

Location: Statewide

Strategic Plan Goals and Objectives: Goal 1: Safeguard Coastal and Marine Ecosystems and Communities in the Face of Climate change; Objective 1.2: Minimize Causes and Impacts to Ocean Acidification and Hypoxia; Goal 2: Advance Equity Across Ocean and Coastal Policies and Actions; Objective 2.4: Enhance Healthy Human Use of the Coast and Ocean; Goal 3: Enhance Coastal and Marine Biodiversity; Objective 3.3: Support Sustainable Marine Fisheries and Thriving Fish Populations, Objective 3.4: Improve Coastal and Ocean Water Quality

Equity and Environmental Justice Benefits: Climate resilience, improved water quality and habitat management, safeguarded human health and subsistence harvesting.

Exhibits:

Exhibit A: Draft Competitive Solicitation for Research Related to Ocean Acidification, Hypoxia, and Marine Harmful Algal Blooms

Findings and Resolution:

Staff recommends that the Ocean Protection Council (OPC) adopt the following findings:

"Based on the accompanying staff report and attached exhibit(s), OPC hereby finds that:

1. The proposed projects are consistent with the purposes of Division 26.5 of the Public Resources Code, the California Ocean Protection Act;
2. The proposed funding solicitation is consistent with Proposition 68 Grant Guidelines, adopted September 10, 2024;
3. The proposed projects are consistent with the Budget Act of 2024, which included a $27 million Greenhouse Gas Reduction Fund (GGRF) appropriation to OPC for ocean protection and resilience to climate change; and
4. The proposed funding solicitation is not a 'legal project' that trigger the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section 21068 and Title 14 of the California Code of Regulations section 15378."

Staff further recommends that OPC adopt the following resolution pursuant to Sections 35500 *et seq.* of the Public Resources Code:

"OPC hereby approves the release of a competitive solicitation of up to $6,000,000 to enhance the State's ability to understand and respond to biological vulnerability to OAH, as well as to the drivers and early indicators of toxic marine HABs.

Selected projects will be brought back to the Council for consideration of disbursement of funding."

Executive Summary:

Staff recommends approval of the competitive solicitation of up to $6,000,000 to advance scientific understanding and the State's response related to these two growing threats to California's coastal and marine ecosystems and communities: OAH and HABs. The solicitation will support monitoring, research, modeling, and synthesis projects that will (a) strengthen California's capacity to track, assess, and address the impacts of OAH on marine ecosystems and coastal economies; and (b) improve early warning systems, HAB control mechanisms, and understanding of ecosystem effects to enable faster detection and more effective real-time responses. Anticipated project outcomes include actionable scientific insights to support the development of state water quality objectives, nutrient standards, and ecosystem health indicators, as well as improved coordination and data sharing to enhance coastal resilience for the benefit of California's communities and ecosystems. These investments in OAH and HAB science and technology will improve California's ability to understand and respond to the impacts of OAH and HABs, ultimately safeguarding marine life, fisheries, public health, and seafood safety.

Project Summary:

Background:

A consequence of increased global carbon dioxide emissions and land-based nutrients, OAH triggers a wide range of marine ecosystem impacts and presents a collective management challenge for coastal California. The impacts of OA disproportionately affect sensitive species, such as calcifying marine organisms, many of which are ecologically important or support commercial and recreational fisheries. Additional evidence indicates that OA impacts may also extend throughout food webs. Similarly, low dissolved oxygen or hypoxic events are increasing in frequency and extent across the west coast, threatening the resilience and stability of marine ecosystems. In March 2025, OPC adopted a Resolution on Ocean Acidification and Hypoxia to elevate and communicate the State's commitment to addressing OAH. OPC's previous OAH-related investments have included the development of a coupled physical-biogeochemical OAH model for the entire West Coast and its application to assess the impacts of anthropogenic nutrients on OAH along the San Francisco and Monterey coasts, improvements of OAH ocean observations of the California coast by expanding biological measurements into ongoing OAH chemical monitoring programs, and projects to advance OAH science and understand ecosystem impacts. Further investigation is needed to understand the biological impacts of these changes in seawater chemistry to support state actions on OAH, a key line of inquiry in OPC's Strategic Plan to Protect California's Coast and Ocean 2020-2025 and draft 2026-2030 Strategic Plan, and highlighted as a management need by the California Ocean Acidification and Hypoxia Science Task Force.

Additionally, marine HABs negatively impact California's coastal ecosystems, marine mammals and birds, fisheries, and local economies. Toxic blooms have occurred on an annual basis for the last four years in California, impacting both ecosystem health (e.g., sea lion strandings) and commercial and recreational fisheries (e.g., harvest restrictions). Recent evidence suggests that land-based nutrients are increasing the risk that toxic *Pseudo-nitzschia* blooms will occur in the Southern California Bight. Furthermore, in recent years these blooms have begun offshore, evading detection by current monitoring systems and prohibiting early warning to coastal managers. Critical to improving early warning systems is (a) understanding the environmental drivers (both chemical and physical) of toxic blooms, (b) monitoring California waters for early signs of a bloom event, and (c) rapid and clear communication of information about blooms to stakeholders. OPC's previous HAB-related investments have included supporting the creation of an automated real-time tracking and early warning system for HABs in California, lab experiments to enhance understanding the drivers of toxic *Pseudo-nitzschia* blooms, and technology development to enhance near real-time detection of HABs in the field. Further investigation is needed to develop a more comprehensive picture of HAB drivers in California marine waters. These key lines

of inquiry are highlighted in the Strategic Plan to Protect California's Coast and Ocean 2020-2025, Framing the Scientific Opportunities on Harmful Algal Blooms and California Fisheries: Scientific Insights, Recommendations and Guidance for California, and Harmful Algal Blooms Workshop: Summary of Key Themes, Discussion Highlights & Next Steps.

Project Summary:

OPC staff will solicit proposals for monitoring, research, synthesis, and modeling projects to enhance understanding of biological vulnerability to OAH (Track 1) and the drivers and early indicators of toxic marine HABs (Track 2). This solicitation will support the collection of paired chemical/biological observations, species response data related to OAH or HABs, studies that explore the efficacy and impacts of HAB control, and synthesis efforts that promote broad access and sharing of OAH or HAB data and information. This solicitation will also support modeling efforts to better understand (a) the drivers of toxic marine HABs and (b) how OAH may impact ocean biology and ecosystems.

Track 1: Advancing Knowledge of the Biological Impacts of OAH:

While chemical observations of OAH are incorporated into many routine monitoring programs, biological impacts are not as commonly monitored. Understanding how OAH impacts ecologically and economically important species is critical for enabling California to improve marine water quality and better support healthy marine ecosystems and fisheries. The objective of this track is to increase the State's ability to understand and respond to the biological effects of OAH by supporting monitoring, research, modeling, and synthesis activities. Project outcomes will be actionable and directly inform management decisions to address threats to marine water quality and fisheries, and (if appropriate) provide recommendations for long-term monitoring and evaluation to support coastal and marine ecosystem health. Other management actions to be supported by these projects include informing new water quality objectives and/or nutrient limits in the California Ocean Plan, providing coastal stakeholders and managers with information on OAH conditions, and developing a biological OAH ocean health indicator for OPC's Ocean and Coast Report Card.

Priority project types for Track 1 are anticipated to include, but are not limited to:

- Monitoring to study the biological impacts of OAH (i.e., pairing *in situ* biological and chemical measurements).
- Developing biologically relevant thresholds and indicators for harm/impairment of economically and/or ecologically important species sensitive to OAH.

- The use of molecular tools (DNA and RNA) to better understand and monitor the biological effects of OAH.
- Foodweb studies that demonstrate how the impacts of OAH at lower trophic levels propagate to the rest of the ecosystem.
- Synthesis efforts that promote broad public access to biological OAH data and information.

Track 2: Marine HAB Research, Monitoring, and Synthesis for Early Warning, Control, and Ecosystem Resiliency:

Early warnings of toxic marine HAB events are critical for coastal managers, marine mammal rescue centers, recreational and commercial fisheries, aquaculturists, and public health entities to prepare for, prevent, and manage the impacts caused by HABs along California's coast. The objectives of this track are to (a) enhance early warning systems for coastal HABs, improving detection and real-time response to protect marine life, fisheries, public health, and seafood safety; (b) better understand drivers, timing, and origin of toxic marine HABs to inform HAB prevention; and (c) investigate potential HAB bloom control strategies. Project outcomes will be actionable and directly inform management actions to address threats to human, ecosystem, and economic health, and (if appropriate) provide recommendations for long-term monitoring and evaluation to support marine ecosystem and human health. Other management actions to be supported by these projects include informing new water quality objectives and/or nutrient limits in the California Ocean Plan, providing coastal stakeholders and managers with early warning of HAB events, and improving routine HAB monitoring and agency response to HABs.

Priority project types for Track 2 are anticipated to include, but are not limited to:

- Filling spatiotemporal gaps in marine HAB monitoring programs, especially in areas identified as hotspots for HAB formation.
- Developing and/or piloting new technology to monitor and provide early warning of offshore HAB events (e.g., molecular tools, gliders, autonomous underwater vehicles, autonomous surface vehicles, Seasats Lightfish, Environmental Sample Processors).
- Expanding and standardizing the suite of variables collected during routine HAB sampling (e.g., paired biological, chemical, and physical samples; additional toxins; etc.) to better understand toxic HAB drivers.
- Improving HAB modeling and forecasting (including tuning to important regional differences) to better understand drivers and occurrence of toxic blooms.
- Research that explores the efficacy and impacts (both costs and benefits) of real-time HAB event control strategies.

- Foodweb studies that demonstrate how toxins move through trophic levels to have impacts throughout the entire ecosystem to better inform seafood safety and marine mammal care.
- Explore mechanisms of adverse effects (dermal, respiratory, gastrointestinal) in humans from dinoflagellate HAB exposure (inhaled, skin contact, incidental/non-seafood related ingestion during recreation).
- Synthesis and standardization efforts that promote consistent data quality and reporting standards, as well as broad public access to HAB data and summarized information.

Equity and Environmental Justice Benefits:

This solicitation will improve the management and conservation of coastal waters and will support actions to minimize the impacts of global climate and localized anthropogenic change on coastal water quality and ocean ecosystems. Effective management and conservation of coastal waters provides benefits for all communities and individuals that rely on healthy ocean ecosystems. The impacts of OAH and HABs on California's biodiversity and coastal water quality affect current and future generations of Californians that rely on a healthy ocean for subsistence, livelihoods, recreation, and other uses. All project applicants will be required to evaluate whether the proposed project provides meaningful and direct benefits to severely disadvantaged communities (SDAC), disadvantaged communities, and other priority populations as required by Proposition 68 and GGRF.

More specifically, Track 2 of this solicitation aligns with OPC's Strategic Plan to Protect California's Coast and Ocean 2020-2025 Goal 1: Advance Equity Across Ocean and Coastal Policies and Actions, Objective 2.4: Enhance Healthy Human Use of the Coast and Ocean, Target 2.4.1: Through the use of public education and management, eliminate unknowing consumption of locally caught contaminated seafood.

Project Timeline:

OPC staff anticipate opening the competitive solicitation (subject to minor refinement) in Winter 2026, with selected projects brought to the Council for approval in September 2026. Timelines for individual projects will be up to three years, as identified during the solicitation and selection process.

Project Financing:

Staff recommends that the Ocean Protection Council (OPC) authorize the competitive solicitation of up to $6,000,000 to enhance the State's ability to understand and respond to biological

vulnerability to ocean acidification, hypoxia (OAH), as well as to the drivers and early indicators of toxic marine harmful algal blooms (HABs).

Ocean Protection Council	$6,000,000
TOTAL	**$6,000,000**

The anticipated source of funds will be from Proposition 68 Chapter 9 Fund, provided by The California Drought, Water, Parks, Climate, Coastal Protection and Outdoor Access for All Act of 2018, Fiscal Year 2025/2026. Chapter 9 funds (Section 80120) may be used to support projects that "conserve, protect and restore marine wildlife and healthy ocean and coastal ecosystems with a focus on the state's system of marine protected areas and sustainable fisheries." Funds appropriated to OPC derived from Chapter 10 (Section 80130) may be used "for projects that plan, develop, and implement climate adaptation and resiliency projects. Eligible projects shall improve a community's ability to adapt to the unavoidable impacts of climate change, improve and protect coastal and rural economies, agricultural viability, wildlife corridors, or habitat, develop future recreational opportunities, or enhance drought tolerance, landscape resilience, and water retention." Additionally, Section 80133 identifies specific purposes for Chapter 10, including "projects that assist coastal communities, including those reliant on commercial fisheries, with adaptation to climate change, including projects that address ocean acidification, sea level rise, or habitat restoration and protection, including, but not limited to, the protection of coastal habitat associated with the Pacific Flyway". The proposed solicitation supports the appropriate use of Proposition 68 funds to improve coastal resiliency and adaptation to climate change, as well as protect marine wildlife, fisheries, and economies.

An additional anticipated source of funds may be from the Budget Act of 2024, Greenhouse Gas Reduction Fund appropriation to OPC (Fiscal Year 2024/2025) for ocean protection and resilience to climate change. The proposed solicitation supports the purpose of this appropriation to inform and advance the resilience of ocean and coastal ecosystems, and the health of California communities, by improving the understanding and response to ocean acidification, hypoxia, and harmful algal blooms.

Consistency with California Ocean Protection Act:

The proposed project is consistent with the Ocean Protection Act, Division 26.5 of the Public Resources Code, because it is consistent with trust-fund allowable projects, defined in Public Resources Code Section 35650(b)(2) as projects which:

- Eliminate or reduce threats to coastal and ocean ecosystems, habitats, and species.
- Improve the management of fisheries and/or foster sustainable fisheries.
- Improve coastal water quality.
- Allow for increased public access to, and enjoyment of, ocean and coastal resources, consistent with sustainable, long-term protection and conservation of those resources.
- Improve management, conservation, and protection of coastal waters and ocean ecosystems.
- Provide monitoring and scientific data to improve state efforts to protect and conserve ocean resources.
- Protect, conserve, and restore coastal waters and ocean ecosystems.
- Provide funding for adaptive management, planning coordination, monitoring, research, and other necessary activities to minimize the adverse impacts of climate change on California's ocean ecosystem.

Compliance with the California Environmental Quality Act (CEQA):

The proposed solicitation is not a 'legal project' that triggers the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section 21068 and Title 14 of the California Code of Regulations, section 15378. If individual projects are selected that trigger CEQA, OPC must determine whether the project is in compliance with CEQA prior to the issuance of funding awards.