Staff Recommendation
January 24, 2023

Item 6b

Action Item:
Consideration and Approval of Disbursement of Proposition 68 Chapter 9 Funds for Projects that Improve Understanding of Marine Protected Areas and Climate Resiliency

Elyse Goin, California Sea Grant Fellow

Recommended Action: Authorization to disburse up to $2,400,000 to investigate the nexus between marine protected areas (MPAs) and climate resilience priorities:

6b.1 Up to $620,979 to Oregon State University for "Climate resilience and California's MPA Network: management options and opportunities"

6b.2. Up to $634,770 to University of California Santa Barbara for "Identifying the vulnerability of fishing communities and targeted species to climate change to optimize the role of MPAs in enhancing socio-ecological resilience"

6b.3. Up to $615,775 to University of California Santa Cruz for "Identifying pathways to distributive equity in MPA Management in a changing climate"

6b.4. Up to $528,476 to University of California Santa Barbara for "Projecting habitat and indicator species distributions for beach and surf zone ecosystems in current and future conditions within CA's MPA Network"

Location: Statewide

Strategic Plan Goals and Objectives:

- **Goal 1:** Safeguard Coastal and Marine Ecosystems and Communities in the Face of Climate Change; Objective 1.3: Improve Understanding of Climate Impacts on California's Coast and Ocean, Objective 1.4: Understand the Role of California's Marine Protected Areas in Conferring Climate Resilience;

- **Goal 2:** Advance Equity Across Ocean and Coastal Policies and Actions; Objective 2.2: Enhance Engagement with Underserved Communities;
- **Goal 3:** Enhance Coastal and Marine Biodiversity; Objective 3.1: Protect and Restore Coastal and Marine Ecosystems, Objective 3.3: Support Sustainable Marine Fisheries and Thriving Fish and Wildlife Populations;
- **Goal 4:** Support Ocean Health Through a Sustainable Blue Economy; Objective 4.1: Advance Sustainable Seafood and Thriving Fishing Communities.

Equity and Environmental Justice Considerations: Educational opportunities and events for coastal communities, including marginalized and underserved communities; technical training for graduate and undergraduate students from underserved communities; engagement with data collected by community and citizen scientists; management recommendations informed by community members and ocean users.

Exhibits: Exhibit A: Letters of support

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:
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> 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 projects are consistent with OPC's Proposition 68 Grant Guidelines, adopted May 2019; and
> 3) The proposed projects are not 'legal projects' that trigger the California Environmental Quality Act (CEQA) pursuant to Public Resources Code section, 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 disbursement of up to $2,400,000 to investigate the nexus between marine protected areas (MPAs) and climate resilience priorities:

- Up to $620,979 to Oregon State University for "Climate resilience and California's MPA Network: management options and opportunities"
- Up to $634,770 to University of California Santa Barbara for "Identifying the vulnerability of fishing communities and targeted species to climate change to optimize the role of MPAs in enhancing socio-ecological resilience"
- Up to $615,775 to University of California Santa Cruz for "identifying pathways to distributive equity in MPA Management in a changing climate"
- Up to $528,476 to University of California Santa Barbara for "Projecting habitat and indicator species distributions for beach and surf zone ecosystems in current and future conditions within CA's MPA Network"

This authorization is subject to the condition that prior to disbursement of funds, grantees shall submit for the review and approval of the Executive Director of the OPC detailed work plans, schedules, staff requirements, budgets, and the names of any contractors intended to be used to complete the projects, as well as discrete deliverables that can be produced in intervals to ensure the projects are on target for successful completion. All projects will be developed under a shared understanding of process, management, and delivery."

Executive Summary:

Staff recommends that OPC approve the disbursement of up to $2,400,000 to fund four research projects that will provide state resource management agencies with recommendations and data necessary to protect marine biodiversity under a changing climate. In May 2019, OPC recognized the need to better understand the role of California's MPA Network in imparting climate resistance and resilience and funded an OPC Science Advisory Team (OPC SAT) working group to explore this nexus. The OPC SAT working group, convened by the Ocean Science Trust, authored the "Climate Resilience and California's Marine Protected Area Network" report, which provides an overview of climate change impacts and scenarios for the California Current, catalogs potential mechanisms by which MPAs could provide resilience to climate change, and suggests research questions and methods that could guide the detection and understanding of climate resilience in California's MPAs going forward. In response to the release of the OPC SAT report, OPC staff launched a competitive solicitation for proposals that would deepen resource

managers' understanding of the role of California's MPAs in building resilience to climate impacts. The solicitation, released in July 2022, received 33 letters of intent, of which 12 were invited to submit full proposals for review. The selected projects are responsive to the strategies and research priorities described in the OPC SAT report by evaluating the potential of the MPA Network to provide ecological resilience through climate refugia, modeling habitat and species distributions in current and future conditions, and assessing social values and outcomes relating to MPAs and climate resilience in California.

These projects will provide much needed models and projections to predict impacts of climate change to key species and habitats and to understand the role of MPAs in providing resilience to these impacts. The projects selected for funding in this staff recommendation are consistent with and will advance priorities in the OPC Strategic Plan, the state's MPA Management Program and goals of the Marine Life Protection Act, the grant guidelines for Prop 68 and the OPC Equity Plan. The innovative research will also be central to the development of the updated MPA Monitoring Action Plan by providing new insights into climate monitoring needs and considerations.

Background and Project Summaries:

Background:

The "Climate Resilience and California's Marine Protected Area Network" report was released in 2021 and identifies the role of California's MPAs and the MPA Network in imparting climate resilience. The report recommends a series of strategies, actions, and activities for the state to take to ensure the best available science is used to guide management recommendations aimed at supporting climate resilience. Many recommendations from this report became the backbone for a competitive solicitation released in July 2022, which requested project proposals that aim to understand the role that California's MPA Network plays in the face of climate change, climate variability, and marine heatwaves in the lives of key species, habitats, or human activities. The following three types of projects were prioritized for funding. Projects that:

- Characterize local vulnerability of MPAs across multiple stressors to evaluate the potential of the MPA Network to provide ecological resilience through climate refugia.

- Model habitat and species distributions in current and future conditions to inform risk assessments of species, ecosystems, and habitats within MPAs.
- Assess social values and outcomes relating to MPAs and climate resilience in California.

The solicitation received interest from 33 applicants who submitted letters of intent (LOI), totaling $15,738,183 in requested funds. Of the 33 LOIs received, 12 applicants were invited to submit full project proposals based on eligibility and alignment with solicitation and OPC Strategic Plan priorities, totaling $6,333,656. The full proposals were evaluated by a review panel consisting of state agency staff at OPC and CDFW following the Proposition 68, Chapter 9 evaluation criteria. The review panel scored and recommended projects for funding, under the advisement of OPC's Acting Executive Director, which are presented in this staff recommendation. Upon funding approval, OPC staff will lead the project management and coordination of these selected projects.

Project Timelines:

Spring 2023 – Summer 2025

6b.1: Up to $620,979 to Oregon State University to evaluate management strategies to increase the climate resilience of California's MPA network.

Project Summary:

This project will use Management Strategy Evaluation to evaluate the likely success of different management and restoration options to increase the climate resilience of California's MPA Network, as well as ecosystems and fisheries outside MPAs. Management Strategy Evaluations are models used by scientists and managers to test whether potential management actions will achieve pre-proposed goals and objectives.[1] The analysis will be based on downscaled climate projections for California's nearshore waters and use spatially realistic representations of population dynamics and species interactions in the kelp forest, based on empirical observations and experiments. The suite of potential management actions to increase resilience within MPAs will be determined in consultation with stakeholders. The project will produce management recommendations for CDFW and an online tool for communicating project results to the public.

[1] PEW Management Strategy Evaluation for Fisheries

This project will accomplish the following objectives:

- Quantify effects of climate stresses on purple urchin behavior and herbivory.
- Project the consequences of future climate conditions on the population dynamics of urchins, kelp, and kelp forest fishery species.
- Use management strategy evaluation to analyze the effectiveness of different strategies to enhance resilience. The project team will combine the products from the purple urchin behavioral experiments, the kelp habitat disturbance projections, and the larval connectivity projections into a realistic model of MPAs along the California coast to simulate potential monitoring scenarios.
- Engage with CDFW and coastal communities to develop research ideas and communicate results, including a web-based interactive modeling tool which will allow managers and stakeholders to explore the varying effects of management actions on kelp, fish biomass and fishery yield.
- Disseminate results in a workshop, at scientific conferences, and in scientific papers.

Equity and Environmental Justice Considerations:
While this research project will develop modeling tools to evaluate management strategies to inform state resource managers, the results of this study will be hosted on a web-based tool that community members and partners will have the opportunity to be trained on to ensure equity in accessing the computational outcomes. All materials shared with state agency and the public will be made ADA accessible. These benefits uphold the OPC Equity Plan Goal 1, Objective 1.2, 1.4; Goal 3, Objectives 3.3, 3.4; and Goal 4, Objective 4.1, 4.2, 4.3.

About the Grantee

Principal investigator Dr. Will White, whose laboratory is based at the Hatfield Marine Science Center at Oregon State University, has a lengthy record of using mathematical modeling approaches to inform the design, assessment, and management of marine protected areas and other aspects of marine resource management. He and most of the co-investigators are also principal investigators in the Partnership for Interdisciplinary Study of Coastal Oceans, a two-decade old multicampus research consortium that has been a leader in using science of marine protected areas to inform policy. The group of co-investigators at Oregon State, UC Davis, UC Santa Cruz, and UC Santa Barbara has extensive experience with California's MPA network, from service on Science Advisory Teams during the

planning process through to ongoing contributions to the MPA Decadal Management Review. They have expertise in coastal and kelp forest ecology, population and community modeling, ocean circulation simulations, and fisheries management, with a record of providing guidance that is incorporated into CDFW management actions.

6b.2: Up to $634,770 to University of California, Santa Barbara to evaluate how shifts in species distributions, fishing grounds, and level of MPA protection will change due to climate change.

Project Summary:

This project will develop species distribution models for marine fish and invertebrates harvested in California's commercial, recreational, and tribal fisheries. These models will be used to project range shifts under multiple climate scenarios and measure changes in MPA coverage. The project team will use highly detailed fisheries-dependent data to characterize the species and fishing grounds currently targeted by every California fishing community. Using these maps, analyses will project shifts in each community's fishing grounds and identify vulnerable communities whose fishing grounds are expected to contract, migrate, and/or become concentrated inside MPAs. This will empower adaptive management that could strengthen traditional fisheries management regulations for fisheries that shift outside of MPA boundaries or lessen regulations for fisheries that gain protection with MPAs, especially for fisheries targeted by vulnerable and disadvantaged communities.

This project will accomplish the following objectives:

- Map shifts in species distributions for over 70 targeted marine fish and invertebrate species under future climate change scenarios. Species distribution models will be projected for the years 2020-2100 using downscaled projection.
- Identify shifts in fishing grounds for all targeted species under climate change and how protection in MPAs is altered.
    - Fish communities vulnerable to climate change will be identified by classifying targeted species and fisheries into three groupings: 1) reduced protection in MPAs, 2) increased protection in MPAs; and 3) consistent protection in MPAs.

    - California fisheries will be ranked in their vulnerability to climate change and management strategies will be proposed based on the target species' shifts.
- Community outreach and results dissemination through an open- source web-tool that will be useful to inform adaptive management actions and a series of workshops and meetings to further share the results of this research.

Equity and Environmental Justice Considerations:

This project will work with fishing communities statewide to provide input on species, concerns, and accessibility of a web-tool from the onset of the project. Disadvantaged communities, who are often represented in shore- and pier-based recreational fishing groups, will be prioritized for engagement. The results of this study will help to inform these groups of changes to their primary sources of income and nutrition and will allow them to be involved in management decisions to mitigate the negative effects of climate change. These benefits uphold the OPC Equity Plan Goal 1, Objectives 1.2, 1.4; Goal 3, Objectives 3.3, 3.4; and Goal 4, Objective 4.2, 4.3.

About the Grantee:

The lead researchers on this project, based at the Marine Science Institute at the University of California Santa Barbara, bring decades of experience in relevant disciplines, including marine population and community ecology, spatial ecology, fisheries, and climate science. The principal investigator, Dr. Jennifer Caselle, is intimately familiar with California's MPA Network, having been involved with the design and monitoring of the Network since the passage of the MLPA in 1999. The research team has worked closely with the state, in particular the California Department of Fish and Wildlife, on projects ranging from MPAs to habitat restoration to fisheries bycatch to ensure that scientific outputs directly inform state priorities.

6b.3: Up to $615,775 to University of California, Santa Cruz to explore the intersection of ocean ecosystems, MPAs, ocean access, and climate change for diverse and disadvantaged populations in southern and central California.

Project Summary:

This project will explore the intersection of ocean ecosystems, MPAs, ocean access, and climate change for diverse and disadvantaged populations in

southern and central California. Working with partners that are based in disadvantaged and tribal communities, the project team will use key informant interviews, surveys, and focus groups to explore how MPAs may function in an era of widespread environmental and socioeconomic change to mediate activities, values, and access across different locations, user groups, and demographics. Through this project, new community partnerships will be established, mentorship to new environmental and conservation leaders from diverse backgrounds will be provided, and policy recommendations and culturally relevant guidance for MPA managers to increase long-term ocean benefits and reduce impacts from climate change will be developed.

This project will accomplish the following objectives:

- Obtain baseline data documenting variation in activities, values, and cultures associated with different coastal species, locations, and habitats through a literature review.
- Document shifting patterns of access, activity and benefit as observed over the past decade through semi-structured interviews with community partner leadership and key informants to cross-reference findings from the literature review. The interview participants will originate from historically underserved demographics in central and southern California.
- Develop a cross-cultural comparative survey instrument to identify differences in practices and beliefs across communities and demographic groups with particular attention to locations of aspirational or current ocean use; consumptive or recreational benefits associated with marine species and habitats; cultural, spiritual, or aesthetic values and traditions associated with marine species and habitats; factors contributing to coastal access; and patterns of shifting usage over the past decade due to climate impacts
- Evaluate the capacity of MPAs to support and enhance these uses and values in the face of climate change and uncertainty using survey data, existing MPA monitoring data, and climate projections.
- Co-develop local climate adaptation strategies and enhance the resilience of underserved communities through community partner led focus groups to further explore themes of MPA capacity to preserve identified values under future climate scenarios and to discuss how managers can engage with their communities moving forward.

Equity and Environmental Justice Considerations:

This project will highlight considerations for equitable and adaptive MPA management in a changing climate. Student researchers who identify as belonging to a minority group will have the opportunity to fully participate in the data acquisition and analysis of this study, along with fostering relationships with community members, state agency and established scientists. Non-profit organizations with a history of working with disadvantaged communities will partner with this research team to help assemble information and facilitate outreach. The main demographics targeted for the study are groups that were traditionally left out of the initial MPA Network designation discussions, including African Americans, Asian Pacific Islanders, Asian Americans, Hispanics, and tribal communities. All survey respondents and community organization partners will be compensated for their contributions and time. The project team will host educational opportunities and events for disadvantaged groups to foster a sense of community and share recommendations for how to overcome barriers to access and maximize ocean benefits in the future. These benefits uphold OPC Equity Plan Goal 1, Objectives 1.2, 1.3, 1.5; Goal 3, Objectives 3.3, 3.4; and Goal 4, Objectives 4.2, 4.3.

About the Grantee:

This project is a collaborative and participatory effort spanning academic institutions (UC Santa Cruz, Stanford University, CSU Monterey Bay), management agencies (NOAA Fisheries Climate and Ecosystems Group, NOAA Channel Islands National Marine Sanctuary), NGOs (California Marine Sanctuaries Network), and tribal entities (Native Coast Action Network) as well as community-based organizations across southern and central California. Project PIs have a successful and productive history of leading cross-cultural, place-based social-ecological research in California, and internationally. They and the other members of the project team are well-suited to leverage personal and professional connections with target user groups, demographics, and communities across the regions where they live and work to foster new partnerships capable of advancing equity and environmental justice in marine resource management at the state and local level.

6b.4: Up to $528,476 to University of California, Santa Barbara to characterize distributions of indicator species and habitats of surf zone and sandy beaches across California's MPA Network under current and future climate scenarios.

Project Summary:

Sandy beach ecosystems are on the front lines of climate change, facing significant climate-driven threats from increasing storm surge, sea level rise, and increasing air and water temperatures. California's extensive MPA Network is a valuable tool as species and habitats adapt to a changing climate. Understanding how species and habitats within the MPA Network respond to future climate impacts is critical to developing management frameworks that can quickly respond to climate change. This project will investigate habitat distributions of key species in sandy beach and surf zone ecosystems, project how these will shift in response to climate change and evaluate the role of California's MPA Network in allowing species to adapt.

This project will accomplish the following objectives:

- Map current and project future habitat extent and climate regimes using existing datasets, remote sensing, MPA monitoring datasets and USGS Coastal Storm Model System (CoSMoS) outputs.
- Model distributions of indicator taxa and species of beaches and surf zones supported by MPAs through the development of species distribution maps for indicator species. Spatially explicit habitat suitability models will be used to predict habitat suitability across MPAs in the future.
- Project changes in distributions of habitat and indicator taxa and species under future climate conditions.
- Pilot species distribution models for California Grunion using community science data ("Grunion Greeters").
- Engage with resource managers and landowners to co-develop strategies that are targeted to mitigate specific climate effects on species and habitat through multiple workshops geared towards engaging with managers, access entities and regional stakeholders.

Equity and Environmental Justice Considerations:

While this research project relies heavily on modeling approaches to determine impacts of climate change to key beach zone species and habitats, educational materials will be developed and disseminated to K-12 teachers and the general

public to share insights about the ecosystem's vulnerability to climate change. Additionally, data collected by a community science entity, Grunion Greeters, will be utilized to develop species distribution models for California grunion and predict impacts of climate change, the novel use of community-derived data. These benefits directly uphold OPC Equity Plan Goal 1, Objective 1.3; Goal 3, Objectives 3.4, 3.5; and Goal 4, Objective 4.2.

About the Grantee:

The lead investigator, Dr. Dugan, is a coastal marine ecologist whose expertise in the ecology of sandy beaches and surf zones in California provides an outstanding foundation for the proposed research. Her work on the vulnerability of these ecosystems to climate change and human interventions has provided managers and policy makers with valuable information for conserving and restoring beach ecosystems. She led or co-led the design and implementation of all the MPA baseline and monitoring studies of beach and surf zone ecosystems in the state. She has applied her knowledge of these dynamic ecosystems to all aspects of the California MPA studies on beaches to date, including study design, site selection and logistics, development of effective survey protocols, training of colleagues, postdocs and students, species identifications and sample processing, data analysis and interpretation of study results, as well as the effective communication of study outcomes to a variety of audiences. Her experience in coordinating diverse teams to perform research on the proposed indicator species on beaches and surf zones across the state and the MPA Network will ensure the success of this study.

Project Financing:

Staff recommends that the Ocean Protection Council authorize encumbrance of up to $2,400,000 to various grantees for projects that were selected to address the nexus between marine protected areas and climate resilience priorities.

Summary of Recommended Proposition 68 Coastal Resilience Projects:	**Prop 68 Funding:**
6a.1: Oregon State University	$620,979

6a.2: University of California, Santa Barbara	$634,770
6a.3: University of California Santa Cruz	$615,775
6a.4: University of California, Santa Barbara	$528,476
TOTAL	**$2,400,000**

The anticipated source of funds will be from the Proposition 68 Chapter 9 Fund, provided by The California Drought, Water, Parks, Climate, Coastal Protection and Outdoor Access for All Act of 2018, Fiscal Years 18/19, and 20/21. 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". The proposed projects support the goals of Proposition 68, Chapter 9 since they will increase the state's understanding of climate resiliency in relation to its MPA Network. Selected projects will provide state managers with projections of how the MPA Network will continue to provide protections to key species and habitats under shifting climate regimes and evaluate management strategies the state can implement to mitigate climate impacts. Furthermore, projects will assess the human dimensions of climate change relative to social and cultural benefits the MPA Network provides to diverse and underserved communities.

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 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 projects are categorically exempt from review under the California Environmental Quality Act ("CEQA") pursuant to 14 Cal. Code of Regulations Section 15306 because the projects involve information collection, consisting of data collection, research, and resource evaluation activities that will not result in a serious or major disturbance to an environmental resource.