

Resources Agency Sea Grant Advisory Panel (RASGAP) Research Priorities

OPC Strategic Plan Goals 2020-2025

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

Overview: Prioritize improved scientific understanding, increased resilience, raising of awareness, and integration of changing coastal and ocean conditions into California's state government policies, planning, and operations.

Objective 1.1: Build Resiliency to Sea-Level Rise, Coastal Storms, Erosion and Flooding

- Effects of armoring on beaches (ecological, recreational, etc.) and adjacent subtidal ecosystems.
- Impacts of and best management practices (BMPs) for beach nourishment with consideration of ecology, recreation, as well as protection services. Including assessments of timing for the return of ecological systems and functions, and effectiveness of beach nourishment activities (e.g. best practices for beach nourishment to increase sand retention and minimize ecological impacts)- incorporate factors such as grain size, color, repeated applications and management activities like grooming and backpassing.
- Identification of thresholds, triggers, and monitoring frameworks for a range of projects for critical adaptive management actions.
- Sea-level rise planning with recognition of sediment as a limited resource.
- Tsunami risk and planning (different from typical storm protection).
- Habitat restoration, conversion and trade-offs, and planning for inland migration along cross-shore environments.
- Groundwater vulnerability to saltwater intrusion.
- Compile lessons learned from pilot studies aimed at improving resilience.
- Review or meta-analysis of economic modeling tools for adaptation planning.
- New/improved modeling techniques to predict sea-level rise effects on bluff retreat, beach and dune systems where constrained vs. unconstrained.
- "Triage" analysis of beach sustainability accounting for backshore status.
- Improve the understanding of ecologically-sensitive adaptation options along the outer coast.
- Development and testing of innovative techniques to address either flooding or erosion impacts, especially innovative techniques that can be scaled to the appropriate zones or areas needing resilience.
- Identification of and support for the use of short-term and mid-term transitions for infrastructure to work toward long-term resilience that minimize resource impacts.

- More research on thin-film sediment placement for its possible use in wetland and seagrass habitat creation and restoration.
- Innovative design for public access facilities that must exist on the coast (e.g., piers, restrooms, visitor serving amenities).
- Guidelines for establishing effective trigger point thresholds for adaptive management decisions.
- Economic analysis tool (weighing management alternatives, market and non-market values) to inform adaptive management decision-making.
- Impacts to coastal agriculture and other affiliated lands to sea-level rise and coastal storms to better coordinate management and preservation of important coastal areas.
- Development of meaningful indicators and performance goals for nature-based solutions including protection and ecological criteria.
- Evaluate armoring methods to identify those that best minimize impacts on adjacent communities.
- Evaluate effects of beach grooming and nourishment on beach marine ecosystems including fished species (e.g. grunion).
- Identify best management practices for habitat restoration/conversion and for facilitating inland migration for coastal and estuarine habitats including rocky and sandy beach intertidal, marsh, mudflats, eelgrass, dunes, etc.

Objective 1.2: Minimize Causes and Impacts of Ocean Acidification and Hypoxia

- What is the relationship between ocean acidification/hypoxia and impacts to marine life?
- Are land-based anthropogenic sources contributing to impacts?
- What parameters and threshold levels are appropriate water quality objectives to address climate change and local stressor effects on marine ecosystems?
- Evaluation of lessons learned from commercial bivalve hatchery operations to minimize ocean acidification impacts on aquaculture.
- Quantitatively describe land use influence/contributions at local and regional scales and identify management levers and baselines(e.g. agricultural runoff entering oceans through our rivers, and sewage ocean outfall plumes- especially in SoCal).
- Quantify buffering capacity and reach of coastal ecosystems and submerged aquatic vegetation. Specifically seagrass in estuaries and shallow coastal waters.
- Quantify carbon storage potential for submerged aquatic vegetation in California.
- Identify priority locations (and scales needed to be worthwhile) where submerged aquatic vegetation restoration opportunities could be used for fulfilling compensatory mitigation obligations.
- Investigations into eutrophication driving basification ahead of acidification in estuaries.

Other Resources:

See "Issue F" in the 2019 Ocean Plan Review for more information:

https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/staff_report.pdf

Objective 1.3: Improve Understanding of Climate Impacts on California's Coast and Ocean

- Observed trends of biological and physical impacts due to climate change.
- Improve understanding of changing ocean conditions on fish ranges, shellfish and other calcium based organisms productivity, and intertidal community response to sea-level rise and rising water temperatures.
- Investigate how harmful algal bloom (HAB) events affect estuaries and shallow nearshore waters, including marine protected areas (MPAs).
- Investigate echinoderm diseases (starfish, purple and red sea urchins): important stressors, vectors (virus, bacteria, amoeba), transference.
- Given the inventory of baseline data inside and outside of California's network of 124 MPA's, continued tracking of sessile and mobile invert and fish abundance and fecundity over time, to track progress, or new crises. We already have our MPA and reference areas in place, which could be evaluated for a role in resistance to invasive species.
- Understanding of strategies for agricultural easements with multiple agencies in the face of sea level rise.
- Practices to help centralize and standardize data management to improve access and use.

Other Resources:

See Objective 1.2 for overlapping priorities.

Note: CDFW has resources that prospective applicants can refer to.

Objective 1.4: Understand the Role of California's Marine Protected Areas in Conferring Climate Resilience

- Investigate whether using eDNA is a viable strategy for monitoring populations and communities within MPAs.
- Conduct genetic studies specifically focused on ground truthing connectivity.
- Investigate benefits of MPAs for target species and how these benefits are affected by changing ocean conditions and range shifts.
- Conduct genetic studies to better understand larval transport and connectivity between and across MPAs. How MPAs contribute their progeny to other MPAs or where the MPAs actually serve as "refuges" for organisms transiting long distances.
- Examine habitat connectivity within and between regional MPAs. Examine the benefits an MPA network provides to a regional group or individual MPA, particularly under changing ocean conditions.

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- Need to understand MPAs in the context of kelp, fished, and unfished species. Reference outside fishable areas and conservation areas should be evaluated against nearby marine reserves for species abundance and biodiversity.
- Consider how shoreline adaptation may influence MPAs e.g., nourishment burying reefs or shoreline protection devices exacerbating beach loss (see Objective 1.1).
- Quantification of external stressors on MPAs that could be ameliorated through restoration or enhancement efforts, such as those imposed by marine debris, sedimentation, sources of poor water quality.
- Do areas within MPAs do better in ocean acidification and hypoxia (OAH) situations than non-MPA areas that have OAH? Why?

Other Resources:

Broad interests in this objective, specifically in regards to Areas of Special Biological Significance: https://www.waterboards.ca.gov/water_issues/programs/ocean/asbs.html

GOAL TWO: ADVANCE EQUITY ACROSS OCEAN AND COASTAL POLICIES AND ACTIONS

Overview: California is committed to actively engaging with tribes, underserved and frontline communities to ensure that our work benefits all Californians. The state prioritizes accessibility and inclusiveness in engagement, including through policy and funding opportunities for disproportionately impacted or historically disenfranchised communities.

Objective 2.1: Enhance Engagement with Tribes

- Broadly interested in indicators and water quality objectives associated with Tribal Beneficial Uses.
- Identifying tribal communities that may be more vulnerable and/or at higher risk of exposure to environmental contaminants. Engagement and communication with tribes affected by environmental contaminants.
- Expand investigation into Tribal Ecological Knowledge. Linkages, compatibility with, and comparison with other long term data. Investigate traditional stewardship of resources, that can inform current management principles and practices.
- Identify better ways to engage Tribes in fishery management (data collection, incorporation of Tribal knowledge, developing management options, setting policy)
- Research proposals should strive to incorporate or in some way build on/acknowledge/incorporate indigenous knowledge/traditional environmental knowledge.
- Actively think about technology and the obstacles/barriers faced by Environmental Justice and Native communities; As a community we need to work to reduce the disparity in access to "tools of participation".
- What exactly does "active engagement" look like from a practical standpoint?

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Other Resources:

See SWRCB Tribal Consultation Policy

(https://www.waterboards.ca.gov/about_us/public_participation/tribal_affairs/docs/california_water_board_tribal_consultation_policy.pdf) and SWRCB Tribal Affairs page for more information on Tribal Beneficial Uses

(https://www.waterboards.ca.gov/about_us/public_participation/tribal_affairs/)

see CCC Tribal Consultation Policy: <https://www.coastal.ca.gov/env-justice/tribal-consultation/>

Objective 2.2: Enhance Engagement with Underserved Communities

- Identifying communities that may be more vulnerable and/or at higher risk of exposure to environmental contaminants. Engagement and communication of results to affected communities.
- Effective sea-level rise messaging to engage with diverse and underserved communities.
- Research proposals should consider addressing one or more questions of consequence for these communities (access, subsistence fishing or closures, etc.). See Objective 2.1.

Other Resources:

See CCC Environmental Justice Policy: <https://www.coastal.ca.gov/env-justice/>

See SWRCB Environmental Justice page:

https://www.waterboards.ca.gov/water_issues/programs/outreach/education/justice.shtml

See SLC Environmental Justice Policy: <https://www.slc.ca.gov/envirojustice/>

Objective 2.3 Improve Coastal Access

See CCC mission & mandate: <https://www.coastal.ca.gov/howweare.html>

Objective 2.4: Enhance Healthy Human Use of the Coast and Ocean

- Gain better understanding of fishermen behavior (recreational and commercial); for instance, what are the factors that anglers consider when deciding what species to target.
- Consider allocation of compensatory mitigation resources/effort to communities without ready access to coastal resources, including restoration.
- What are effective pathogen indicators, accounting for human health risk and salinity, to reflect bacteria objectives for water contact recreation?
- Innovations of detecting HABs and improving community outreach and awareness to protect public health. Many of the HABs have been sequenced, next steps of rapid sample collection and lab turnaround are a priority.

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Other Resources:

See "Issue N" from the 2019 Ocean Plan Review for more information:

https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/staff_report.pdf

See CCC mission & mandate: <https://www.coastal.ca.gov/whoweare.html>

Objective 2.5: Advance “Healthy Oceans” Policy and Science

- Are there "indicator" or "scorecard" projects already out there that could be either tested or built upon?

see CCC mission & mandate: <https://www.coastal.ca.gov/whoweare.html>

GOAL THREE: ENHANCE COASTAL AND MARINE BIODIVERSITY

Overview: OPC is committed to safeguarding our coastal and underwater ecosystems, habitats and biodiversity through collaborative leadership, strategic investments, and policy development.

Objective 3.1: Protect and Restore Coastal and Marine Ecosystems

- Marine habitat mitigation and restoration methods, particularly for reefs and submerged aquatic vegetation (SAV).
- Evaluation of low-cost remote-sensing monitoring methods relative to traditional field methods.
- Effects of offshore dredging at sediment borrow sites.
- Connectivity between coastal and marine ecosystems via riparian, bluffs, dunes, etc.
- Methods to address stressors that can be managed (e.g., debris, water quality, sedimentation); use of eDNA as a semi-quantitative tool.
- Explore use of clean-up and debris removal from former aquaculture sites as means of restoring eelgrass or other important habitats.
- Interpret coastal ecosystems as inclusive of wetlands, riparian corridors, coastal bluffs, coastal prairie, etc - not only those under direct marine influence.
- Support well-researched and monitored pilot sediment management projects throughout the state to advance these plans into implementation.
- Identify key target species that utilize estuaries as nursery grounds and develop processes to mitigate impacts to these species.
- Determine best management practices to minimize adverse effects of aquaculture on nearshore and estuarine communities.
- Identify key target species that utilize estuaries as nursery grounds and develop processes to mitigate impacts to these species.

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- Investigate best methods for protection and restoration of salmon and other anadromous fishes.
- Understanding preservation strategies and trade offs to coastal areas that are vulnerable to sea-level rise, especially when certain land types may change (farmlands, wetlands, estuaries, inland migration, etc.).
- What does adaptation look like and how are decisions made about habitat trade offs and prioritization?
- In the changing landscape of sea-level rise, how can we use land protection tools to allow for wetland migration and the maximal protection of other coastal ecosystems as well as agricultural resources?

Other Resources:

See OSPR's mission: <https://wildlife.ca.gov/OSPR/About>

Objective 3.2: Restore and Protect Kelp Ecosystems

- Mitigation opportunities for subtidal habitat impacts.
- Supporting red abalone growth and survival in Northern California in coordination with bull kelp restoration.
- Determine bull kelp gametophyte and sporophyte critical temperature thresholds coupled with restoration methods and techniques and investigate methods, circumstance, and limiting factors that affect bull kelp recovery.
- Giant kelp versus bull kelp - what controls their distribution along the Central California coast? Investigate expansion of giant kelp into bull kelp areas and visa versa.
- Kelp is an extremely critical habitat and more study could focus on selection for more heat and acidic tolerant kelp varieties.
- Species of community important to kelp should be studied. Research is needed to culture wasting disease tolerant pycnopodia, solaster, ochraceus and brevispinus sea stars, to start getting the astronomically high urchin population in check.
- Aquaculture can potentially play a role as a commercial/economic method of restoring kelp ecosystems. There is interest in ranching purple urchins by taking urchins empty of gonads from barrens and feeding them on land as an economic means of harvesting worthless urchins in the barrens.
- Better understand drivers of kelp decline (e.g., herbivory and herbivore dynamics, herbivore-predator dynamics, nutrients, water temperature, disturbance events) and recovery; include improved methodologies for kelp restoration and management mechanisms that promote kelp forest ecosystem resiliency and capacity for recovery as well as techniques for quantifying kelp recovery in various habitats.
- Exploration of how kelp restoration might be compatible with aqua-farming and/or whether and to what extent kelp can dampen wave action and thus erosion of coastal beaches.

Objective 3.3: Support Sustainable Marine Fisheries and Thriving Fish Populations

- Red sea urchin seasonal roe amounts and quality in productive kelp areas versus barren ground.
- Develop bycatch reduction devices for fisheries that currently have unacceptable levels of incidental or non-targeted catch.
- Develop improved electronic monitoring to document fishing effort (location, time, duration) while tracking bycatch levels and more efficient technologies for identifying and enumerating bycatch species.
- Understand what the market drivers are for the sea cucumber fisheries.
- Examine effects of fishing on ridgeback and spot prawn communities (e.g. ecological interactions) and habitat.
- Gain better understanding of socio economic effects of MPAs, from both the social (individual and community demographics and viewpoints) and economic (businesses) perspectives.

Objective 3.4: Improve Coastal and Ocean Water Quality

- Prevent or minimize releases of petroleum hydrocarbons into coastal environments.
- Solutions to address and mitigate impacts from point and nonpoint sources from the first big storms of the year.
- Best management practices for managing stormwater runoff and potential to further improve practices.
- Land use management options for locally ameliorating OAH.
- What are potential risk pathways and impacts to human health caused by microplastics and microfibers?
- Impacts of desalination effluent on nearshore pH and ecosystems.
- Post-fire debris flows to coastal and marine ecosystems and geomorphology considering near-term and long-term effects of sediment transport and water quality.
- Fire management approaches including vegetation clearance (and thereby potential release of sediment) and use of flame retardants on downstream systems.

Other Resources:

See the 2019 Ocean Plan Review for very high and high priority ranking issues, including: (https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/staff_report.pdf).

See the California Conservation Corps guidelines on Propo 68 funds for riparian restoration (https://www.conservation.ca.gov/dlrp/grant-programs/Documents/WLRCP%20Prop68_Draft%20Guidelines_PublicComment_4.3.2019.pdf)

Objective 3.5: Control and Eradicate Marine Invasive Species

- Methods for removal of marine invasive species as a means to rehabilitate, enhance, or restore marine habitats injured by petroleum hydrocarbon releases.
- Trade-offs between slower ship speeds and reduced emissions but increased biofouling vs. faster speeds, which reduce biofouling but result in more emissions.
- Evaluation of method efficacy for abatement.
- Evaluation of in-water cleaning technologies.
- Identification of invasion hotspots that could be reasonably addressed and/or tracked.
- Role of climate change in range expansions and threat to native system resilience.
- Presence and "seasoning" at new reefs - is risk of invasion greater and/or threatening to intended reef benefits?
- Do bilgewater treatment technologies and treatment requirements employed to prevent the release of marine invasive species from vessel incidental discharges, such as chlorination, raise water quality concerns?

See "Issue B" from the 2019 Ocean Plan Review:

https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/staff_report.pdf

Objective 3.6: Accelerate Collaborative Accountability

GOAL FOUR: IMPROVE OCEAN HEALTH THROUGH A BLUE ECONOMY

Overview: Blue economy strategies can accelerate California's policy to make the state carbon neutral by 2045 through development of coastal and offshore wind systems, decommissioning of offshore oil and gas rigs, and decarbonization of ports and shipping fleets, and marine Aquaculture.

Objective 4.1: Advance Sustainable Seafood and Thriving Fishing Communities

- Developing less impactful fishery practices, focus on bringing to market a higher quality of fish, avoiding bycatch of threatened or overfished species, minimizing waste and general bycatch.
- Environmental impacts of mariculture and aquaculture facilities that are already in production, or planning for installation.
- Finding ways to utilize technology to improve the economics of fish caught within the US to compete better against cheaper foreign imported products such as obtaining higher yields from processing through the use of better technologies within the processing plants.
- Finding alternative uses for offal.

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- Finding methods of cheaply sorting and utilizing seafood by-products to manufacture fish meal for inclusion into formulated diets as a substitute for ocean caught anchovies, menhaden, and other species targeted for fish meal production.

See Issue H from the 2019 Ocean Plan Review

(https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/staff_report.pdf)

Objective 4.2: Promote Sustainable Aquaculture

- Potential co-production of food sources with cultivated submerged aquatic vegetation (SAV) as means to provide benefits of buffering, water quality, etc. and possibly even as expansion of SAV resources for additional ecological benefits.
- Lessons learned compilation, from both practitioner and regulatory perspectives.
- Development of new species for aquaculture.
- Evaluate the environmental impacts of mariculture and aquaculture facilities that are already in production, or planning for installation.
- Can aquaculture contribute or serve a multi-functional role as shoreline erosion protection?

Objective 4.3: Evaluate Oil Platform Decommissioning

- Lessons learned from early cases.
- Does oil platform infrastructure aid MPA success, and if so, to what extent?
- Are oil rigs net sources of biomass, or purely attractors/aggregators of biomass already present?
- Develop strategies for carrying out a net benefit environmental analysis for full removal of decommission platforms versus partial removal of decommissioned platforms.

Objective 4.4: Guide Sustainable Renewable Energy Projects

- Identify potential impacts of sustainable renewable energy projects.
- Design components to mitigate impacts on marine and aerial wildlife (e.g., deterrents, siting, materials).
- Baseline and biodiversity studies of proposed areas, marine spatial mapping taking into account marine transportation, local fishing grounds, state and federally restricted fishing areas and marine migrations.
- Analysis of what is already being done globally and which projects are relatable to the California coastal environment.

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- Do marine energy devices that use wave energy attenuate waves enough to slow erosion?

Objective 4.5: Decarbonize Ports and Shipping