June 22, 2022

To: The California Air Resources Board

From: California Ocean Science Trust (on behalf of the signatories below including members of the Ocean Protection Council Science Advisory Team and additional scientific experts)

Subject: Recommending inclusion of best available science on Blue Carbon habitats in the 2022 Climate Change Scoping Plan

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This memo was developed by the California Ocean Science Trust (OST) in consultation with members of the Ocean Protection Council (OPC) Science Advisory Team and leading coastal scientists listed below. OST is a legislatively mandated non-profit organization dedicated to accelerating progress towards a healthy, equitable and productive coast and ocean, formally bridging the gap between cutting edge scientific research and sound ocean and coastal management. OST's Executive Director serves as co-chair of the OPC Science Advisory Team, an interdisciplinary team of experts who work to ensure that the best available science supports OPC policy and funding decisions. www.oceansciencetrust.org

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Dear Chair Randolph and Members of the California Air Resources Board,

We applaud the California Air Resources Board (CARB) for their extensive efforts to prepare the 2022 Climate Change Scoping Plan (Scoping Plan) with the aim of building a robust and comprehensive strategy for meeting the goals of the Global Warming Solutions Act of 2006 (AB/SB 32). This scale of analysis is no small undertaking, and we commend the work of CARB staff and Board to position California as a national and global leader in developing science-based climate mitigation policies.

The magnitude of the climate crisis, however, requires that we account for, manage, conserve, and invest in *all* natural and working lands to achieve carbon neutrality by mid-century. **On behalf of members of the OPC Science Advisory Team and the state's leading coastal scientists, we are writing to recommend that the best available science on California's coastal "blue carbon" habitats be included in the natural and working lands (NWL) modeling scenarios presented in the draft Scoping Plan.** We appreciate inclusion of new modeling of potential emissions reduction opportunities from restoration activities in Suisun Marsh and the Sacramento-San Joaquin Delta (the Delta). However, a critical missing component of the wetland landscape in the draft Scoping Plan includes the scientifically verifiable carbon sequestered and stored within the biomass and soils of the state's coastal wetlands.

There are now sufficient data and methods available for inventorying and estimating GHG emissions and removals from coastal wetlands to support their inclusion in the 2022 Scoping Plan. Below, we reference some of the latest information and resources that are contributing to our best estimates of carbon stocks and GHG exchanges across California's coastal wetland habitats, a field of study which has rapidly advanced over the last decade. We also offer our expertise and commitment to engaging in a process to integrate these data into modeling of management scenarios for coastal wetlands that could be included in the 2022 Scoping Plan and refined in future updates.

California's blue carbon habitats - also referred to here as coastal wetlands - include tidally-influenced marshes, scrub/shrubs, and eelgrass habitats that consist of organic and mineral soils that are covered or saturated for all or part of the year by water. Coastal wetland organic carbon is derived from above- and below-ground photosynthetic production as well as inputs from coastal watersheds. Based on spatially explicit land cover mapping datasets[1], these habitats cover over 57,000 acres, including approximately 43,000 acres of tidal marsh and scrub/shrub wetlands and 13,000 acres of eelgrass. According to new analyses, **the inclusion of coastal wetlands has the potential to increase the extent of existing wetlands evaluated in Scoping Plan scenarios by nearly 70% (Vaughn, Plane, Harris, Robinson, and Grenier, in prep).**

With regards to estimating the statewide standing stock of coastal wetland carbon, California has ample spatial and temporal coverage of peer-reviewed (~140) and unpublished (~250) soil core data that span a range of coastal wetland types, salinity classes, and include restoration sites. These data have been deemed sufficient for carbon stock assessments and carbon sequestration modeling (Holmquist, Wolfe, and Megonigal, 2021), many of which are publicly accessible on the Coastal Carbon Atlas[2] and have been standardized across the Pacific coast. Radiometric dating of soil core profiles provides a historic time series of carbon accumulation over the last 100+ years, thus it is not required to sample stocks annually.

While data are available for a statewide approach, a regional inventory recently developed for the San Francisco Bay tidal Estuary provides an "off-the-shelf" assessment that can inform the Scoping Plan and serve as a template for expanding statewide (Beers and Crooks, 2022). From the period of 1990 to 2020, coastal wetlands in the San Francisco Estuary were a net carbon sink, with GHG removals increasing through time attributable to significant coastal wetland restoration in the region. In 2020, these habitats sequestered approximately 43,600 metric tons CO_2 equivalent (CO_2e).

For a statewide time series of emissions and removals, the US EPA National Greenhouse Gas Inventory (NGGI) of Emissions and Sinks provides state-level estimates of carbon stock change and methane emissions going back to 1990, indicating California's coastal wetlands are a net sink (EPA, 2022). These data, in combination with state-specific carbon data and land cover mapping, can allow for a more accurate accounting of greenhouse gas (GHG) emissions and removals in coastal wetlands than what is currently included in CARB's 2018 Natural and Working Lands GHG inventory.

Continued conservation and restoration of saline tidal wetlands and eelgrass habitats can promote additional carbon storage and further reduce GHG emissions. Management actions can include restoring natural hydrology, reducing nutrient inputs, limiting vulnerability to sea level rise, and avoiding high levels of bioturbation, among others (Macreadie et al., 2017; Moritsch at al. 2021). Loss of wetlands can cause significant release of GHGs like methane, and there is evidence to suggest that restored wetlands can provide greater rates of carbon storage compared with natural systems, particularly in the

[1] Existing California land cover data sets include CARI, NOAA C-CAP, NLCD, and USGS LCMAP, BAARI, San Francisco Bay Eelgrass Inventory

[2] See here: https://serc.si.edu/coastalcarbon/data

first decade (Poppe and Rybczyk, 2021). A forthcoming report by Vaughn, Plane, Harris, Robinson, and Grenier provides preliminary analyses and recommendations for expanding existing Scoping Plan scenarios to include management actions for saline tidal wetlands and eelgrass beds based on regional targets and planning efforts.

In closing, we urge CARB to consider the best available science referenced herein indicating that coastal wetlands can play a critical role in helping achieve the state's climate change and GHG reduction goals. In addition to long-term carbon storage, significant alternative benefits of restoring these ecosystems have already been observed and quantified - including shoreline protection in response to sea level rise, localized amelioration of ocean acidification, and cultural significance (Akema et al., 2013; Lead et al. 2011; Pinksy et al., 2013; Ricart et al., 2021; Shepard et al., 2011).

We appreciate the work of CARB staff and Board, and acknowledge the task ahead to continue updating the 2022 Climate Change Scoping Plan. The California Ocean Science Trust, members of the OPC Science Advisory Team, and the state's leading coastal wetlands experts stand at the ready to serve as a resource for continued engagement on this issue to help ensure these critical habitats are recognized in state policy.

Sincerely,

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Disclaimer: Institutional affiliations are provided for informational purposes. The views and science expressed in this letter represent the collective views of individuals and not their institutions or organizations.

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