THE PEW CHARITABLE TRUSTS

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June 23, 2022

Chair Liane M. Randolph and Board Members
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Via Electronic Submittal (http://www.arb.ca.gov/lispub/comm/bclist.php)

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

RE: Pew Comments on the Draft 2022 Climate Change Scoping Plan (Natural and Working Lands)

On behalf of the Pew Charitable Trusts (Pew), thank you for the opportunity to comment on the draft 2022 Climate Change Scoping Plan. We commend the staff of the California Air Resources Board (CARB) for developing this ambitious, science-driven plan. The Scoping Plan has the potential to provide a model for other states and nations on rigorous pathways to achieve carbon neutrality by the mid-century to limit global warming and avoid the catastrophic impacts related to climate change.

Although all aspects of the draft 2022 Climate Change Scoping Plan are vital for achieving California's ambitious climate goals, Pew defers to other experts to weigh in on the relative merits of the plan as a whole. Our comments will focus on the Natural and Working Lands component, specifically information and recommendations included in the draft with relevance to coastal wetlands.

Coastal wetlands, including salt marsh, scrub shrub, tidal swamps, and eelgrass, are incredibly efficient at absorbing large quantities of greenhouse gases (GHG) from the atmosphere and surrounding waters. Referred to as "blue carbon," these habitats are recognized globally as important carbon sinks given the large amount of carbon that can be accumulated over hundreds to thousands of years.[1] The Intergovernmental Panel on Climate Change (IPCC) has approved methodologies for countries and subnational bodies to include coastal wetlands in GHG inventories and climate commitments.[2]

California has lost approximately 90% of its wetlands, including significant losses of coastal wetlands like salt marsh, scrub shrub, and eelgrass from diking, draining, damming, filling, and

[1] See: https://oceanservice.noaa.gov/ecosystems/coastal-blue-carbon/
[2] See: https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/

dredging.[3] Though the state now has strict regulations in place to avoid direct impacts to these habitats, the legacy of historic destruction, continued development in adjacent areas, blockage of upstream water and sediment flows, and sea level rise[4] pose existential threats to the state's coastal wetlands absent significant and urgent action. Destruction of coastal wetlands results in loss of accumulated carbon and the potential for future carbon storage, as well as increased emissions from degraded landscapes.

The draft Scoping Plan recognizes the mitigation potential of coastal wetlands by including a minimum 60,000-acre target for Delta wetland restoration in its preferred Scenario. Pew supports this ambitious goal that - if effectively implemented - will lead to reduced GHG emissions, support biodiversity, protect communities from flooding, and improve water quality and reliability.

However, we urge CARB to include more comprehensive recommendations for all of the state's coastal wetlands, consistent with the California Natural Resources Agency's Pathways to 30 by 30 Strategy and Natural and Working Lands Climate Smart Strategy, as well as the Ocean Protection Council's goal to increase the acreage of California's coastal wetlands by 50% by 2040.

Our specific comments below are intended to support this overarching recommendation, though some have applicability beyond just coastal wetlands to all landscapes included in the Natural and Working Lands (NWL) portion of the Scoping Plan.

Improve the Natural and Working Lands Inventory for Coastal Wetlands

We recommend that CARB provide more detailed information regarding how it intends to use and improve the NWL GHG inventory to support implementation of the Scoping Plan recommendations. An analysis conducted by Silvestrum Climate Associates, which is responsible for the coastal wetlands sections of the U.S. Environmental Protection Agency's National Greenhouse Gas Inventory of Emissions and Sinks, of the CARB NWL inventory for coastal wetlands found discrepancies between the CARB estimates and California-specific estimates from the National GHG inventory, as well as a lack of transparency regarding equations and assumptions used in CARB GHG calculations. Additionally, the CARB inventory does not include data on coastal wetland biomass carbon stocks or lands converted to coastal wetlands, which represent small but important carbon pools (see Attachment 1).

With support from Pew, Silvestrum Climate Associates recently developed a GHG inventory of the San Francisco Bay Estuary. The analysis shows that in 2020, across carbon pools/land use categories (Vegetated Coastal Wetlands Remaining Vegetated Coastal Wetlands and Land Converted to Vegetated Coastal Wetlands), the tidal coastal wetlands of San Francisco Bay

[3] See: https://mywaterquality.ca.gov/eco_health/wetlands/extent/loss.html
[4] See Thorne et al 2018 (https://doi.org/10.1126/sciadv.aao3270)

Estuary sequestered 44,200 metric tons CO2e. We encourage CARB to use the inventory as a model for improving the state NWL inventory for coastal wetlands. In addition, the San Francisco Bay Estuary GHG inventory quantifies the carbon sequestration impacts provided by tidal wetland restoration. This information can be incorporated into the forward-looking targets and strategies for NWL in the 2022 Climate Change Scoping Plan.

Improve Recommendations Related to Coastal Blue Carbon Habitats

The assertion (page 199 of the draft plan) that blue carbon is not covered by IPCC inventory guidelines should be corrected. The *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas inventories: Wetlands* covers coastal wetlands, including mangrove forests, tidal marshes, and seagrass meadows.[5] The GHG inventory of San Francisco Estuary wetlands noted above follows IPCC guidance.

In addition, CARB should strengthen recommendations for coastal wetlands by incorporating goals and pathways for blue carbon adopted by the California Natural Resources Agency's NWL Climate Smart Strategy and Pathways to 30 by 30, as well as the Ocean Protection Council's Strategic Plan target to increase coastal wetland acreage by 50% by 2040.

Recognizing staffing and time constraints, we urge CARB to include coastal wetlands in its updated modeling work that will take place over the summer to reflect these agency commitments. A forthcoming report (to be released in July 2022) developed by the San Francisco Estuary Institute (SFEI) provides an overview of the data and resources currently available for incorporating coastal wetlands into the Natural and Working Lands plan. According to this report, a draft version of which has been shared with CARB staff, sufficient information exists to incorporate approximately 57,000 acres of tidal wetlands outside the Delta into the CARB Scoping Plan and other state and regional climate planning efforts. The report leverages this information to provide illustrative scenarios; for example, adding 23,000 acres of saline tidal wetland and 3,000 acres of eelgrass restoration to the Scoping Plan proposed scenario would increase total wetland GHG benefits by 35,000 MT CO2e per year. SFEI also recommends consideration of management strategies in the Scoping Plan related to ensuring the persistence of coastal wetlands in the face of sea level rise, including protecting wetland migration space and sediment augmentation.

Expand Co-benefits Analysis

Conservation, restoration, and improved management of the state's natural and working lands, including coastal wetlands, will leverage significant co-benefits. In our last comment letter, Pew included a literature review of co-benefits provided by the state's coastal wetlands in addition to carbon sequestration and storage (Attachment 2). CARB should expand its co-benefits analyses to include climate resilience, biodiversity, water quality, and other key services to help CARB

[5] See: https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/

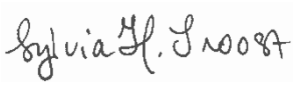
and agency partners prioritize on-the-ground investments and improve cost-benefit analyses for natural and working lands.

Other Recommendations

- Include more explicit recognition of climate change impacts related to sea level rise and ocean acidification in the "Severity of Climate Change Impacts" section.
- Include a section on adaptive management and improvements that should be made in the next Scoping Plan update for the Natural and Working Lands component.

Thank you for the opportunity to comment on the draft 2022 Climate Change Scoping Plan. Pew and our partners welcome the opportunity to provide further information and assistance in support of our recommendations.

Sincerely,



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Attachment 1:

Memo:	Pew Charitable Trusts
Subject:	Comparison of California's GHG Coastal Wetlands Inventories using EPA and CARB data

Silvestrum Climate Associates conducted an analysis to compare the California Air Resources Board's (CARB) coastal wetland GHG inventory with the EPA's state-level disaggregation of the National GHG Inventory (NGGI) for California. Details are provided below, and the datasets discussed include only where the two inventories overlap: soil carbon accumulation and CH_4 emissions for coastal wetlands remaining coastal wetlands in 2016. The CARB inventory does not include data on coastal wetland biomass carbon stocks or lands converted to coastal wetlands (see Table 21 within Technical Support Document for the Natural and Working Lands Inventory[6]) and therefore are not discussed further. Both inventories follow the guidance of the IPCC's Coastal Wetlands Supplement[7]. The comparison of emissions and removals estimates for CARB and the NGGI are in the table below.[8]

	MMT CO_2e		
Inventory	**Soil C accumulation**	**CH_4 emissions**	**Net Emissions**
National GHG Inventory	-0.19	0.09	-0.11
CA Air Resources Board	0.19	0.00	0.19

The NGGI estimates of soil carbon emissions and removals are nearly opposite of those from the CARB analysis, with the NGGI calculations showing that coastal wetlands are net CO_2 sink compared to them being a net source in the CARB analysis. Methane emissions are assumed to be zero within the CARB inventory whereas they are a relatively small source in the NGGI dataset.

Within the CARB's Technical Support Document for the Natural and Working Lands Inventory Section 5E, methods are described for how the emissions and removals are calculated for wetlands. The inventory includes values for rewetted organic soils, coastal wetlands, and inland wetland mineral soils. The geospatial dataset used for delineating coastal wetlands was the California Aquatic Resources Inventory[9], which includes areas of all wetlands within California in 2016. There is a reference to the equations that are used for calculating emissions and removals (equations W – T) but Silvestrum was

[6] https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory_technical.pdf
[7] https://www.ipcc-nggip.iges.or.jp/public/wetlands/
[8] The convention for depicting emissions and removals in the EPA's NGGI is that removals are denoted by negative numbers and emissions are positive numbers. The CARB inventory uses the opposite convention. Since the NGGI follows international standards, the values in this memo follow that.
[9] https://www.sfei.org/cari

unable to find where these equations are included and was unable to directly compare how the calculations were made for coastal wetlands. Additionally, there are footnotes referenced in Table 20 of the Technical Support Document, but the text associated with them could not be found. The Technical Support Document says 'The Tier 1 equations and methods used to calculate the emissions and removals from wetland soils are well documented in the 2013 IPCC Wetland Supplement (IPCC, 2013), hence readers are referred to the Wetlands Supplement for equations'. At a minimum, the Document should include what Tier 1 values and equations were used.

The NGGI estimates for soil carbon emissions and removals for California follow IPCC guidance. The soil carbon accumulation rates are derived from dated soil cores collected within CA only that were compiled in 2017.[10] Accumulation rates were applied to the tidal wetland classes defined within the Coastal Change Analysis Program (C-CAP) spatial dataset (estuarine and palustrine emergent, scrub-shrub, and forested wetlands), multiplied by the area of each wetland class in 2016, summed, and converted to CO_2e. Due to lack of CA specific CH_4 measurements at the time of the analysis, the IPCC default value of 193.7 CH_4 ha^{-1} yr^{-1} was applied to palustrine wetlands only[11] and thus are likely to be an underestimate.

There currently is not enough information listed within the CARB Technical Support Document to conduct an adequate assessment of how the values in the table above were calculated and why coastal wetlands are calculated to be net emitters of CO_2e. In future iterations of California's NWL inventories, all appropriate information regarding equations and assumptions should be included so that the methods can be replicated. Additionally, the CARB inventory does not include biomass or dead organic matter carbon stocks for coastal wetlands.

[10] https://github.com/Smithsonian/Coastal-Wetland-NGGI-Data-Public; CA wetlands are categorized within the Mediterranean climate zone.
[11] The estuarine class in C-CAP applies to salinities greater than 0.5 ppt and therefore cannot be disaggregated to the range of salinities where CH_4 is produced.

Attachment 2: Co-benefits					
Co-benefits of including coastal wetlands in Natural & Working Lands strategies	**Critical services common to marshland and eelgrass meadows**	**Critical services provided by tidal saltmarsh**	**Critical services provided by eelgrass meadows**	**Critical services provided by brackish tidal marsh (Sacramento – San Joaquin River Delta)**	**Examples of relevant State Agency Plans**
Water quality	Nutrient cycling and transport reduce eutrophication [1, 2], sediment retention and stabilization [1], and temperature regulation	Salinity and temperature buffer zone [3], traps sediments [1, 3], and reduces pathogens and pollutant loads reduces eutrophication [1-4] before entry into marine systems [2]	Uptake and remove toxic contaminants [5], nutrient cycling reduces eutrophication [6, 7]	Salinity and temperature buffer zone [3], nutrient regulation [3, 8] and turbidity control [3, 9]	Water Quality Control Plan for Oceans Waters (revised 2019) [10], Enclosed Bays and Estuaries (2018) [11], Bay-Delta Plan (2018) [12], Ocean Protection Council's 2020-2025 Strategic Plan [13]
Coastal climate adaptation and resilience	Shoreline protection through wave attenuation and erosion prevention [14-16]	Storm wave attenuation [15, 17], flooding, sea level rise and shoreline movement mediation [17, 18]	Non-storm wave attenuation and sediment stabilization [6, 7, 14, 15], localized amelioration of ocean acidification [19]	Flooding mediation [3], habitat climate adaptation for sensitive species through tidal floodplain restoration [20]	California Climate Adaptation Strategy (draft) [21]; Ocean Protection Council's 2020-2025 Strategic Plan [13]; California Ocean Acidification Action Plan [22]
Wildlife habitat and ecological support	Directly and indirectly support numerous keystone [23] and ecologically significant terrestrial and marine species [23], including essential habitat for birds flying the Pacific Flyway [24-26]	Habitat for numerous insects, fish, small and large mammals [2, 18, 23], and migratory and resident shorebirds [17, 18, 25, 27], including the endangered California clapper rail [17, 25, 27].	Feeding, spawning, and sheltering habitat for fish [5-7], sea turtles [7], resident and migratory shorebirds [5, 6] (black brant rely almost entirely on eelgrass) [24, 26], and mammals [23], and the food chains they rely on [6, 7]	Highly productive wetlands [8], supports locally endangered Chinook salmon [28, 29] and Delta Smelt populations [30], and highly productive to all trophic levels [3]. Habitat for mammals and sensitive migratory birds [3]	California State Wildlife Action Plan (2015) [31]; Pathways to 30 by 30 (draft) [32]; Ocean Protection Council's 2020-2025 Strategic Plan [13]
Natural resource dependent economies: commercial & recreational fisheries, ecotourism	High primary productivity [8, 33] supports a variety of economically important species [2]. Estuarine fisheries make up half of all California commercial fishery landings, especially sardine, anchovy, salmon, and Dungeness crab [5, 34]. Ecotourism industry support [5, 17]	Highly productive habitat supporting juvenile salmon feeding and nursery ground [2, 29, 35], shellfish fishery, oyster rearing grounds, and recreational fishing [17, 18, 35] and ecotourism industries [17]	Designated by the Pacific Fishery Management Council as Essential Fish Habitat [5-7]. Directly or indirectly supports important crab, salmon, squid, bivalves (wild and farmed), and other fisheries as nursery and feeding grounds [5, 7, 35], and ecotourism [5].	Highly productive juvenile salmon habitat and adult migration route [3, 29, 36], supports sturgeon fishery [37] and a large sportfishing industry [38]	Ocean Protection Council's 2020-2025 Strategic Plan [13]
Cultural Services	Supports local recreational fishing and outdoor activities, including wildlife viewing [5, 17]	Historical tribal nation fishery and cultural grounds [17], supports recreational fishing/bird hunting and public parkland [17]	Tribal Nation use of eelgrass plant material [39], supports recreational fishing, swimming, wildlife viewing [5]	Important area for sportfishing [38], boating, and hunting [40]	Ocean Protection Council's 2020-2025 Strategic Plan [13]

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