THE PEW CHARITABLE TRUSTS

111 SW Columbia Street, Suite 200
Portland, Oregon 97201
pewtrusts.org

March 31, 2022

Dr. Adam Moreno
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Pew Comments on Scoping Plan Update - Initial Modeling Results

Dear Dr. Moreno:

On behalf of the Pew Charitable Trusts (Pew), thank you for the opportunity to comment on the California Air Resources Board (CARB) 2022 Scoping Plan update, specifically the natural and working lands component of this effort. We commend CARB for pursuing a science-driven, comprehensive approach to developing goals and pathways related to reducing emissions and enhancing carbon sequestration and storage in the state's natural and working lands.

As noted in our previous comment letters, Pew's interests relative to the 2022 Scoping Plan update, and the focus of this letter, is to advance the protection and restoration of California's coastal wetlands, from the inland tidal reach of the Delta to nearshore eelgrass beds, as a key component of the state's climate response policies. Our comments will specifically provide feedback on CARB's revised Natural and Working Lands (NWL) scenarios memo and March 15, 2022, presentation of modeling results, as well as offer specific information to encourage a more robust analysis of co-benefits related to wetlands.

Revised Natural and Working Lands Scenarios/ Modeling Results

Pew supports the refined focus around four Natural and Working Lands (NWL) scenarios. With respect to wetlands, we note that the 120,000 acres proposed for Scenario 1 (prioritize short-term carbon stocks, minimize disturbances) could also serve the purposes of Scenario 3 (prioritize restoration and climate resilient carbon stocks). We support strong consideration of the higher ambition wetland restoration targets given the significant emissions reduction impacts, the future gains in terms of carbon sequestration and storage (which were not presented with the CARB analysis results), and the strong nexus with building community resilience against sea level rise, flooding, and subsidence.

Given the complexity of the modeling work and the tight timeframe governing this process, we understand the desire to focus on a reasonable number of landscape types for modeling. However, given CARB's intent to align the NWL work with the soon-to-be finalized Natural and Working Lands Climate Smart Strategy, which includes several recommendations related to coastal wetlands (emergent and submerged) across the state, we strongly urge CARB to include goals and management strategies for all coastal wetlands, including eelgrass beds. For kelps and

other seaweeds, we encourage CARB to prioritize inclusion of these ecosystems in the next Scoping Plan update, by which time greenhouse gas (GHG) accounting methodologies may likely be in place alongside new science and data given the growing interest in ocean climate solutions.[1]

Pew has provided support for Silvestrum Climate Associates and San Francisco Estuary Institute to conduct a focused GHG inventory for San Francisco Bay and synthesize data and approaches for incorporating coastal wetlands into NWL climate mitigation strategies (respectively). We hope that these science products, which will be disseminated broadly including with CARB, will help bolster inclusion of blue carbon ecosystems into the Scoping Plan Update for 2022 and future updates.

Co-benefits

With respect to assessing co-benefits of NWL actions, Pew strongly recommends including coastal wetlands (inclusive of the Delta) as part of this analysis. Healthy coastal wetland ecosystems provide significant climate adaptation and resilience benefits, including lessening the impacts of flooding and reducing erosion. They also support coastal economies, improve water quality, and serve as biodiversity hot spots. By omitting wetlands in the co-benefits assessment, CARB will miss an opportunity to help the state take a comprehensive approach to its land use management that maximizes climate mitigation, adaptation, biodiversity, and community resilience goals. To this end, we are attaching a literature review on coastal wetland co-benefits that we hope CARB can utilize to incorporate these ecosystems into its co-benefits analyses.

Thank you for the opportunity to comment on this important work to leverage California's Natural and Working Lands in support of climate mitigation. Pew and our partners welcome the opportunity to provide further information and assistance in support of our recommendations.

Sincerely,

Sylvia Troost
Senior Manager
Conserving Marine Life in the U.S.

Gilly Lyons
Officer
Conserving Marine Life in the U.S., Pacific

[1] For example, see Krause-Jensen, D., Duarte, C. Substantial role of macroalgae in marine carbon sequestration. *Nature Geoscience* 9, 737–742 (2016). https://doi.org/10.1038/ngeo2790

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]

Citations

1. Knox, A.K., et al., *Efficacy of Natural Wetlands to Retain Nutrient, Sediment and Microbial Pollutants.* Journal of Environmental Quality, 2008. **37**(5): p. 1837-1846.
2. National Oceanic and Atmospheric Administration West Coast Regional Office. *Estuary Habitat on the West Coast*. 9/30/2019 [cited 1/21/2022; Available from: https://www.fisheries.noaa.gov/west-coast/habitat-conservation/estuary-habitat-west-coast.
3. Kneib, R., et al., *Tidal Marsh Conceptual Model*. 2008, Sacramento (CA): Delta Regional Ecosystem Restoration Implementation Plan.
4. Shapiro, K., et al., *Effect of Estuarine Wetland Degradation on Transport of Toxoplasma gondii Surrogates from Land to Sea.* Applied and Environmental Microbiology, 2010. **76**(20): p. 6821-6828.
5. Sherman, K. and L. DeBruyckere, *Eelgrass Habitats on the US West Coast: State of the Knowledge of Eelgrass Ecosystem Services and Eelgrass Extent*. 2018, Pacific Marine and Estuarine Fish Habitat Partnership.
6. National Oceanic and Atmospheric Administration West Coast Regional Office. *The Importance of Eelgrass*. 11/7/2014 [cited 1/21/2022; Available from: https://www.fisheries.noaa.gov/feature-story/importance-eelgrass.
7. U.S. Dept. of Commerce, N.O.A.A., National Marine Fisheries Service, West Coast Regional Office, *California Eelgrass Mitigation Policy and Implementing Guidelines*. 2014.
8. Swanson, K.M., et al., *Modeling Tidal Freshwater Marsh Sustainability in the Sacramento–San Joaquin Delta Under a Broad Suite of Potential Future Scenarios.* San Francisco Estuary and Watershed Science, 2015. **13**(1).
9. Hestir, E.L., et al., *The Effect of Submerged Aquatic Vegetation Expansion on a Declining Turbidity Trend in the Sacramento-San Joaquin River Delta.* Estuaries and Coasts, 2016. **39**(4): p. 1100-1112.
10. California Environmental Protection Agency, *Water Quality Control Plan: Ocean Waters of California*. 2019.
11. California Environmental Protection Agency, *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California*. 2018.
12. California Environmental Protection Agency, *Revised Water Quality Control Plan*. 2018.
13. California Natural Resources Agency and California Ocean Protection Council, *Strategic Plan to Protect California's Coast and Ocean 2020-2025*. 2020.
14. Walter, R.K., et al., *Large-scale erosion driven by intertidal eelgrass loss in an estuarine environment.* Estuarine, Coastal and Shelf Science, 2020. **243**: p. 106910.
15. Christianen, M.J.A., et al., *Low-Canopy Seagrass Beds Still Provide Important Coastal Protection Services.* PLOS ONE, 2013. **8**(5): p. e62413.
16. Currin, C.A., *Chapter 30 - Living Shorelines for Coastal Resilience*, in *Coastal Wetlands*, G.M.E. Perillo, et al., Editors. 2019, Elsevier. p. 1023-1053.
17. Rouleau, T., et al., *The Economic Value of America's Estuaries: 2021 Update*. 2021, Restore America's Estuaries.
18. Thorne, K., et al., *U.S. Pacific coastal wetland resilience and vulnerability to sea-level rise.* Science Advances, 2018. **4**(2): p. eaao3270.

19. Ricart, A.M., et al., *Coast-wide evidence of low pH amelioration by seagrass ecosystems.* Global Change Biology, 2021. **27**(11): p. 2580-2591.
20. Matella, M.K. and A.M. Merenlender, *Scenarios for Restoring Floodplain Ecology Given Changes to River Flows Under Climate Change: Case from the San Joaquin River, California.* River Research and Applications, 2015. **31**(3): p. 280-290.
21. California Natural Resources Agency, *Draft California Climate Adaptation Strategy*. 2021.
22. Phillips, J., et al., *State of California Ocean Acidification Action Plan*. 2018, California Natural Resources Agency.
23. Mayer, K.A., et al., *Surrogate rearing a keystone species to enhance population and ecosystem restoration.* Oryx, 2021. **55**(4): p. 535-545.
24. Moore, J.E., et al., *Staging of Pacific flyway brant in relation to eelgrass abundance and site isolation, with special consideration of Humboldt Bay, California.* Biological Conservation, 2004. **115**(3): p. 475-486.
25. Athearn, N.D., J.Y. Takekawa, and J.M. Shinn, *Avian response to early tidal salt marsh restoration at former commercial salt evaporation ponds in San Francisco Bay, California, USA.* Natural Resources and Environmental Issues, 2009. **15**(14): p. 77-86.
26. Heck, K.L., et al., *Trophic Transfers from Seagrass Meadows Subsidize Diverse Marine and Terrestrial Consumers.* Ecosystems, 2008. **11**(7): p. 1198-1210.
27. Wood, J.K., et al., *Abundance, Diversity, and Demography of Tidal Marsh Birds at China Camp State Park, Marin County, California.* San Francisco Estuary and Watershed Science, 2012. **10**(2).
28. Perry, R.W., et al., *Estimating Survival and Migration Route Probabilities of Juvenile Chinook Salmon in the Sacramento–San Joaquin River Delta.* North American Journal of Fisheries Management, 2010. **30**(1): p. 142-156.
29. Perry, R.W., et al., *Sensitivity of survival to migration routes used by juvenile Chinook salmon to negotiate the Sacramento-San Joaquin River Delta.* Environmental Biology of Fishes, 2013. **96**(2): p. 381-392.
30. Moyle, P.B., J.A. Hobbs, and J.R. Durand, *Delta Smelt and Water Politics in California.* Fisheries, 2018. **43**(1): p. 42-50.
31. California Department of Fish and Wildlife, *California State Wildlife Action Plan*. 2015. Available from: https://wildlife.ca.gov/SWAP/Final
32. California Natural Resources Agency. *30x30 California: Accelerating Conservation of California's Nature*. 2021 [cited 3/15/2022; Available from: https://www.californianature.ca.gov/pages/30x30.
33. Miller, R.L. and R. Fujii, *Plant community, primary productivity, and environmental conditions following wetland re-establishment in the Sacramento-San Joaquin Delta, California.* Wetlands Ecology and Management, 2010. **18**(1): p. 1-16.
34. Lellis-Dibble, K.A., K.E. McGlynn, and T.E. Bigford, *Estuarine fish and shellfish species in U.S. commercial and recreational fisheries: economic value as an incentive to protect and restore estuarine habitat.* 2008. NOAA Technical Memorandum NMFS-F/SPO-90.
35. Sea Grant California. *Discover California Commercial Fisheries*. 2021 [cited 1/12/2022; Available from: https://caseagrant.ucsd.edu/discover-fisheries.
36. Willmes, M., et al., *Fishery collapse, recovery, and the cryptic decline of wild salmon on a major California river.* Canadian Journal of Fisheries and Aquatic Sciences, 2018. **75**(11): p. 1836-1848.
37. Heublein, J.C., et al., *Improved fisheries management through life stage monitoring: The case for the southern Distinct Population Segment of North American green sturgeon and the Sacramento-San Joaquin River white sturgeon.* 2017. NOAA-TM-NMFS-SWFSC-588.

38. Melwani, A.R., et al., *Spatial trends and impairment assessment of mercury in sport fish in the Sacramento–San Joaquin Delta watershed.* Environmental Pollution, 2009. **157**(11): p. 3137-3149.
39. California Tribes and Tribal Communities and California Department of Fish and Game, *Appendix E: California Tribes and Tribal Communities*. 2010.
40. Kraus-Polk, A. and B. Milligan, *Affective ecologies, adaptive management and restoration efforts in the Sacramento-San Joaquin Delta.* Journal of Environmental Planning and Management, 2019. **62**(9): p. 1475-1500.