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May 20, 2021

Ms. Jennifer Norris
Deputy Secretary for Biodiversity and Habitat
California Natural Resources Agency
1416 Ninth Street
Sacramento, CA 95814

RE: Pew comments on Executive Order N-82-20: Natural and Working Lands Climate Smart Strategy and Pathways for 30 by 30

Dear Deputy Secretary Norris:

On behalf of The Pew Charitable Trusts (Pew), thank you for the opportunity to provide input into the development of strategies to combat the biodiversity and climate crises, as called for in Governor Newsom's Executive Order (EO) N-82-20. We commend Governor Newsom's administration for the bold goals set forth in the EO and for its inclusive and extensive public engagement process to develop pathways to achieve these goals.

Pew's data-driven conservation efforts—both in the U.S. and abroad—help to preserve wild places and rivers, restore biodiversity, and increase understanding of ocean ecology. On land, we focus on conserving wildlife corridors, coastal ecosystems, and pristine landscapes. Pew also works to minimize the consequences of overfishing, pollution, warming waters, and loss of habitat.

Pew's interest relative to EO N-82-20, and the focus of our comments, is to advance conservation and restoration of California's iconic and vital coastal ecosystems, including kelp forests, eelgrass beds, and coastal wetlands, as well as promote an ecosystem-based approach to fisheries management in state waters. As the state develops its Natural and Working Lands Climate Smart Strategy ("NWL Climate Strategy") and pathways to conserve at least 30 percent of land and coastal waters by 2030 ("Pathways to 30 by 30"), Pew recommends consideration of the following:

- **Prioritize conservation and restoration of coastal ecosystems as a focal nature-based solution:** The NWL Climate Strategy and Pathways to 30 by 30 should recognize and prioritize the critical role coastal ecosystems play in combatting the biodiversity and climate crises, including storing carbon, ameliorating ocean acidification, stabilizing shorelines, protecting against storm damage, filtering water, and providing essential habitat for California's iconic marine wildlife.
- **Account for and leverage blue carbon in state climate mitigation policies**: Coastal wetlands and eelgrass beds are known "blue carbon" sinks, and California is uniquely

poised to be a leader in integrating these resources into its climate mitigation efforts.[1] We recommend that the NWL Climate Strategy prioritize updating and improving estimates in the state NWL inventory[2] of the amount of carbon being captured and stored in tidal wetlands and eelgrass beds. We further recommend proposing specific goals[3] related to protection and restoration of blue carbon habitats that can be incorporated into the California Air Resources Board (CARB) Scoping Plan update, including a focus on blue carbon hotspots like Humboldt Bay, San Francisco Bay, Sacramento-San Joaquin Delta, Morro Bay, and smaller pocket estuaries found along the central and south coast. We also recommend that the NWL Climate Strategy call for research into the role of California's nearshore ecosystems, such as kelp forests and the seabed, as carbon sinks. Such actions would enable California to leverage the entire suite of ecosystem benefits provided by coastal habitats, including carbon sequestration, through enhanced protections, targeted restoration, and funding.

- **Strengthen existing state policies and plans governing coastal habitats by adding a climate smart lens:** California has some of the most robust laws, policies, and plans around coastal protection in the nation. Through the NWL Climate Strategy and Pathways to 30 by 30, the state can expand this leadership role by adding a climate lens to existing natural resource management policies and plans across the board. Given the coastal resilience and carbon sequestration services provided by coastal habitats, we highlight two specific opportunities. First, the NWL Climate Strategy can incorporate the Ocean Protection Council's objectives related to preserving existing eelgrass resources and creating an additional 1,000 acres, as well as protecting, restoring, or creating 10,000 new acres of coastal wetlands, as critical "climate smart" strategies. The Strategy can then establish coordinated agency actions, policy mechanisms, and resources needed to achieve these objectives. Second, Pew recommends that the Strategy call for applying a climate smart lens to state efforts related to sustainable fisheries, focusing in particular on the need to protect coastal habitats that provide vital climate refugia for state and federally-managed fish populations including salmon, Dungeness crab, California halibut, rockfish, and Pacific herring.
- **Plan for the climate habitats of the future:** Coastal habitats, including tidal wetlands, eelgrass beds, and kelp forests, are key nature-based solutions for addressing the climate crisis. As sea levels rise and ocean temperatures warm, these habitats will move and shift in response. As such, the NWL Climate Strategy and Pathways to 30 by 30 should ensure the persistence of these habitats into the future by identifying and protecting areas that can serve as future habitat by allowing for inland and shoreward migration. Next steps would include mapping, planning, and identifying various protective tools (e.g., land purchase, easements, limiting leasing in subtidal areas, etc.) to allow these areas to remain undeveloped.

In sum, protecting California's existing coastal resources, expanding their extent through restoration, and planning for future habitat needs, are no-regret measures that will yield measurable carbon sequestration and climate resilience benefits while also delivering a host of co-benefits for communities and biodiversity. Our detailed comments are provided below.

[1] L.M. Wedding, Global Environmental Change, https://doi.org/10.1016/j.gloenvcha.2020.102206

[2] https://ww2.arb.ca.gov/nwl-inventory

[3] https://ww2.arb.ca.gov/resources/documents/draft-california-2030-natural-and-working-lands-climate-change-implementation

Conserving coastal ecosystems is a "climate smart" strategy

Conserving coastal habitats like tidally influenced wetlands, eelgrass, and kelp forests is an important nature-based strategy for combatting the biodiversity and climate crises. Although these habitats currently represent only a fraction of their historic extent due to past land use practices, restrictions on water flow, and other impacts, coastal ecosystems continue to provide vital benefits to communities and wildlife that should be maintained and expanded via the NWL Climate Strategy and Pathways to 30 by 30.

Climate mitigation

Tidal wetlands and eelgrass beds found along coasts and in estuaries are globally recognized for their ability to capture carbon dioxide and store the resulting "blue carbon" in their vegetation and soils for millennia at rates (per unit area) exceeding tropical forests. Conversely, their destruction releases this stored carbon back into the atmosphere. Across the globe, an estimated 0.45 billion tons of CO2 is emitted from the destruction of coastal wetlands annually,[4] the equivalent of over 97 million cars' worth of carbon dioxide in one year.[5]

Coastal wetlands are currently the only marine ecosystem recognized by the United Nations Framework Convention on Climate Change for the measurable contribution they can provide to achieving climate mitigation goals. Researchers are also working to quantify the role of other marine ecosystems, such as kelp forests, to capture and sequester carbon.[6]

Since 2017, the United States Environmental Protection Agency (USEPA), working with the National Oceanic and Atmospheric Administration (NOAA) and blue carbon experts, has accounted for the role of coastal wetlands in greenhouse gas emissions and removals in the "land use/land use change and forestry" sector. According to the Inventory of U.S. Greenhouse Gas Emissions and Sinks (National Greenhouse Gas Inventory, or NGGI)[7] released in April 2021, coastal wetlands in the lower 48 states sequester 8.8 metric tons of carbon dioxide equivalent (CO2e) per year and store 2.9 billion tons of CO2 in their soils.

With over 1,200 km^2 of tidal marshes and 60 km^2 of seagrass,[8] California has a relatively large area of coastal blue carbon ecosystems. Accordingly, conserving these areas and expanding their extent represents an important pathway for climate mitigation in the state. Further, because coastal habitats can become sources of GHG emissions if degraded, the avoided emissions associated with protecting wetlands, estuaries, and eelgrass should also be a key part of California's carbon calculus.

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[4] L. Pendleton et al., "Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems," *PLOS ONE* 7, no. 9 (2012): e43542, https://doi.org/10.1371/journal.pone.0043542.

[5] United States Environmental Protection Agency, "Greenhouse Gas Emissions from a Typical Passenger Vehicle" (2021), https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle.

[6] J. Howard et al., "Clarifying the Role of Coastal and Marine Systems in Climate Mitigation," *Frontiers in Ecology and the Environment* 15, no. 1 (2017): 42-50, https://doi.org/10.1002/fee.1451.

[7] https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

[8] Wedding 2021

Climate adaptation and resilience

Coastal ecosystems help promote coastal adaptation and resiliency to the impacts of climate change. They also help protect communities from climate-related threats, including buffering against damaging waves during severe storms, absorbing excess flood waters, and stabilizing shorelines. Nationally, storm damage services related to coastal wetlands have been valued at over $23 billion dollars annually.[9]

In addition to storm defense, seagrass and kelp ecosystems help draw down excess carbon dioxide in the nearby water column, thereby reducing the impacts of ocean acidification, a global threat stemming from increasing levels of carbon dioxide. A recent study[10] of seagrass meadows along California's coast indicates that these habitats provide localized amelioration of ocean acidification, providing critical climate refugia for marine wildlife including valuable fish and shellfish, birds and other species, in the face of acidifying waters.

The need for action

California has lost an estimated 90% of its wetlands across the state: the tidally influenced Sacramento-San Joaquin Delta has only 3% of historical freshwater emergent wetlands; the San Francisco Bay has only 15% of historical estuarine wetlands; and between 75 and 85% of historical wetlands in Southern California watersheds have been lost.[11] This extensive loss can be attributed to past land use practices including diking, draining and filling of wetlands; cutting off sediment and water flows through damming and other barriers; and pollution. Today, California's rate of loss has significantly slowed thanks to strict regulations and landmark laws like the California Coastal Act and the Porter-Cologne Water Quality Act. However, the impacts of past land use practices, as well as on-going and accelerating threats posed by development pressure and sea level rise, continue to put these ecosystems at risk.

Eelgrass, California's native seagrass habitat, has also faced extensive loss in the state due to excess sedimentation resulting from land use practices, pollution, and direct impacts from coastal infrastructure. Globally, scientists rank seagrass as one of the most threatened ecosystems on earth, with almost 30% of the known seagrass coverage vanishing since the 19th century, a loss that parallels those of mangroves and coral reefs.[12] Morro Bay, site of a National Estuary Program, has experienced a massive die-off in eelgrass habitat, with declines of more than 90% since 2007.[13] Sea level rise, which impacts light penetration in nearshore waters, will accelerate this loss if eelgrass beds are unable to migrate shoreward.

Finally, bull kelp off California's north coast has collapsed by 95% since 2014, a loss described by scientists as "unprecedented";[14] giant kelp is also showing signs of stress and decline in other parts of the state.[15] These declines, the most severe of which are found off Sonoma and

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[9] https://www.fisheries.noaa.gov/national/habitat-conservation/coastal-wetlands-too-valuable-lose

[10] A.M. Ricart et al., "Coast-Wide Evidence of Low Ph Amelioration by Seagrass Ecosystems," *Global Change Biology* (2021), https://doi.org/10.1111/gcb.15594.

[11] https://mywaterquality.ca.gov/eco_health/wetlands

[12] https://tinyurl.com/494mtzy5

[13] https://calpolynews.calpoly.edu/news_releases/2020/july/estuary

[14] McPherson, Meredith L et al. "Large-scale shift in the structure of a kelp forest ecosystem co-occurs with an epizootic and marine heatwave." *Communications biology* vol. 4,1 298. 5 Mar. 2021, doi:10.1038/s42003-021-01827-6

[15] California Ocean Protection Council. 2021. Interim Action Plan for Protecting and Restoring California's Kelp Forests.

Mendocino counties, are driven by marine heat waves and their cascading effects, prompting concerns about the longer-term impacts of climate change on kelp forests.[16] The increased frequency of such warm water events along California's coast underscores the urgent need to conserve existing kelp beds, restore depleted ones, and bolster kelp's resilience to climate impacts.

The extensive loss faced by California's coastal habitats can result in a "shifting baselines" dilemma. Because the extensive loss and resulting limited spatial footprint are now the "new normal," these habitats can be overlooked in the policy realm related to prioritizing and advancing nature-based solutions. Accordingly, a key policy need is to elevate the importance of maintaining and expanding functioning, intact coastal ecosystems as part of the state's climate calculus with relevance to mitigation, adaptation, and resilience.

Prioritizing conservation of coastal ecosystems as a focal nature-based solution

Account for and leverage blue carbon in state climate mitigation policies

California's tidally influenced wetlands and eelgrass beds represent a small but verifiable carbon sink. Given the growing body of research on blue carbon, it is probable that the state is significantly underestimating the current and potential carbon services these ecosystems provide.

Accordingly, Pew recommends that the NWL Climate Strategy propose two major near term actions: (1) improve the California Air Resource Board (CARB) NWL greenhouse gas (GHG) inventory for tidally-influenced wetlands (inclusive of eelgrass); and (2) maintain and expand the state's blue carbon baseline as part of activity goals in the Scoping Plan Update.

Making blue carbon count: improving the NWL GHG inventory

The NWL Climate Strategy has the opportunity to establish California as a national leader in accounting for blue carbon in GHG reduction efforts. Currently, California is one of only a handful states with a NWL GHG inventory, and the most recent inventory[17] includes "Tier 1" estimates of GHG emissions and removals from tidal wetlands, using default values from the Intergovernmental Panel on Climate Change (IPCC).[18] The current inventory indicates tidal wetlands as a small source of emissions, in contrast to other studies that show these ecosystems as a source of GHG removals.[19] Accordingly, we recommend the state prioritize moving the coastal wetlands inventory from Tier 1 to Tiers 2 and 3 status by taking advantage of the

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[16] Arafeh-Dalmau, N. et al. "Marine heat waves threaten kelp forests." Letters in *Science*. Vol. 367, Issue 6478. 7 Feb. 2020. DOI: 10.1126/science.aba5244

[17] An Inventory of Ecosystem Carbon in California's Natural & Working Lands, 2018 Edition https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf

[18] Tier 1 represents the minimum set of information needed to complete inventories based on default values from global literature reviews, while Tiers 2 and 3 represent marked improvements over Tier 1 estimates in terms of certainty and sophistication through the use of national, regional and localized data sets. Tiers represent options for national and state entities to incorporate coastal wetlands into GHG inventories without the need to wait for all key data gaps to be filled. As more complete data become available, these entities can work to achieve greater certainty in GHG emissions and removals estimates.

[19] https://ww3.arb.ca.gov/cc/inventory/pubs/nwl_inventory.pdf

growing body of research around blue carbon, as well as newly available data from the NGGI.[20] In doing, the state will have a more accurate GHG accounting that will show that these ecosystems are a net carbon sink for the state. Improved GHG accounting will also help the state target high "carbon bank for buck" opportunities related to restoring coastal habitats.

This year (2021), the U.S. government is releasing a breakdown of state level NGGI data, creating an opportunity for states to incorporate this information into their own inventories. This development is particularly important for states that want to recognize the role of coastal wetlands in their inventories and lack resources and/or robust state level data. For coastal counties, a time-series of land use change data, including for tidal wetlands and tidal forests, is provided by the NOAA Coastal Change Analysis Program,[21] and forms the basis of the NGGI. California can use the NGGI estimates and improve with state specific data to create a robust GHG inventory for coastal wetlands. This action would also help create consistency between the California and the NGGI and help improve future NGGI updates by incorporating state research and data.

Pew also recommends that the NWL Climate Strategy propose including eelgrass habitats in upcoming NWL inventory improvements. Although spatially limited (approximately 60 square kilometers[22]), eelgrass habitats are a known carbon sink. In its "Carbon Accounting Methods and Sequestration Benefits of California Wetlands" report, the California Ocean Science Trust (OST) provides initial estimates of sequestration at the equivalent of 550 cars off the road per year.[23] The report further highlights the need for increased assessment of carbon storage, export, and sequestration rates in eelgrass, as these figures could potentially be undercounting blue carbon.

Finally, with its extensive ocean area, California can be a leader in advancing research into the role of nearshore ecosystems as a carbon sink. The OST report includes a robust list of research areas that should be highlighted in the NWL Climate Strategy, including (for example) kelp detritus stored in the seabed that may represent an important (and unaccounted for) carbon pool for the state.[24]

Blue carbon activity goals

According to the OST report, "(protecting and restoring) blue carbon habitats (can) accomplish two goals with respect to greenhouse-gas (GHG) emissions: 1) avoiding added emissions to the atmosphere from the destruction of these habitats' large carbon reservoirs, and 2) contributing to continued carbon trapping and sequestration in perpetuity. The capacity of these already highly valuable habitats to not only store carbon, but offer additional carbon capture capacity makes them a strong focus for climate change mitigation efforts as well as coastal adaptation planning."[25]

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[20] See: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

[21] See: https://coast.noaa.gov/digitalcoast/data/ccapregional.html

[22] California Department of Fish and Wildlife. 2015. Marine Region GIS Downloads. Marine Regions GIS Downloads.

[23] https://www.oceansciencetrust.org/wp-content/uploads/2021/02/Carbon-Accounting-_State-of-the-Science_-report_External_Draft_Feb2021.pdf

[24] Ibid

[25] Ibid

The NWL Climate Strategy can help elevate the importance of blue carbon habitats in the context of climate mitigation by proposing specific activity goals to be included in the upcoming Scoping Plan Update. Consistent with the findings from OST, we recommend that these goals focus on:

- Protecting and expanding (through restoration) the current blue carbon habitat footprint by identifying and conserving known "blue carbon" hot spots, including Humboldt Bay and the Eel River Estuary, San Francisco Bay, Monterey Bay, Morro Bay, and small "pocket" estuaries in Southern California.
- Increasing blue carbon sequestration and storage through targeted restoration that would increase the size and the health of the state's coastal habitats. The tidally-influenced Sacramento-San Joaquin estuary represents an extensive portion of California's historic coastal wetland footprint.[26] Currently, almost 2 million metric tons of carbon are emitted annually from this region, the equivalent of about 500,000 motor vehicle emissions.[27] The area has been identified as a potential restoration opportunity that could deliver shorter term emissions reduction and longer term carbon storage for the state.[28] Accordingly, the NWL Climate Strategy can identify opportunities to expand pilot efforts that are restoring currently degraded and leveed areas back to functioning wetlands as a pathway for advancing climate mitigation while also delivering significant co-benefits related to flood protection, water quality, and biodiversity. In addition, the Strategy should propose a blue carbon component to the ambitious San Francisco Bay restoration program to leverage the climate mitigation potential of this blue carbon area. We recommend calling for the development of a blue carbon baseline for bay wetlands and incorporating estimates for increased carbon sequestration and storage through restoration. Opportunities for eelgrass restoration and climate mitigation benefits should also be proposed.

Strengthen existing state policies and plans governing coastal habitats by adding a climate smart lens

In addition to incorporating coastal habitats in state climate mitigation strategies, Pew recommends that the NWL Climate Strategy seek to bolster existing state policies and plans by incorporating a climate lens to these policies. Examples of climate smart opportunities include the Ocean Protection Council's strategic plan objectives for eelgrass and kelp, the California Department of Fish and Wildlife's (CDFW) kelp restoration and management plan, and CDFW's implementation of the Marine Life Management Act (MLMA).

- The Ocean Protection Council's strategic plan for 2020-2025 establishes ambitious and quantified goals for protecting and restoring both tidal wetlands and eelgrass.[29] In addition to enhancing biodiversity, achieving these goals will also greatly advance California's resilience to a changing climate as well as its ability to mitigate adverse impacts. Interagency collaboration on efforts to protect and restore these habitats will be

[26] Brophy LS, Greene CM, Hare VC, Holycross B, Lanier A, Heady WN, et al. (2019) Insights into estuary habitat loss in the western United States using a new method for mapping maximum extent of tidal wetlands. PLoS ONE 14(8): e0218558. https://doi.org/10.1371/journal.pone.0218558

[27] https://www.watereducation.org/western-water/can-carbon-credits-save-sacramento-san-joaquin-delta-islands-and-protect-californias

[28] https://caseagrant.ucsd.edu/sites/default/files/Hemes-profile-2018.pdf

[29] http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20200226/OPC-2020-2025-Strategic-Plan-FINAL-20200228.pdf

essential to maximizing conservation outcomes in terms of biodiversity as well as ecosystem services related to blue carbon.

- CDFW's comprehensive kelp restoration and management plan, which is slated to be developed over the next three years, represents an excellent opportunity to articulate kelp protection measures that could connect to both 30x30 objectives and climate mitigation strategies.
- Wetlands, eelgrass, and kelp are vital to supporting California's dozens of state- and federally-managed fisheries, such as salmon, Dungeness crab, California halibut, rockfish, and Pacific herring – all of which rely on seagrasses in bays and estuaries during portions of their life histories. As CDFW prepares to develop new or updated scaled management documents for many of the state's highest priority fisheries, there may be an opportunity to bolster protections for key coastal habitats in conjunction with these fishery management efforts. Such protections would have benefits for commercial and recreational fisheries – enhancing California's marine biodiversity – and would also help improve those fisheries' resilience to climate change. Related, we note that some of these same intertidal and estuarine habitats are also the focus of existing or proposed aquaculture development, a use that can harm or substantially limit these habitats' provision of ecosystem services. To this end, we recommend that the NWL Climate Strategy acknowledge that while aquaculture may be a suitable use in some cases and places, any such activities should be avoided where they could damage coastal habitats and their ability to provide wildlife habitat, improve water quality, ameliorate ocean acidification, or sequester and store carbon.

Plan for the climate habitats of the future

California's coastal habitats provide front line defenses against current and emerging threats related to climate change, including sea level rise. However, these resources are also threatened by the very phenomena that they can help to alleviate. When coastal habitats like wetlands are overtaken by rising waters, they release stored carbon, and the state loses a significant carbon pool.

California is fortunate to have some of the most robust information in the nation on the vulnerability of coastal habitats to sea level rise.[30] According to research conducted by The Nature Conservancy and the State Coastal Conservancy, California has close to 200 km^2 of potential future habitat (largely in agriculture and developed open space) that could help mitigate the potential loss of vulnerable habitats to sea level rise.[31] The NWL Climate Strategy and Pathways to 30 by 30 provide significant opportunities to implement the recommendations put forward in this research. This process will require a robust community-based planning process coupled with financial incentives and other innovative solutions focused around forging "win win" partnerships between the state and local governments and the private sector.

Pew also recommends focused strategies on eelgrass beds relative to sea level rise. As waters get deeper, eelgrass can shift shoreward to areas with better light penetration. Similar to marsh and

[30] Heady, W. N., B. S. Cohen, M. G. Gleason, J. N. Morris, S. G. Newkirk, K. R. Klausmeyer, H. Walecka, E. Gagneron, M. Small. 2018. Conserving California's Coastal Habitats: A Legacy and a Future with Sea Level Rise. The Nature Conservancy, San Francisco, CA; California State Coastal Conservancy, Oakland, CA. 143 pages.
[31] Ibid, page 4

other wetlands, these subtidal habitats can be blocked from migration by coastal development (e.g., docks, piers, aquaculture facilities). This “coastal squeeze” threatens eelgrass habitat, which is already in a depleted state, and the ecosystem services this resource provides for fisheries, birds, water quality, shoreline stabilization, and carbon storage. The NWL Climate Strategy and Pathways to 30 by 30 could recommend protection of mudflats and other areas that can provide suitable future habitat for eelgrass.

In conclusion, by prioritizing coastal habitats in its NWL Climate Strategy and Pathways to 30 by 30 efforts, California can deliver a triple win for people and nature in the state through climate mitigation, adaptation, and resilience. California can be a national leader in protecting and restoring coastal “blue carbon” habitats and potentially help drive similar national-level efforts related to 30 by 30 and Paris Treaty commitments. Pew welcomes the opportunity to help build knowledge and advance science-based policies in support of California’s coastal habitats.

We thank you for the opportunity to comment on EO N-82-20 and look forward to engaging as the work progresses.

Sincerely,

Gilly Lyons
Officer

Sylvia Troost
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Senior Manager