**What are examples of assessing and mitigating the climate impacts of fishing? (March 2022)**

***Question to the MPA Help community:* “What are some examples of assessing and mitigating the climate impacts of fishing (disturbance of carbon in seabeds, extraction of carbon directly through fish, CO2 emissions)? In addition, what models/methods/tools are being used to assess the ecosystem impacts of fisheries, and do they already or could they incorporate the climate impacts of fishing?”**

*Note: The original question and lightly edited responses below were posted to the* [*MPA Help listserve*](https://list.octogroup.org/mailman/listinfo/mpahelp) *run by* [*OCTO*](https://octogroup.org/)*. OCTO does not guarantee the accuracy of the responses.*

*Do you have anything to add? Send additional responses to* *sarah@octogroup.org**.*

**RESPONSES**

A recent review paper ([Epstein et al. 2022](https://onlinelibrary.wiley.com/doi/10.1111/gcb.16105)) looked at 38 studies that assessed the impact of bottom-contact fishing on marine sediment carbon and found very mixed results. I love review papers for all the context they provide - my take-away is that the real impact of sediment disturbance on carbon sequestration is dependent on local factors, so it’s hard to make blanket assumptions.

In coastal areas, the rapid accumulation of large amounts of particulate organic matter from rivers and marine algal blooms can create a reservoir of undecomposed organic carbon. This material can be suddenly released through resuspension of bottom sediments due to trawling activities. We have also attempted to estimate fluxes of this organic carbon back to the water column under the assumption of climate change: whether this would cause retreat and erosion of coastal deltaic and lagoon systems (including their content of undecomposed organic material) or advance these systems onto the continental shelf. Some references on the topic:

* <https://www.tandfonline.com/doi/abs/10.1080/02757540902762935>
* <https://www.sciencedirect.com/science/article/abs/pii/S0048969715308287>
* <https://www.researchgate.net/profile/Francesca-Alvisi/publication/256536591_Role_of_sedimentary_environment_in_the_development_of_hypoxia_and_anoxia_in_the_NW_Adriatic_shelf_Italy/links/5d496cd44585153e59408835/Role-of-sedimentary-environment-in-the-development-of-hypoxia-and-anoxia-in-the-NW-Adriatic-shelf-Italy.pdf>
* <https://www.sciencedirect.com/science/article/abs/pii/S0025322713000273?via%3Dihub>

There is a new report "[EV on H2O: The Feasibility of Electrifying Maine's Lobster Fleet by 2050](https://maineclimatetable.org/electrifying-the-lobster-fleet/)" out this month. In addition, a small workshop is being held next month on understanding greenhouse gas emissions in the Gulf of Maine’s seafood industry. The workshop is meant for businesses interested in understanding how to calculate emissions. Subsequent workshops might dive deeper into specific topics, such as innovations in refrigeration, transportation, electrification of the working waterfront, etc. From the workshop description: “Harvesting is only a part of the seafood supply chain. Input materials, mechanical operation and maintenance, bait procurement, transportation, processing, refrigeration, packaging, retailing, and waste management are also components, and contribute to greenhouse gas emissions along the seafood supply chain. With innovation, we can reduce emissions so the region’s seafood industry remains competitive in an increasingly climate-conscious global marketplace. Join us for a conversation where seafood harvesters, suppliers, processors, distributors, retailers, and others can learn how to assess and interpret emissions throughout the business supply chain. The workshop will start with an ‘Emissions 101’ session, followed by a facilitated discussion among participants about what the industry wants or needs to know about emissions.”

A 2021 report “[Marine Unprotected Areas: A case for a just transition to ban bottom trawl and dredge fishing in offshore Marine Protected Areas](https://www.researchgate.net/publication/348266966_MARINE_UNPROTECTED_AREAS_A_case_for_a_just_transition_to_ban_bottom_trawl_and_dredge_fishing_in_offshore_Marine_Protected_Areas)” overlays sediment data, and provisional carbon storage data from Luisetti et al., (2019) to illustrate the potential carbon mitigation costs, and loss of carbon storage capacity between 2015 and 2040 from continued trawling over shelf-sediments.

Fisheries, as one of the primary threats to large baleen whales like humpbacks and North Atlantic right whales (ship strikes being the other large threat), are hurting the ability of the whale populations to recover and provide the carbon sequestration services that they otherwise would. The way that is managed is real-time fisheries management to avoid whale entanglements. Two links to articles about whales’ importance in increasing the ocean’s capacity to absorb carbon are below. The [International Monetary Fund](https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm) estimates that, “if whales were allowed to return to their pre-whaling numbers—capturing 1.7 billion tons of CO2 annually—it would be worth about $13 per person a year to subsidize these whales’ CO2 sequestration efforts.”

* “[Nature’s Solution to Climate Change](https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm)”
* “[The biggest whales can eat the equivalent of 80,000 Big Macs in one day](https://www.alaskapublic.org/2021/11/03/the-biggest-whales-can-eat-the-equivalent-of-80000-big-macs-in-one-day/)”