



# FISH CARBON

## EXPLORING MARINE VERTEBRATE CARBON SERVICES

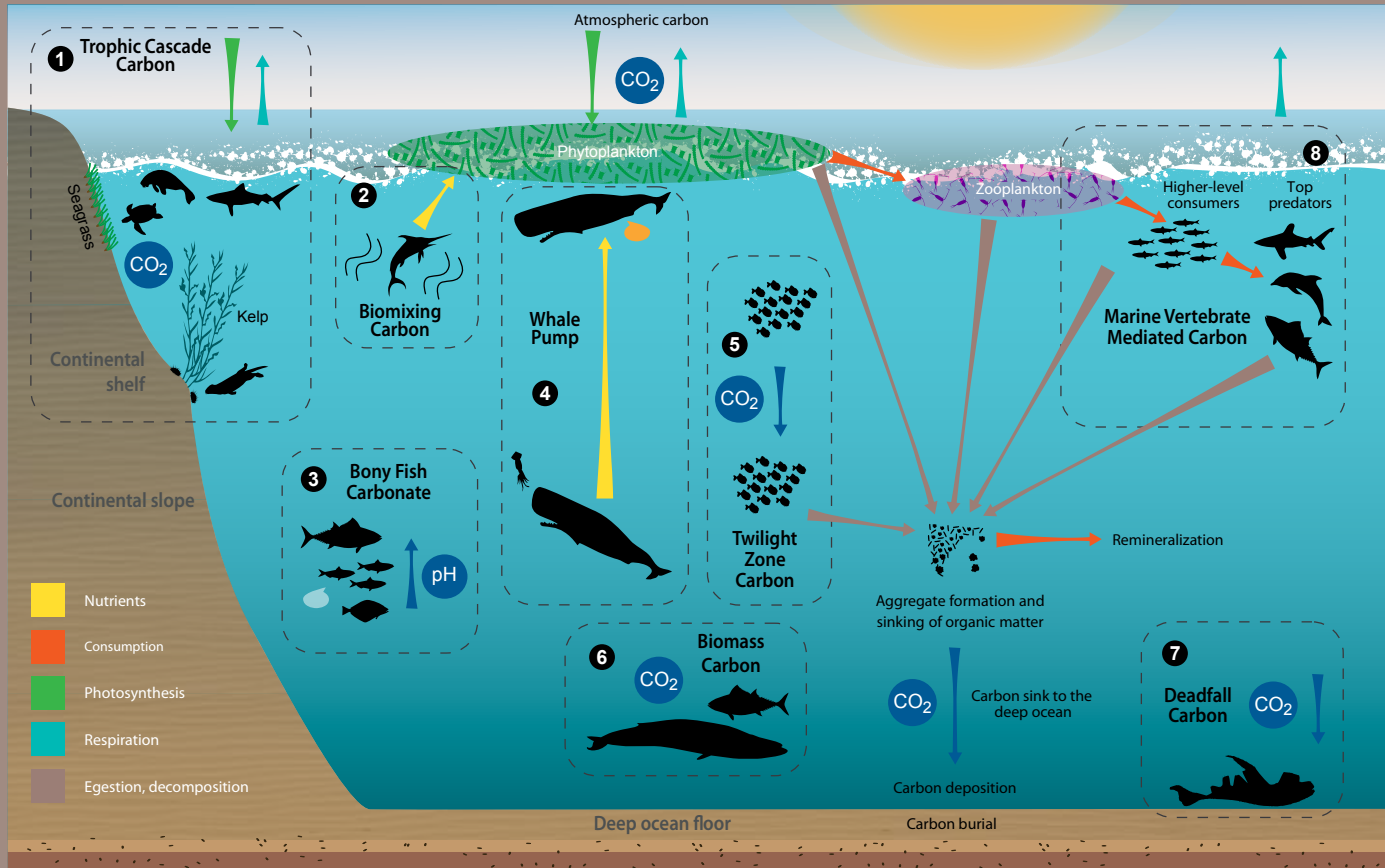
Marine vertebrate carbon services, 'Fish Carbon', are natural mechanisms of carbon cycling that help maintain the ocean's role in climate regulation. Through Fish Carbon the management of marine ecosystems is intrinsically linked to the global climate challenge.



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- 1 Trophic Cascade Carbon** Food web dynamics help maintain the carbon storage and sequestration function of coastal marine ecosystems (e.g. the health of primary producers such as seagrass meadows and kelp forests is maintained by herbivory and predation).
- 2 Biomixing Carbon** Turbulence and drag, associated with the movement of marine vertebrates, causes enhanced mixing of nutrient rich water from deeper in the water column towards the surface, where it enhances primary production by phytoplankton and thus the uptake of dissolved CO<sub>2</sub>.
- 3 Bony Fish Carbonate** Bony fish excrete metabolised carbon as calcium carbonate (CaCO<sub>3</sub>) enhancing oceanic alkalinity and providing a buffer against ocean acidification.
- 4 Whale Pump** Nutrients from the faecal material of whales stimulate enhanced primary production by phytoplankton, and thus uptake of dissolved CO<sub>2</sub>.
- 5 Twilight Zone Carbon** Mesopelagic fish feed in the upper ocean layers during the night and transport consumed organic carbon to deeper waters during daylight hours.
- 6 Biomass Carbon** Marine vertebrates store carbon in the ocean as biomass throughout their natural lifetimes, with larger individuals storing proportionally greater amounts over prolonged timescales.
- 7 Deadfall Carbon** The carcasses of large pelagic marine vertebrates sink through the water column, exporting carbon to the ocean floor where it becomes incorporated into the benthic food web and is sometimes buried in sediments (a net carbon sink).
- 8 Marine Vertebrate Mediated Carbon** Marine vertebrates consume and repackage organic carbon through marine food webs, which is transported to deep waters by rapidly sinking faecal material.