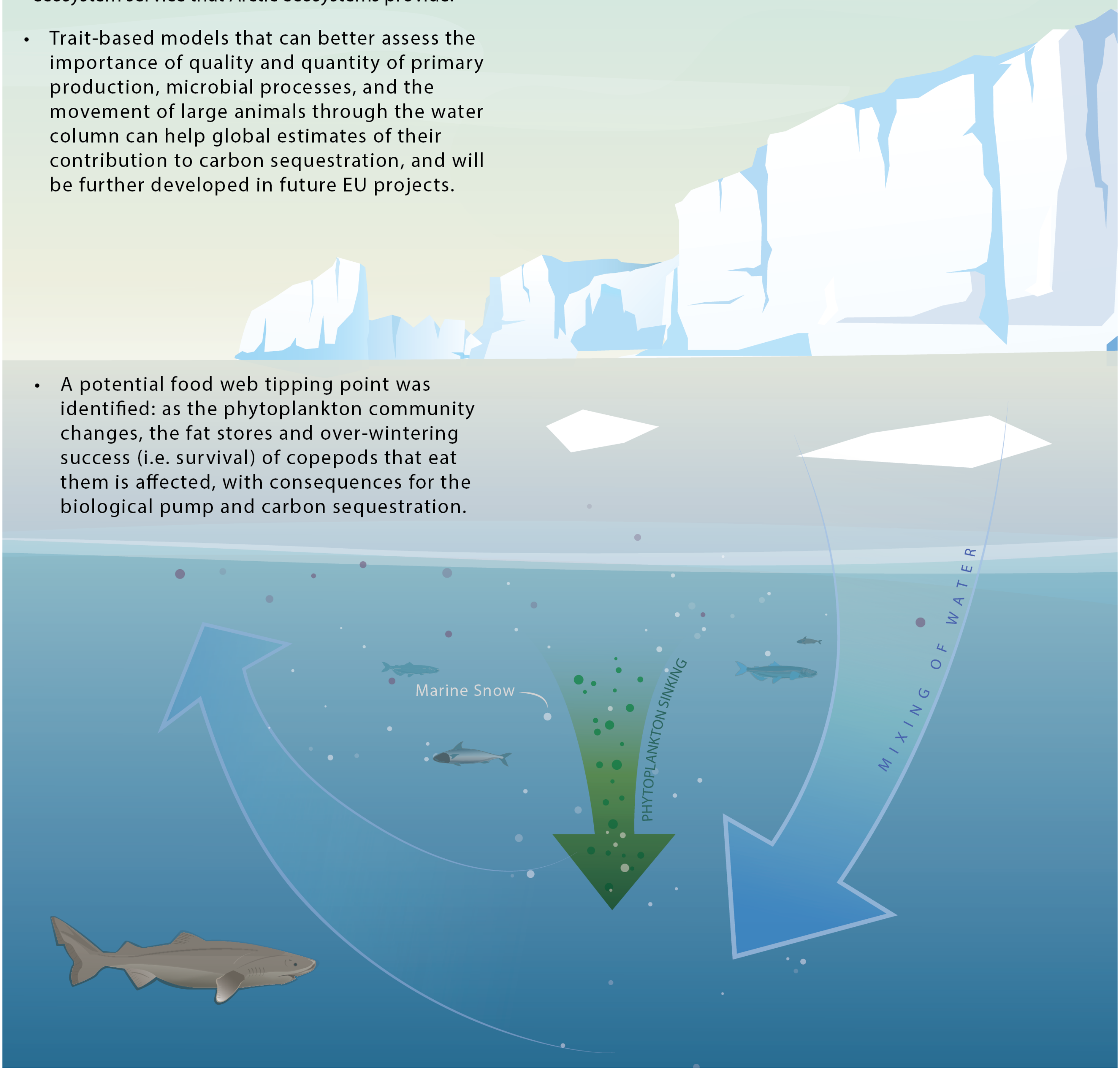
CARBON SEQUESTRATION

The following factsheet presents the joint results, research gaps and priorities identified by the H2020-funded ECOTIP, FACE-IT, and CHARTER projects on Arctic biodiversity changes on land, coasts and in the ocean.

Knowledge of the stocks and fluxes of carbon in the Arctic ecosystems and how they might respond to climate change is insufficient to quantify or predict future carbon sequestration. In some cases, such as the open ocean, data is so limited that we are not even able to predict the direction of change. The biological pump is highly dependent on biodiversity (both functional and structural), so unknown combinations of new and old species have the potential to critically alter this major ecosystem service that Arctic ecosystems provide.

- Trait-based models that can better assess the importance of quality and quantity of primary production, microbial processes, and the movement of large animals through the water column can help global estimates of their contribution to carbon sequestration, and will be further developed in future EU projects.

- Light is the main factor of primary production in fjord systems caused by large amounts of run-off and sediments coming from land, increasing turbidity.
- In the upper layers of the open ocean, the pelagic zone, the limiting factor is nutrient availability, but an increase of freshwater to the surface water traps essential nutrients in deep waters and is out of reach for primary producers at the surface.
- Tidewater glaciers counteract freshwater trapping of nutrients in deep waters (below the photic zone) by re-introducing nutrients to the surface water through subglacial discharge during the summer.



- A potential food web tipping point was identified: as the phytoplankton community changes, the fat stores and over-wintering success (i.e. survival) of copepods that eat them is affected, with consequences for the biological pump and carbon sequestration.

RESEARCH GAPS

BIODIVERSITY AND ECOSYSTEM KNOWLEDGE

How can knowledge about linkages between biodiversity and ecosystem services help better assess how Arctic pelagic food webs respond to changes in temperature, nutrient availability or light? How can this knowledge help us to predict changes in fishery productivity or carbon sequestration?

CO2 EXPORT

How do factors determining the fate of primary production, such as transfer in the food web, resulting fisheries production, recycling or sink in the ocean contribute to CO_2 export?

CHANGES TO THE FOOD WEB

How do ongoing environmental changes to the overwintering strategies of key organisms at the bottom of the food web, such as the copepod *Calanus* spp. (the main food source of most juvenile fish) influence higher trophic levels?

CARBON SEQUESTRATION

How can we better understand the carbon sequestration potential and trajectory of land and glaciers around fjords?

INTERDISCIPLINARY METHODS

How can biologists and geologists develop novel techniques to extract biological information from sediment cores (e.g., eDNA) in an interdisciplinary way?

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