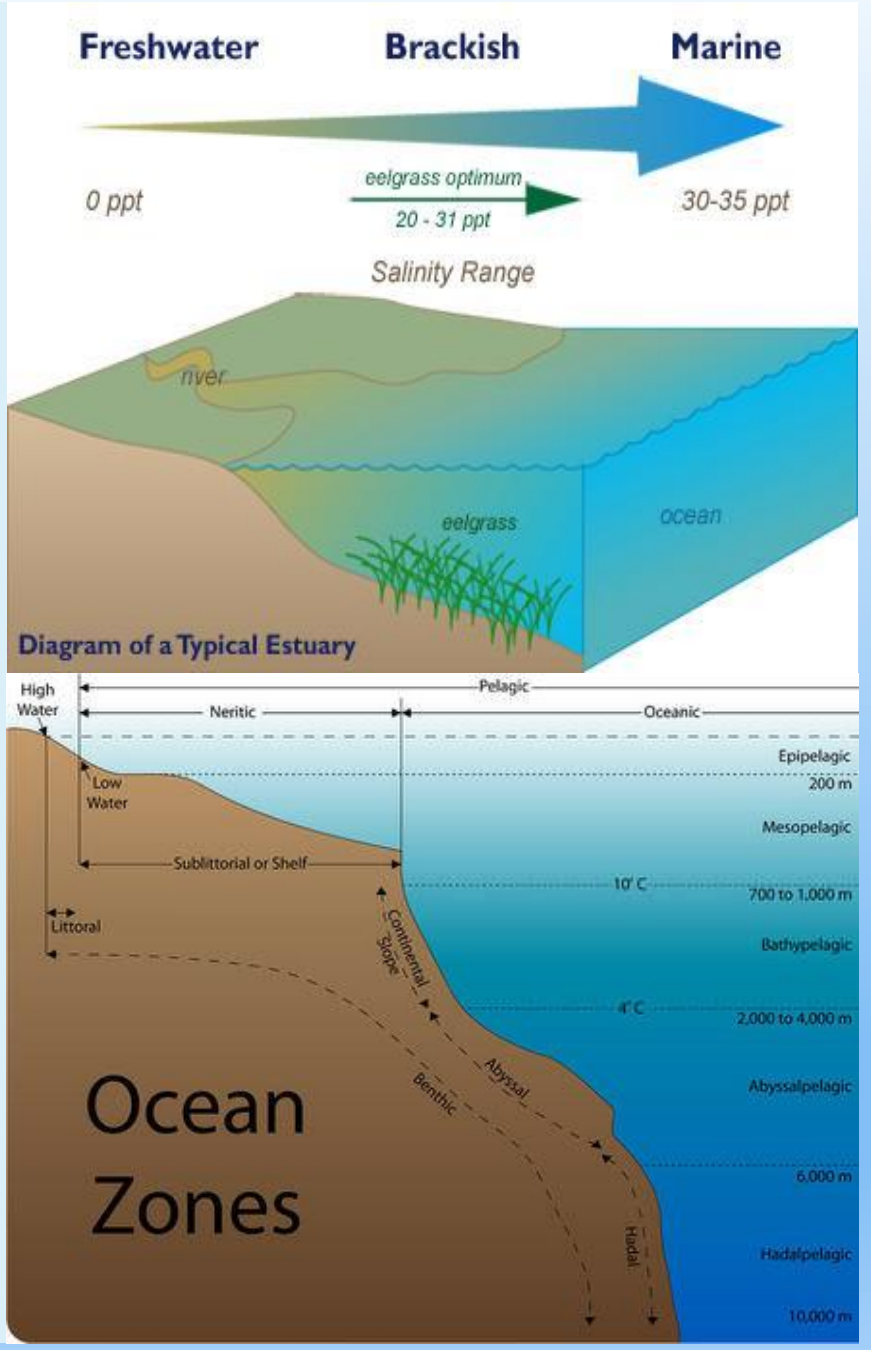
FRONTAL ZONES

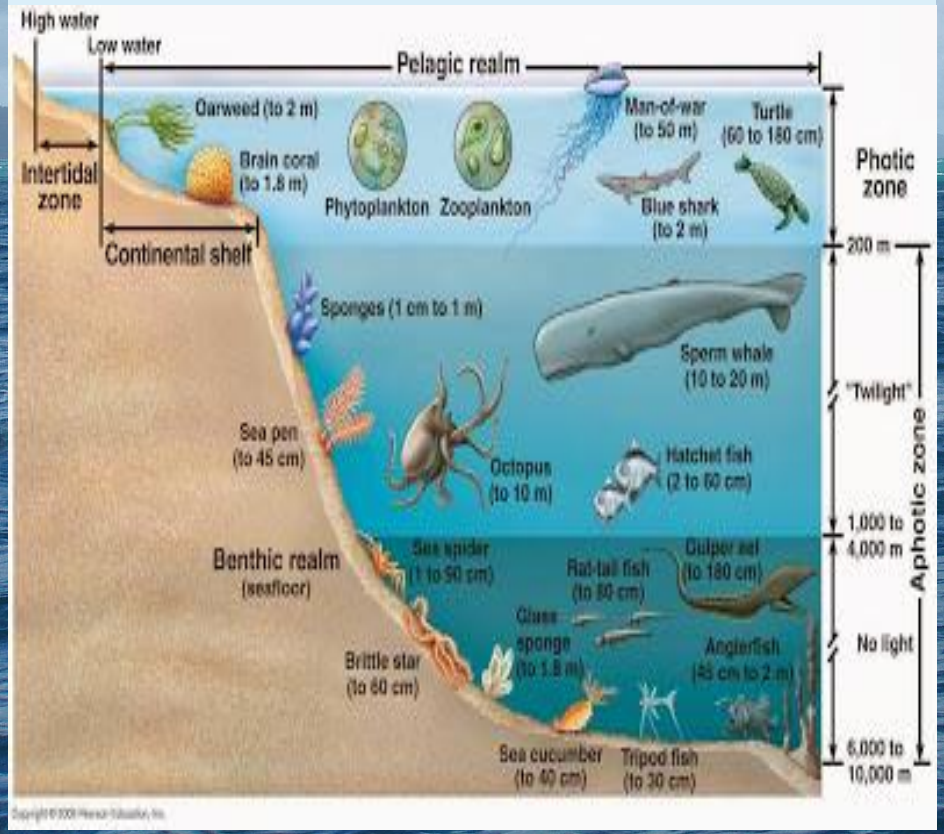
Ana Noel

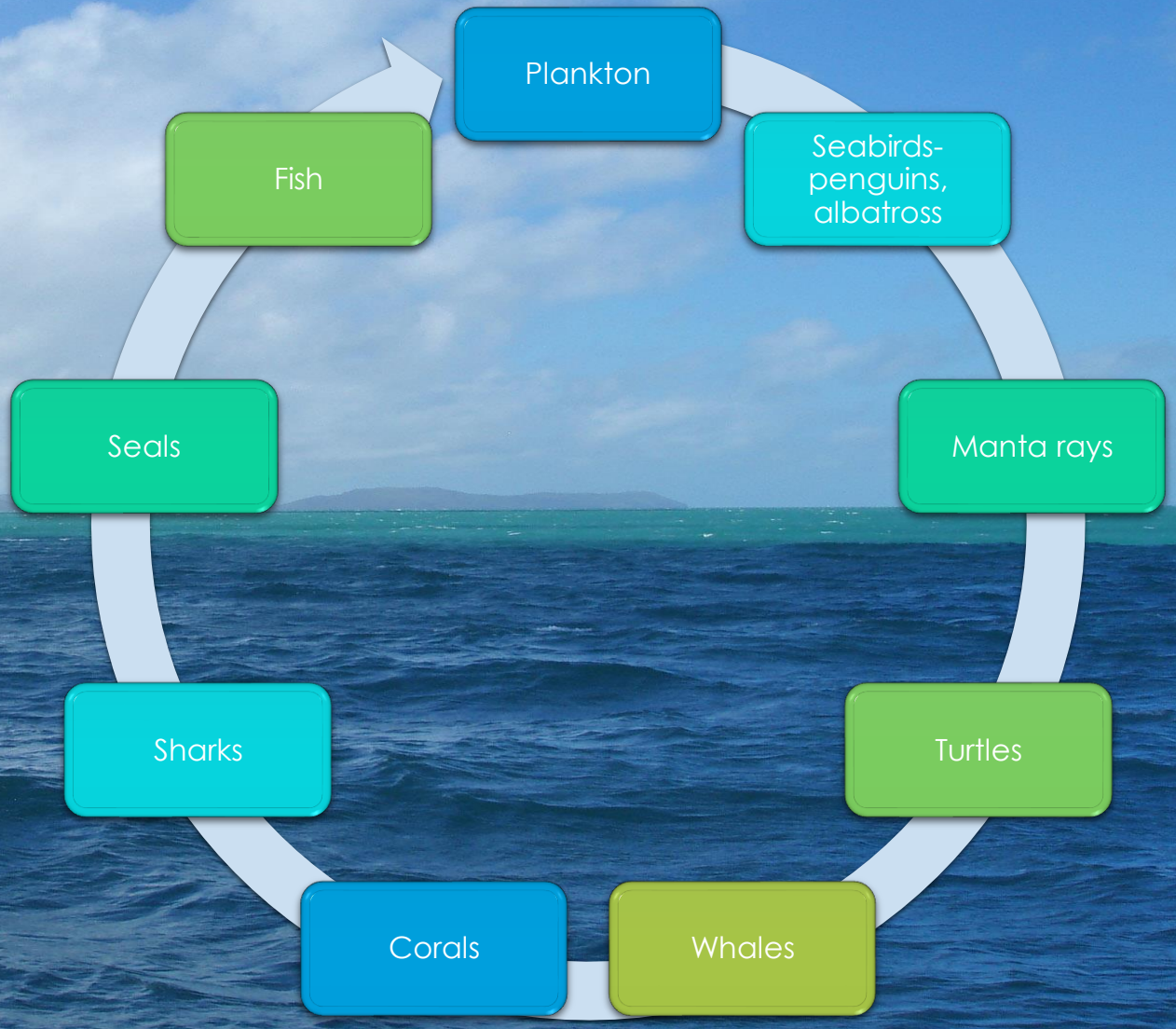
What are frontal zones?

- Frontal zones are where two bodies of water differ significantly in temperature, salinity, density, or color.
- Important area for marine life because of the variety of nutrients and plankton to feed on that are found there.
- Many plankton are found in these zones because of the light used for photosynthesis, which attracts marine life as well.



Organisms found in frontal zones





How Frontal Zones Work

Nutrients accumulate on the sea floor. Nutrients run-off from rivers.

Upwellings, currents, tides, gyres, and eddies circulate the nutrients.

These nutrients attract small photosynthetic organisms such as plankton.

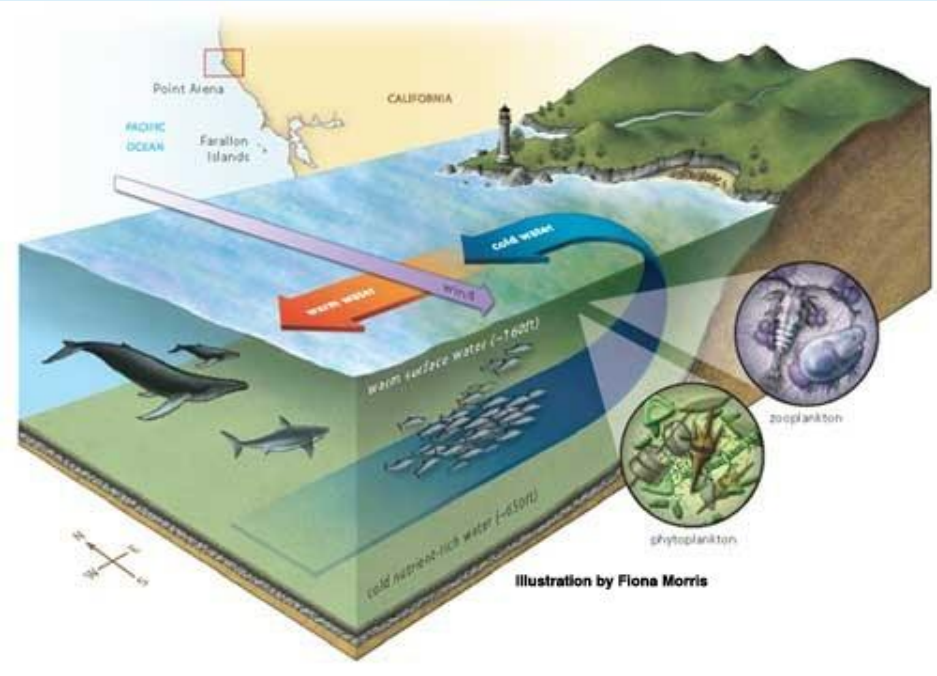
Larger organisms such as rays, turtles, sharks, birds, fish, whales, etc. feed on these plankton.

This creates a diverse and important habitat for many marine animals.

Nutrients

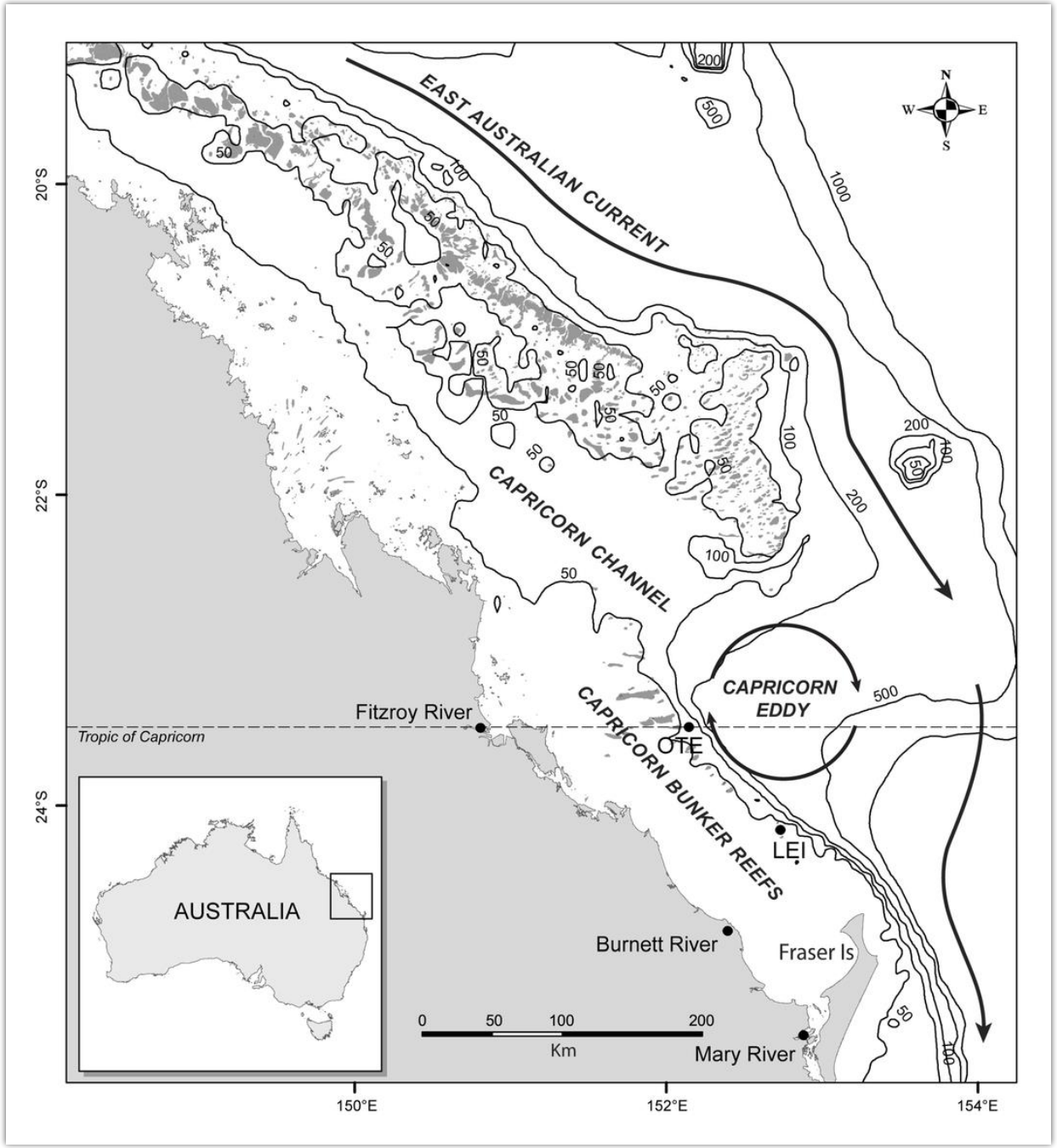
Upwellings

- Cooler nutrient rich water replaces the warm surface water.
- Wind pushes warmer water away form coast, causing cooler water to move in.



Eddies

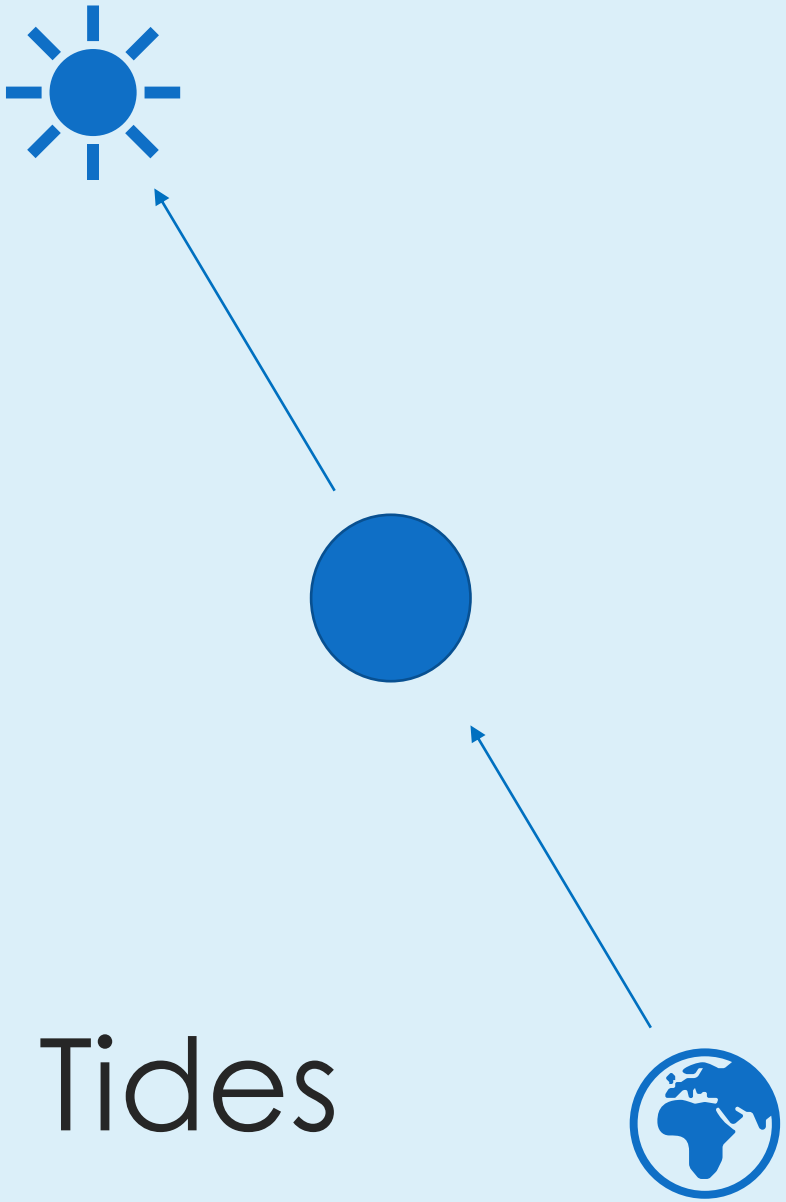
- Help bring up the cooler water and nutrients and can transport them to the reef zone.
- Formed when a current hits a physical barrier.



Capricorn Eddy

- Capricorn Eddy brings nutrients and cooler water into and around the Bunker Reefs.
- Attracts many marine animals such as manta rays.
- Caused by the East Australian Current.

Tides



High tides bring in nutrients to the photic zone from the nutrient-rich waters.

During high tides, photosynthesis decreases because plankton are moved to deeper water where light is scarce.

During the slack tide, everything settles and photosynthesis increases as a result of more chlorophyll.

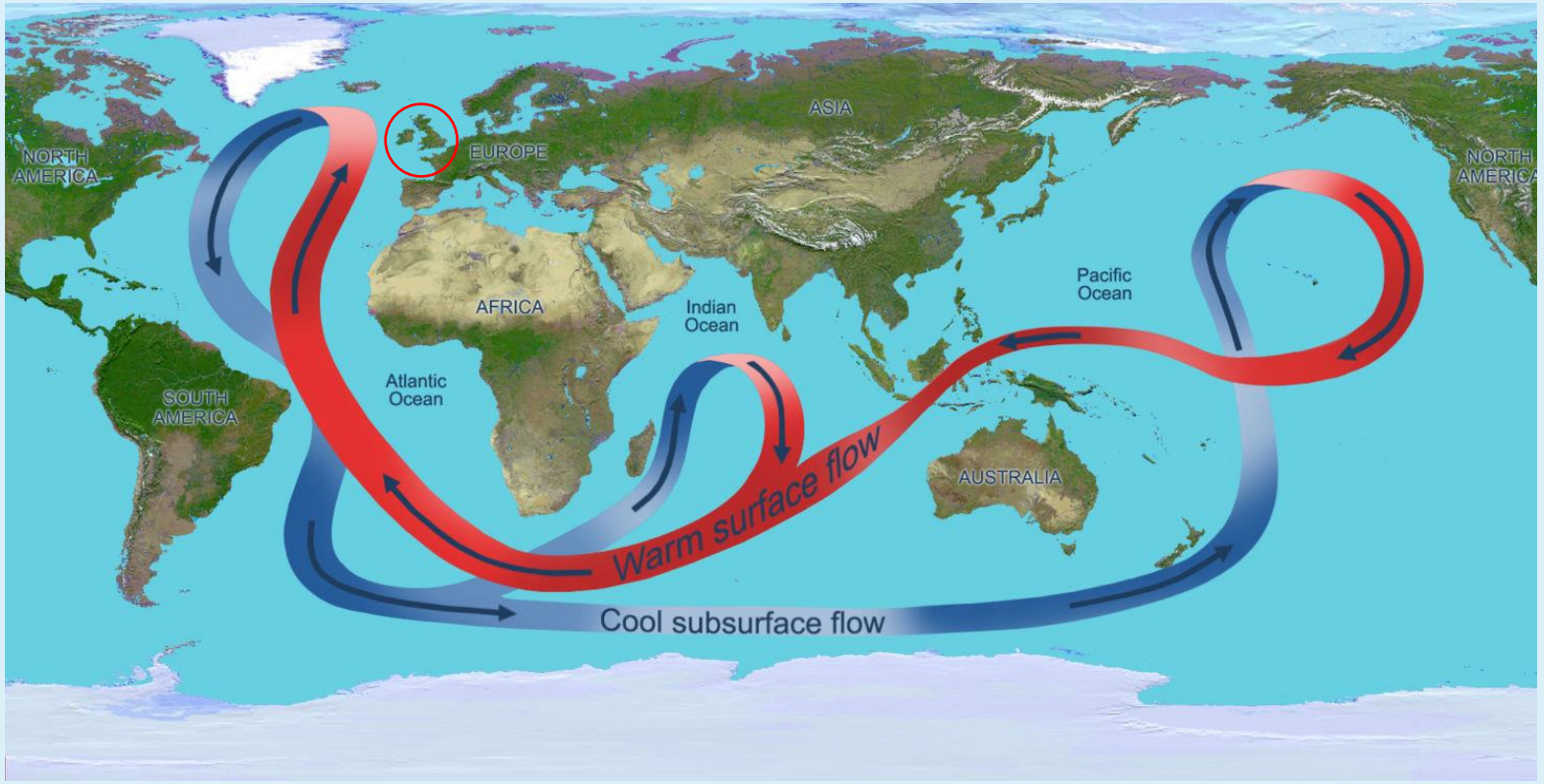
Ebb tides result in more sunlight and clearer waters.

Manta Rays on Lady Elliot Island

- Lady Elliot Island is off the east coast of Australia.
- Manta rays feed on plankton.
  - High amount of plankton because of chlorophyll.
- The Spring Ebb Tide attract the most manta rays to the island.
- The largest manta ray feeding occurs during the Spring Ebb Tide along with river outflow, eddies, upwelling, and convergent fronts.

Thermohaline circulation

- The warm waters of the thermohaline current attract many animals that live in warmer habitats.
- Near the Celtic Sea, basking sharks are found during the winter because of the warmer waters.
- In addition, the thermohaline circulation is important for transferring nutrients, temperature changes, and density of the water.



Threats to Marine Life in Frontal Zones

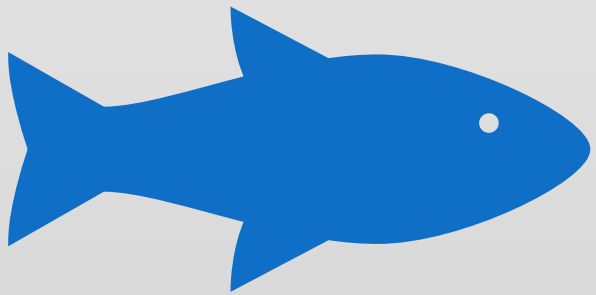
- There is overlap in frontal zones between critical marine environments and fisheries.
- Bycatch by fisheries is a concern.
  - Bycatch- When another organism is caught unintentionally when fishing for a specific species.
- Top predators compete with fisheries when hunting.
- Pollutants and trash can accumulate in frontal zones.
- Marine Renewable Energy Installations can affect the tidal flows.

Significance of Frontal Zones

- Essential for many marine life to survive.
- Allows eddies, tides, currents, upwellings, gyres, and the thermohaline circulation to circulate properly thought the ocean.
- Because of this, coral bleaching is less likely because of cooler water being brought up.
- Great place to conduct research.

Articles

- On the Front Line: frontal zones as priority at-sea conservation areas for mobile marine vertebrates, 2014.
- Unique Sequence of Events Triggers Manta Ray Feeding Frenzy in the Southern Great Barrier Reef, Australia, 2015.
- Tidal Influence on Nutrients Status and Phytoplankton Population of Okpoka Creek, Upper Bonny Estuary, Nigeria, 2013.
- The Capricorn Eddy: a prominent driver of the ecology and future of the southern Great Barrier Reef, 2012.



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