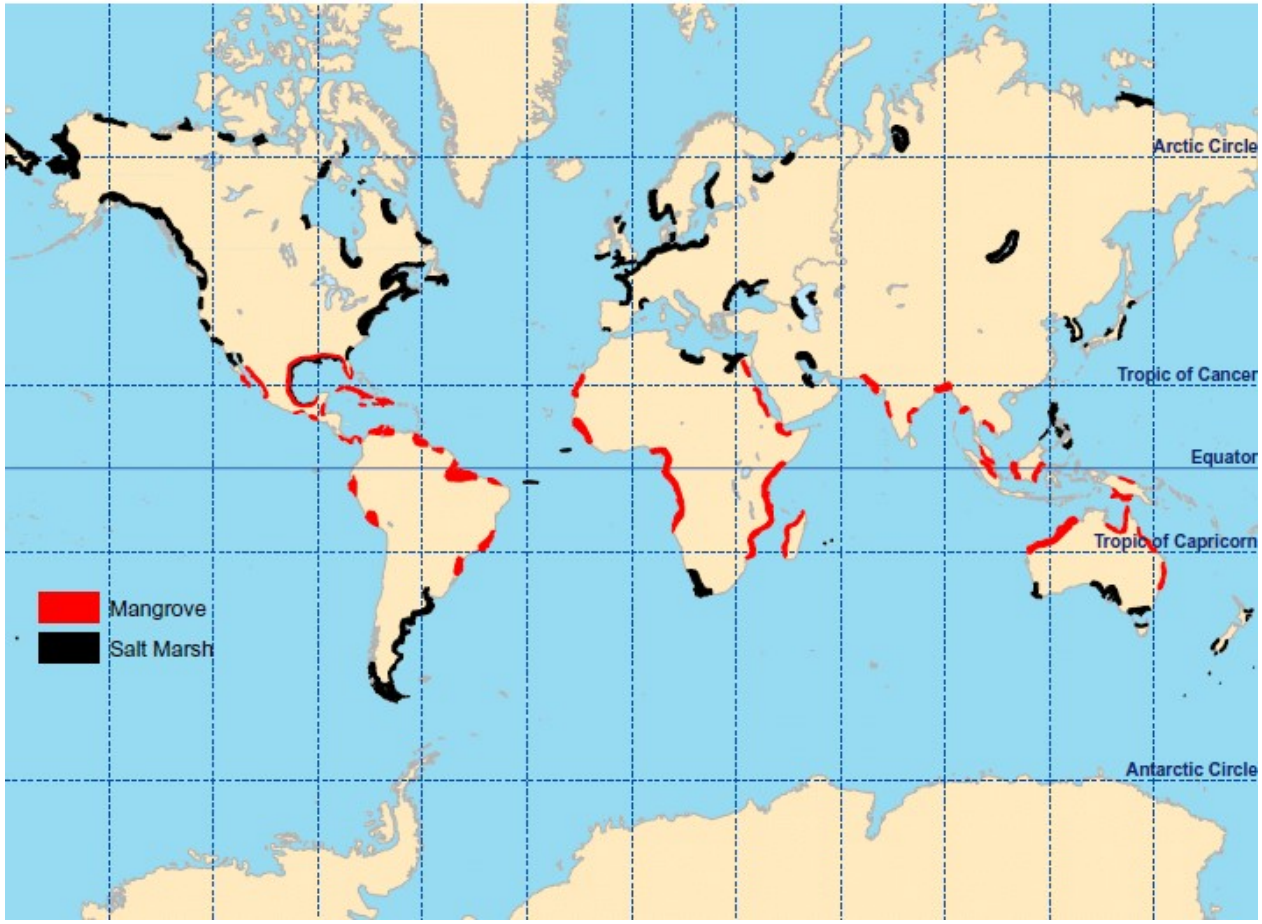
Zoogeography

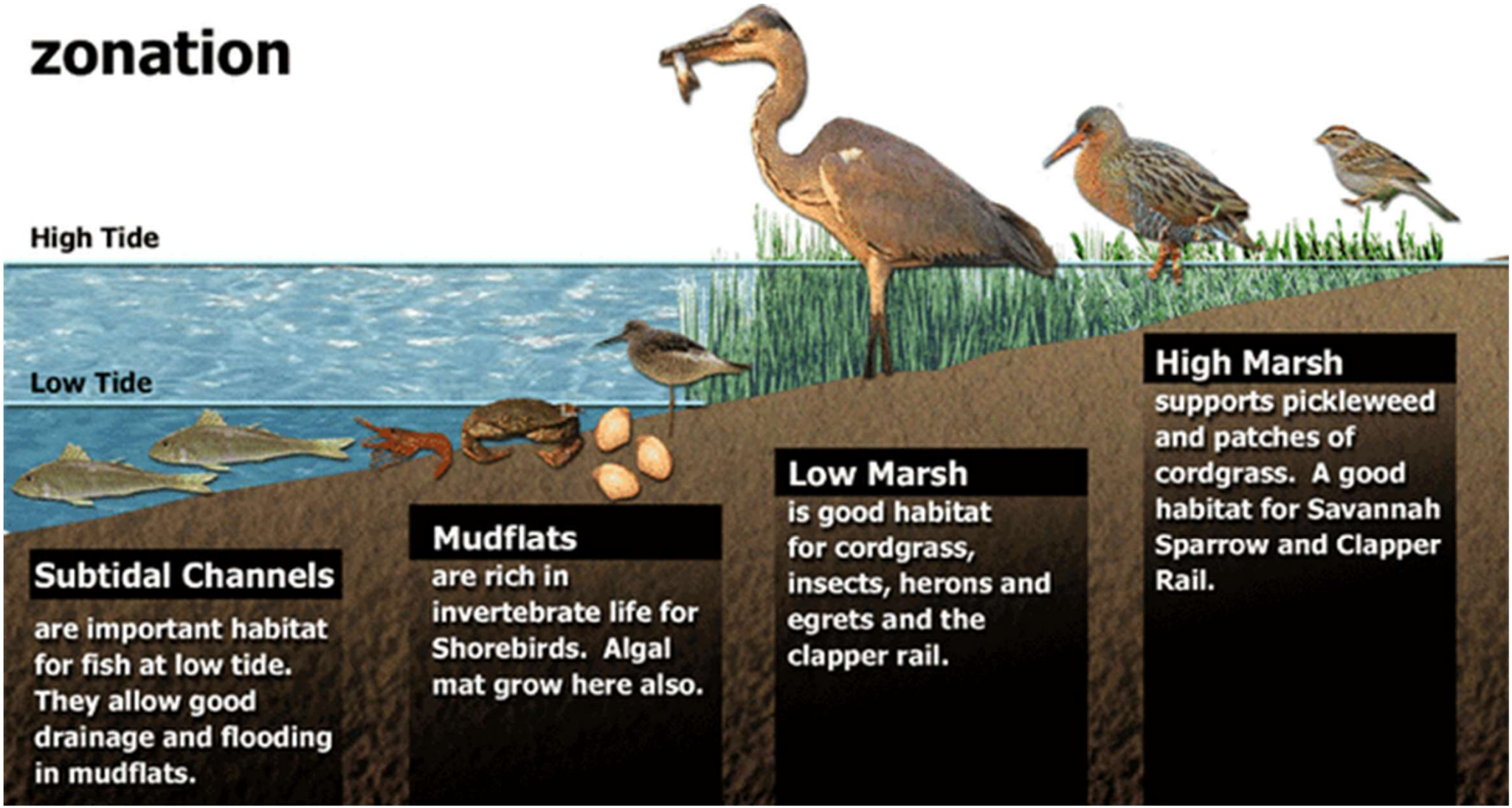
Lesson 13

Salt marshes

- Salt marshes occur where oceans meet land.
- These places are **rich in nutrients** from sediment brought in by the ocean.
- Marshes are regularly flooded by high tides, making the surrounding **ground wet and salty**.
- As a result, the **soil is low in oxygen** and filled with decomposing matter.
- These ecosystems are dominated by **low-growing shrubs and grasses**.



zonation


High Tide
Low Tide
Subtidal Channels
are important habitat for fish at low tide. They allow good drainage and flooding in mudflats.
Mudflats
are rich in invertebrate life for Shorebirds. Algal mat grow here also.
Low Marsh
is good habitat for cordgrass, insects, herons and egrets and the clapper rail.
High Marsh
supports pickleweed and patches of cordgrass. A good habitat for Savannah Sparrow and Clapper Rail.

Mangrove forest

- Mangrove forests are found in tropical areas.
  These ecosystems frequently flood with ocean water, submerging the roots of mangrove trees.
- The root systems of mangroves filter out salt and sit above ground to access oxygen. These trees provide a home for a variety of species.
- Animals, such as fish, crabs, shrimp, reptiles, and amphibians, live among the mangrove's roots while its canopy provides a nesting site for birds.

i.e. key animals in mangroves

- Crabs are the most abundant and important larger invertebrate in mangroves. When building their burrows, crabs improve the penetration of ground water, water from high tides and freshwater runoff
- Crabs are vital to the recycling of nutrients, in particular nitrogen. Many crabs eat large amounts of fallen mangrove litter while other species eat algae and detritus.
- The presence of crabs in these ecosystems has been shown to improve the growth of mangrove plants, and also increases the biomass and diversity of other organisms.

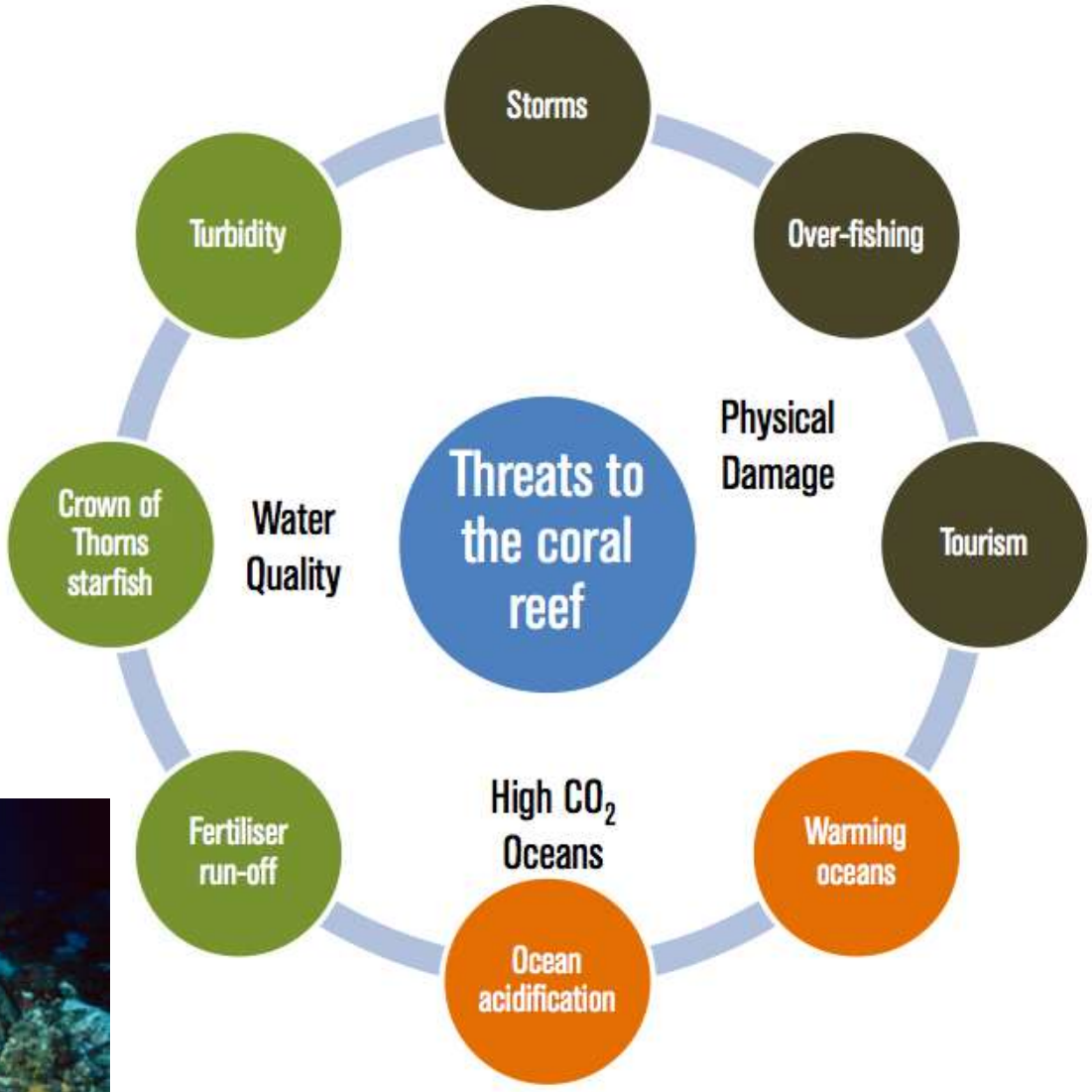
Threats

- Deforestation for fuel & timber accounts for the ongoing loss of approximately 26% of existing mangroves (Valiela *et al*. 2001).
- However, we cannot rely on reforestation to prevent mangrove loss. These fragile and rare ecosystems are being lost at such a tremendous rate that mangrove experts predict that without changes to current practices, mangroves will be functionally extinct in **less than a century** (Duke *et al.* 2007).
- A world without mangroves means a world without most fisheries, without bioshields from storms, and without many bird and other species. The loss of mangroves as a unique habitat would directly **jeopardize more than a billion of the world's human population.**

Coral reef

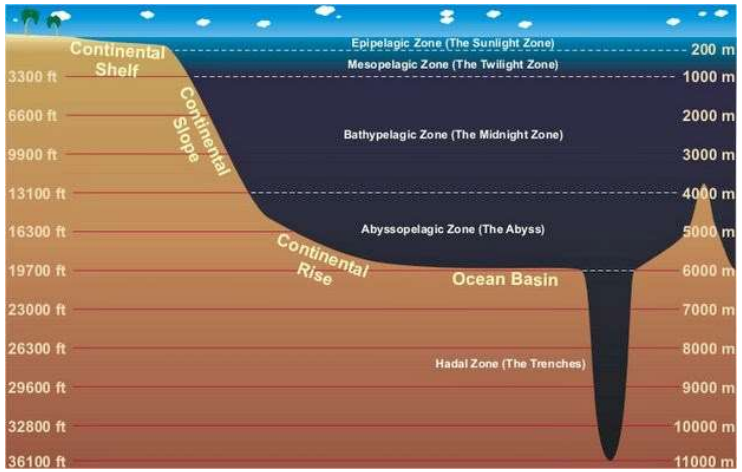
- A bit farther out into the tropical sea are coral reefs, euphotic-zone ecosystems built from the exoskeleton secreted by coral polyps. These exoskeletons form complex structures that shelter many different organisms.
- Coral reefs are extremely diverse ecosystems that host sponges, crustaceans, mollusks, fish, turtles, sharks, dolphins, and many more creatures. By some counts, **coral reefs can account for a quarter of all ocean species**.

Coral reef threats



The open ocean

- Beyond the coral reefs lies the open ocean.
- At the surface of the ocean, the **euphotic zone**, the ecosystem receives plenty of light and oxygen, is fairly warm, and supports many photosynthetic organisms. Many of the organisms that we associate with marine ecosystems, such as whales, dolphins, octopi, and sharks, live in the open ocean.



- https://www.bioexplorer.net/ocean-animal-adaptations.html/
- **Camouflage**: To survive in the well-lit, exposed habitat of the open ocean, many types of animals have evolved a form of camouflage called countershading (e.g. sharks, rays, dolphins, and whales). These animals are darker on their top side and lighter on their under side (e.g. great white shark, Fig. 7). This makes them more difficult to spot from above (they blend in with the darker deep water below them), or from below (they blend in with the clearer shallow water above them).

The deep-sea

- As the depth of the ocean increases, it gets **darker**, **colder**, and with **less oxygen available** Organisms living in deep-sea ecosystems within the dysphotic and aphotic zones have unusual adaptations that help them survive in these challenging environments. Some organisms have extremely large mouths that allow them to catch whatever nutrients fall from shallower ocean depths. Others have adapted to get their energy via chemosynthesis of chemicals from hydrothermal vents.

Yeti crabs, *Kiwa hirsuta*, were discovered relatively recently, in 2015, during the expedition to the deep-sea hydrothermal vents

- These crabs can be found at the bottom of the sea, around hydrothermal vents in the Pacific, and close to Antarctica. Yeti crabs are yellowish-white in color, with prominent front pincers.
- All of their appendages are covered in long hair called setae, and the hair layer is incredibly thick on the front pincers.
- The scientists have observed that the crabs occasionally sit at the vents' openings, waving their hairy pincers above them.
- It was also established that the hair contains a large number of bacteria. It is supposed that the crabs support these bacterial colonies, providing them with nutrients emitted by the vents, and these bacteria are used as a supplemental food source.

The Pacific blackdragon is a deep-water fish. It has an elongated body with a long fin along the upper part of the body.

- It has a large head with prominent, sharp, and curved teeth.
- This fish is a predator.
- Unlike anglerfish that bait the potential prey, the blackdragon prefers to wait in an ambush. Unfortunately, this strategy can be problematic even in the deep sea.
- Though this species lives on the levels where there is no natural light, multiple species have bioluminescence.
- This means that there is enough light for potential prey to see their predators. The black dragons have an ingenious solution to this problem.
- Like many sea species, these fish have the black pigment-melanin. Melanin is stored in unique structures called melanosomes.
- In Pacific blackdragons, these melanosomes are very tightly packed, which is usually quite rare.
- Due to this melanosomes organization, the Pacific Blackdragons can absorb bioluminescent light almost wholly, dissolving into the darkness – and attacking their prey entirely unexpectedly.