Arctic Marine Biomes

As we have learned thus far, the Arctic is filled with a variety of terrain, all which contain their own respective biomes. As there are different types of biomes on land, there are different biomes in the Arctic seas. Arctic seas refer to several bodies of water, including but not limited to the Arctic Ocean, the Greenland Sea, the Canadian Archipelago, the Barents Sea and the Bering Sea (Pipenburg, 2005; Arctic Diversity Assessment, 2013). These bodies of extreme cold temperatures contain seasonal or permanent ice cover (Pipenburg, 2005; Arctic Diversity Assessment, 2013), separating them from other seas around the globe. Although Arctic Seas are set apart from other seas by their temperature and ability to house sea ice, there is more to what makes up their biomes. Arctic seas consists of three biomes which work in tandem to maintain ecological balance; the sympagic zone, the pelagic zone, and the benthic zone (Daase et al., 2021). All three biome zones are interconnected and highly dependent on one another for energy sources vital to the survival of life (Daase et al., 2021).

Sympagic

The sympagic zone in Arctic waters is the top layer, associated with ice cover (Ehrlich et al., 2020). This includes all forms of sea ice; landfast ice, drifting pack ice, and the marginal ice zone (AMAP, 1998). Fauna in the sympagic zone live out their lives within sea ice, or part of their life cycle attached to it (Ehrlich et al., 2020). Flatworms are one of the types of sympagic species, also known as meiofauna (Ehrlich et al., 2020). Meiofauna feed off ice algae (Ehrlich et al., 2020), similar to species from the pelagic zone. Microscopic invertebrates, alveolates, crustacean larvaes, and crustaceans are some of the meiofauna found in the Arctic sympagic zones (Ehrlich et al., 2020).

Pelagic

The pelagic zone in Arctic waters is the water column between the sympagic and the benthic zones (Daase et al., 2021). Although the pelagic is its own biome, it can be further subdivided by depth, starting with epipelagic and ending with hadopelagic (Daase et al., 2021). The pelagic zone is home to species of different kinds and sizes. At the bottom of the food web are over 2100 of different microbial species (Daase et al., 2021). The microbial diversity consists of phytoplankton and ice algae; all of which are unicellular and photosynthetic creatures (Daase et al., 2021). The phytoplankton live in the upper water column, while the ice algae growon the bottom of the sea ice (Daase et al., 2021) creating a type of upside down sea floor. Zooplankton feed on the phytoplankton and ice algae (Daase et al., 2021). Although crustaceans account for more than half of all Arctic zooplankton, the diversity of the zooplankton grows with the deepness of the waters (Daase et al., 2021). Pteropods, sea slugs and sea snails, also feed on microbial species in Arctic waters (Daase et al., 2021).

All of the food web depend on lipids, the energy source which vary in form and storage relative to species (Daase et al., 2021). Species considered at the top of the food chain, the predators of the pelagic zone, begin with Arctic fish (Daase et al., 2021). There are at least 630 different fish species in Arctic waters, with a minimum of 70% of these species originating from boreal biomes (Daase et al., 2021). Polar cod is one of the most important fish species in a

pelagic ecosystem because of its centered place in the food web (Daase et al., 2021). Predatorial species feeding on Arctic cod vary in size. Ringed seals, narwhales, belugas, Northern Fulman, and both the Brünnich and Black guillemots feed on Arctic cod (Daase et al., 2021).

Benthic

The benthic zone is the sea floor. Conditions are cold, dark, with high atmospheric pressure (Wiedmann et al., 2020). The benthic bed can vary in sediment and texture (Kendra et al., 2020) in relation to location. The benthic bed can be muddy, sandy, contain silt and clay, and gravel (Kendra et al., 2020). The benthic zone, and its relationship with the pelagic zone, is dependent on the sympagic zone (Wassman and Reigstad, 2011). The rate of meltic sea ice is a determinant in the quality of the sea floor (Wassman and Reigstad, 2011), the benthic zone.

In specific geographic areas, such as the Alaskan coast, the benthic zone is filled with corals, sea anemones and sea squirts (Kendra et al., 2017). Marine fungi are a part of the food web as well, but more research is needed to further determine the importance of their role and how many species they provide nutrients to (Wiedmann et al,, 2020). Other species on the benthic bed are starfish, brittle star, and bivalves (Fang et al., 2018).

Vertical flux, the sinking of leftover algae, fecal matter, and other organic compounds (Daase et al., 2021), determines how much nutrients benthic organisms have access to (Wassman and Reigstad, 2011). Marine annelid worms are a species that feed off the organic matter (Kendra et al., 2017)) brought down to the benthic zone by the vertical flux. In the food web, the marine worms become a food source for crabs, walrus, fish, snails, slugs, squids, cuttlefish, octopus, nautilus (Kendra et al., 2017), and sea cucumbers (Wiedmann et al., 2020).

Finding Academic Sources

I used the course readings to choose what I wanted to write about. Once I knew what I wanted to research, I found reliable and authoritative academic sources by using Trent University's OMNI Search and Google Scholar. I only used sources that have been peer reviewed, as that is the standard for academic sources when writing academic papers.

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