**CC: Ice cover**

Ice cover is decreasing as a result of global warming because higher temperatures cause melting of both sea ice and land-based ice (IPCC, 2021).

**CC: weather conditions at the sable island weather station and at the banquereau and laurentian fan weather-buoy sites, including wind direction and speed, air pressure and sea-level air temperatures, plus for the buoy sites sea surface temperatures, wave height and dominant wave period**

Climate change is linked to extreme weather events because rising global temperatures disrupt weather patterns, making some events more intense, frequent, or prolonged. Warmer air holds more moisture, leading to heavier rainfalls and more intense storms (Wang et al., 2016).

**CC: phytoplankton production, community composition and the timing of the spring bloom in the mpa and the surrounding region**

Climate change can reduce nutrient mixing due to increased stratification as a result of increased temperatures. This means phytoplankton in the surface layer quickly deplete the available surface nutrients. This can also lead to a shift in community composition where smaller phytoplankton such as picoplankton and cyanobacteria are more competitive in low-nutrient conditions. The timing of the bloom also shifts to be earlier as a result of rising temperatures shifting accelerating phytoplankton metabolism and growth rates, and other factors such as earlier sea ice melt leading to increased light penetration, creating favorable conditions for earlier blooms (Smith et al., 2020).

**CC: zooplankton biomass, community composition and the biomass of selected species within the mpa**

Warmer temperatures can speed up zooplankton life cycles, resulting in smaller adult sizes. Species adapted to colder waters may experience stress or die off in warmer waters and could potentially result in a decline in biomass (Beaugrand et al., 2015).

**CC: Nutrient Conditions (Nitrate)**

Nutrient conditions become more stratified as a result of global warming. This also limits the nutrient upwelling and can result in a decreased supply of nutrients such as nitrate in the surface ocean (Barton et al., 2012).

**CC: Oxygen conditions**

Warmer waters can hold less oxygen, and climate change can therefore result in less oxygen available to marine organisms (Pörtner et al., 2014).

**CC: pH**

More CO₂ in the atmosphere results in an increase of CO₂ in the ocean, which results in a decrease of pH in the ocean, making seawater more acidic (Doney et al., 2009).

**CC: Calcium carbonate saturation**

Ocean acidification and increased temperature can result in a decrease of available calcium carbonate in the ocean (Feely et al., 2004).

**CC: Chlorophyll conditions**

Chlorophyll conditions are often used as a proxy for phytoplankton biomass. As the surface ocean warms, it becomes more stratified, meaning the surface waters become less mixed with nutrient-rich deeper waters. This leads to a reduction in the upward transport of nutrients (such as nitrogen and phosphorus) from the deeper ocean layers, which are essential for phytoplankton growth (Buitenhuis et al., 2013).

**CC: Bloom Amplitude**

The timing of the bloom can shift to be earlier as a result of rising temperatures, accelerating phytoplankton metabolism and growth rates. Other factors, such as earlier sea ice melt leading to increased light penetration, create favorable conditions for earlier blooms (Henson et al., 2017).

**CC: Temperature**

Global warming relates to an increase in temperature in the oceans due to the build-up of greenhouse gases (Mann et al., 2009).

**CC: Sea surface height**

Sea surface height is influenced by various processes related to climate change. The rise in sea level due to climate change is primarily driven by two main factors: thermal expansion of seawater and the addition of water from melting ice (Church et al., 2013).

**CC: Mean temperature of catch**

Global warming relates to an increase in temperature in the oceans due to the build-up of greenhouse gases. It is therefore expected that the mean temperature of catch would increase as well (Cheung et al., 2013).

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