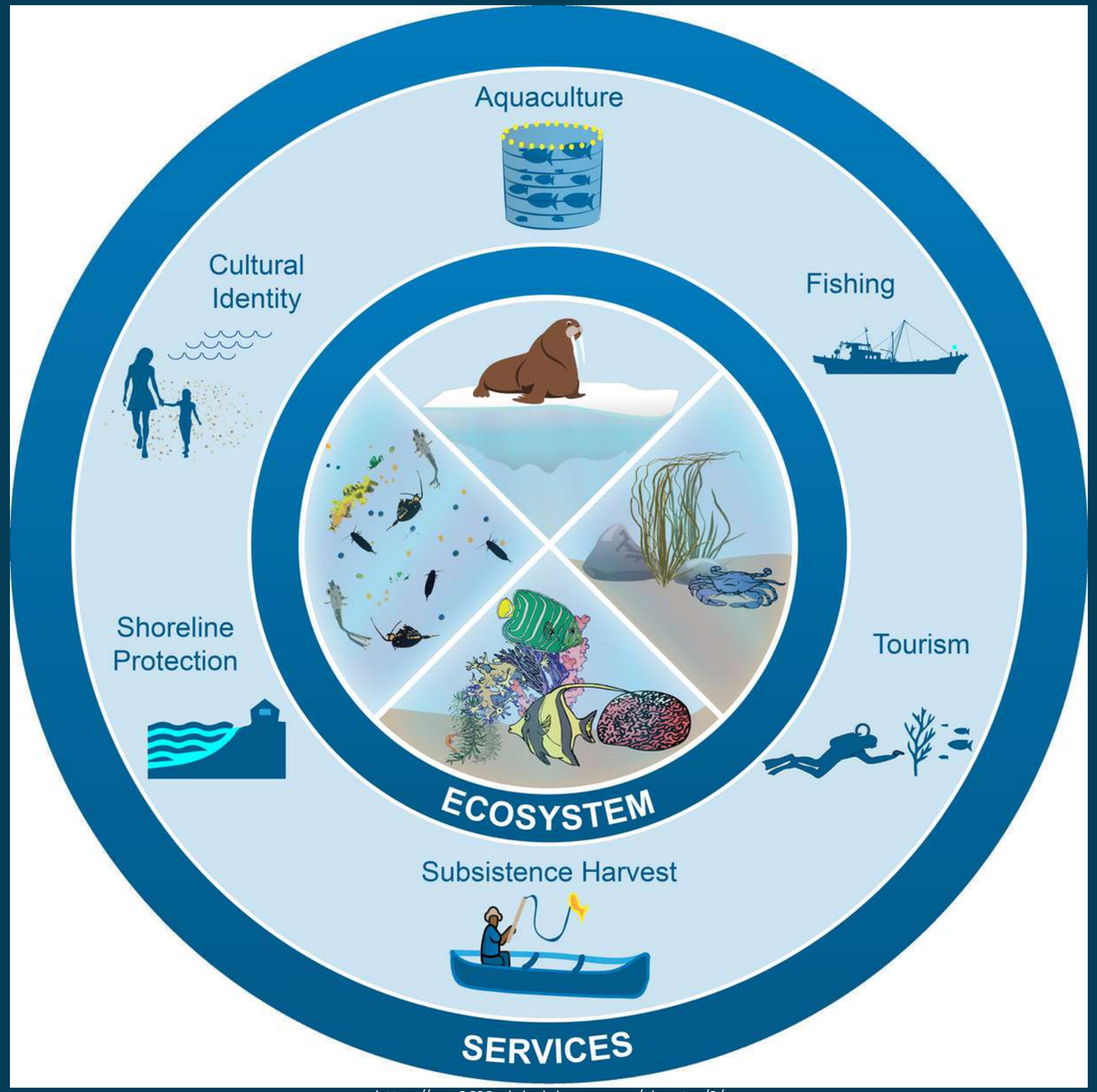
IMPACTS OF CLIMATE CHANGE ON OCEANS

Extreme Events

Benefits of Our Oceans

- Provides a habitat for millions of species
- Provides food for millions of people
- Tourist attraction

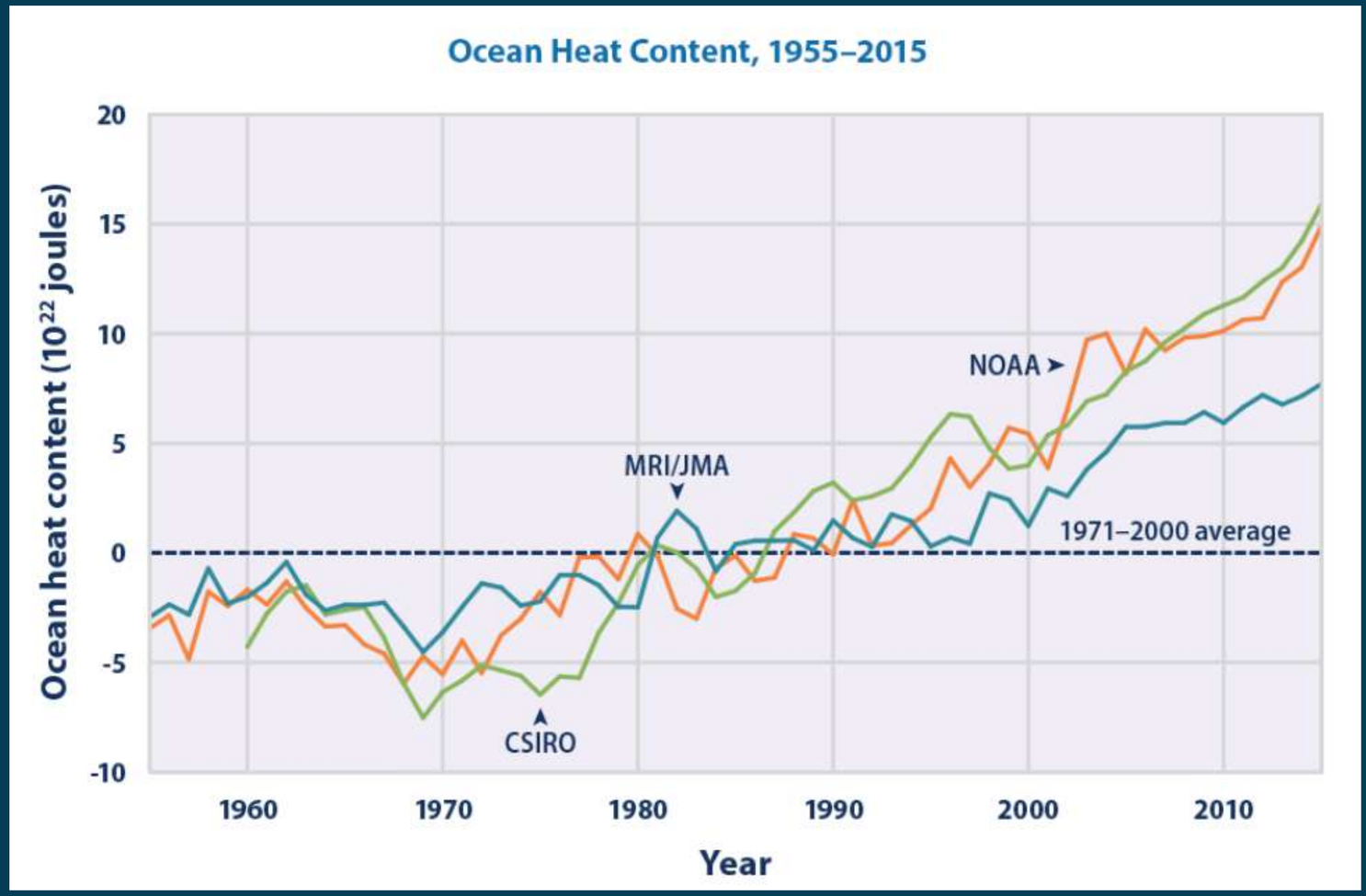


https://nca2018.globalchange.gov/chapter/9/

Oceans' Role in Climate System

- Carbon and heat sink
  - Oceans cover 70% of the Earth
  - Ability to hold heat and transport it from the tropics to higher latitudes
  - Large mass of water absorbs carbon
  - Interacts with atmosphere transporting heat and CO2

Ocean Warming Trend



https://www.epa.gov/sites/production/files/styles/large/public/2016-07/ocean-heat-download1-2016.png

Impacts of Climate Change

DEOXYGENATION

Warmer waters hold less oxygen, and sometimes create harmful algal blooms that also diminish oxygen levels.

ACIDIFICATION

Excessive amounts of CO_2 creates carbonic acid and acidifies the marine environments.

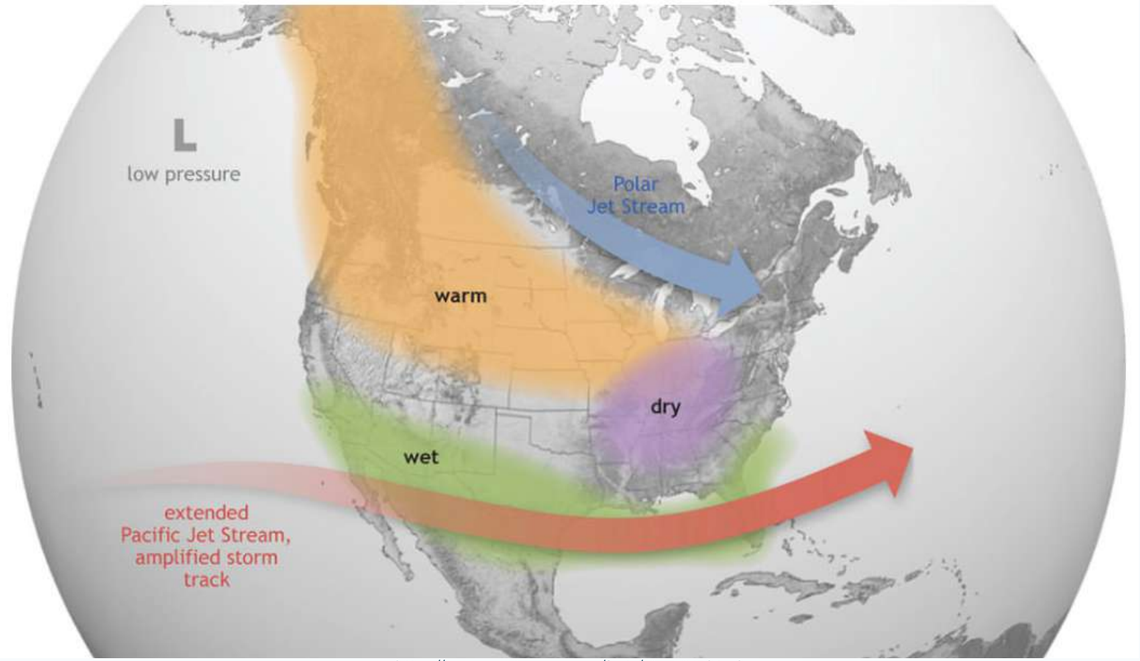
TEMPERATURE

Higher temperatures expand water molecules, adding volume to the oceans.

Extreme Events

Hazardous events occur naturally, but the impacts of Climate Change make these events more intense and frequent.

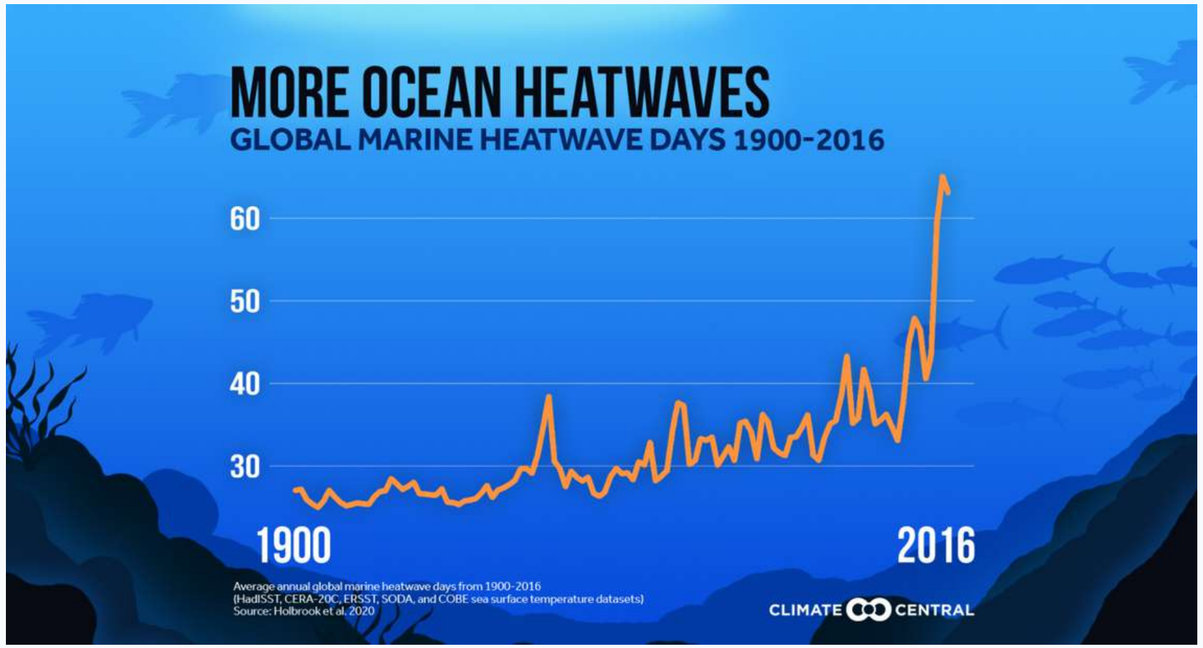
El Nino



https://oceanservice.noaa.gov/facts/ninonina.html

- El Nino translates into "Little Boy", and was first noticed by fisherman in South America in the 15th century.
- Warming oceans cause the Pacific jet stream to move south, instead of its usual neutral level.
- The shift causes the northern U.S. region and Canada to be warmer and dryer, while the Southeast region and U.S. Gulf Coast are wetter with increased flooding events.
- Affects the ocean circulation and reduces/stops upwelling that pulls nutrients from the deep for the phytoplankton to feed on. In turn, it effects the food available for smaller fish, and the pattern continues up the foodchain.

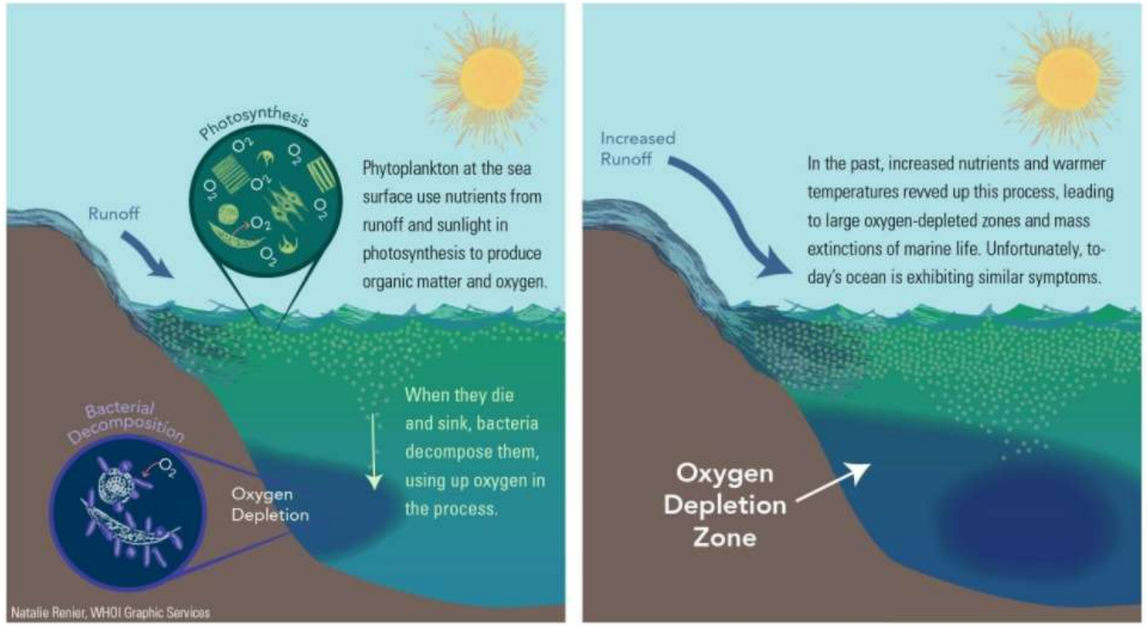
Heat Waves



https://medialibrary.climatecentral.org/resources/2020-ocean-heat-waves

- Marine Heat Waves (MHW) are extended extreme oceanic warm events that last five days or longer.
- Warming events such as this provide regions that will strengthen tropical storms and hurricanes.
- MHW impact the marine ecosyem, even though they are short term compated to other Climate Change impacts.
- Data shows these heat waves collapse kelp forests, bleach coral, decrease the population of sea birds, and more.

Deoxygenation



https://www.whoi.edu/oceanus/feature/will-oxygen-in-the-ocean-continue-to-decline/

- Caused by CO2 emissions in the atmosphere that are absorbed and also released by the oceans.
- The decrease in forested areas (deforestation) allows more runoff with additional nutrients into the oceans, reducing oxygen levels.
- The additional nutrients provides more food for algal blooms, further reducing oxygen.
- Data shows these conditions result in Dead Zones, where hardly any marine life lives due to the lack of oxygen.