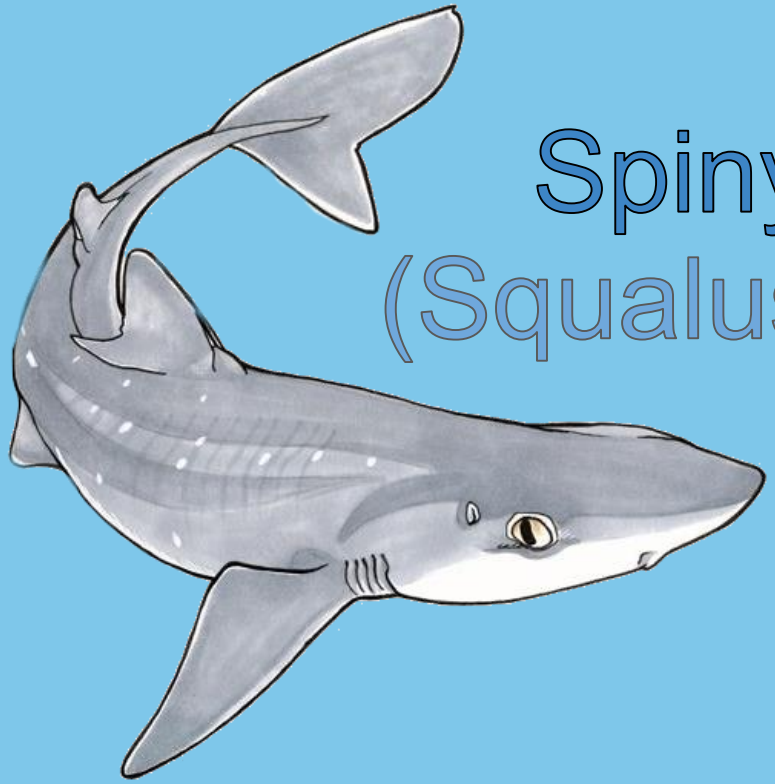
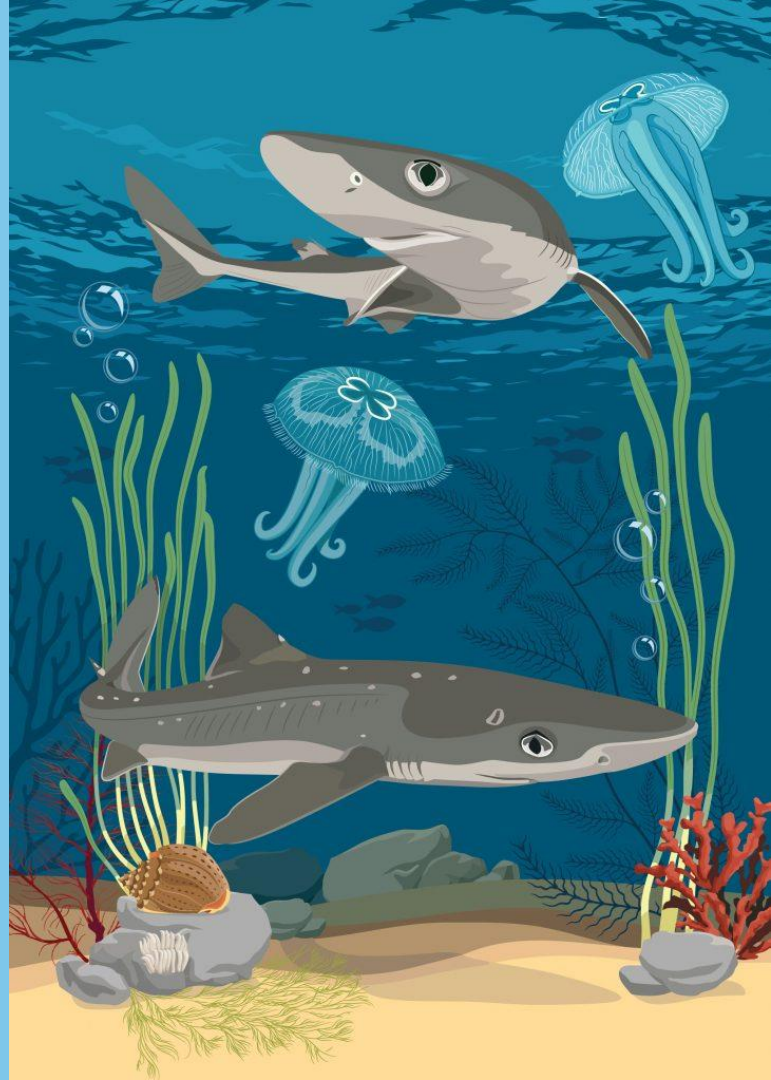


Spiny Dogfish
(Squalus acanthias)

Bochis Malina-Maria

Summary

- General Characteristics
- Sea warming
- Overfishing
- Other causes of spiny dogfish population reduction
- Why is shark conservation important?
- References



General characteristics

- Scientific name: Squalus acanthias
  - lat. Squalus = shark, gr. acanthias = spines
- Family: Squalidae
- Class: Chondrichthyes
- Maximum length:
  - male: 39 inches
  - female: 49 inches
- Weigh: ~8 pounds
- Key characteristics:
  - white spots on their side
  - large eyes
  - slender body
  - pointy snout
  - strong jaws
  - sharp teeth
- Skin:
  - brown or gray along the top of their body
  - brownish/grayish on the top, fades to white or pale color on the belly
- Spiny Dogfish are **unique** in that they have **two spines** that they use for self-defense
  - if they are attacked, they will use these two spines to arch their backs and inject poison into their attacker
- Preferred habitat: saltwater
  - optimal pH: between 6.5 and 8.5)
  - water temperature: 6 to 15°C
- Preferred depths to swim: between 160 and 490 feet beneath the surface
- Lifespan: typically between 20 and 24 years
- These sharks often hunt for food in a larger pack of up to 1,000 Dogfish
- Food: octopuses, crabs, squid, smaller sharks, jellyfish, shrimp, sea cucumber
  - they use their very strong jaws and sharp teeth to bite their prey
  - during winter, they consume less food because they spend more time in deeper water
  - during spring and summer, they swim towards the coasts where it is warmer, and they can find more food

Distribution and migration routes of the Spiny dogfish (Squalus acanthias) at Black Sea level

Image credit: http://www.[illegible]mediu.ro/beta/wp-content/uploads/[illegible]2012-10-color4.pdf

- The Romanian fishing area is comprised between Sulina and Vama-Veche. Coastline extends for over 240 km, which can be divided into two main geographical and geomorphologic sectors:
  - the northern sector (about 158 km in length) lies between the secondary delta of the Chilia branch and Constantza, constituted of alluvial sediments
  - the southern sector (about 85 km in length) lies between Constantza and Vama Veche characterised by promontories with active, high cliffs, separated by large zones with accumulative beaches often protecting littoral lakes

- Sexual maturity:
  - males: 11 years
  - females: 12 to 14 years
- Mating:
  - offshore waters
  - internal fertilization
  - after fertilization, a hard shell forms around the embryos to keep them protected; this shell will shed off after 4 to 6 months, but the young fish will continue to gestate for 18 to 20 more months
- Total gestation period: about 2 years, **the longest of any vertebrate**
- Pups:
  - between 2 and 11 each litter
  - on average: 6
  - between 20 and 33 centimeters long

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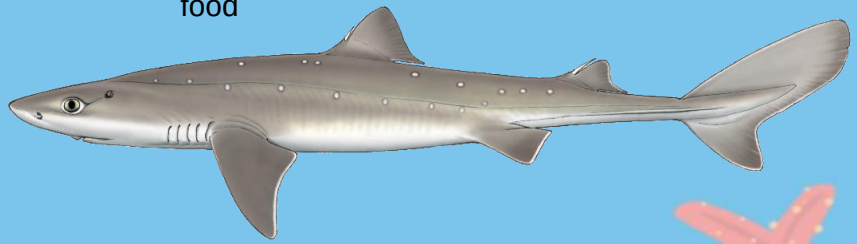

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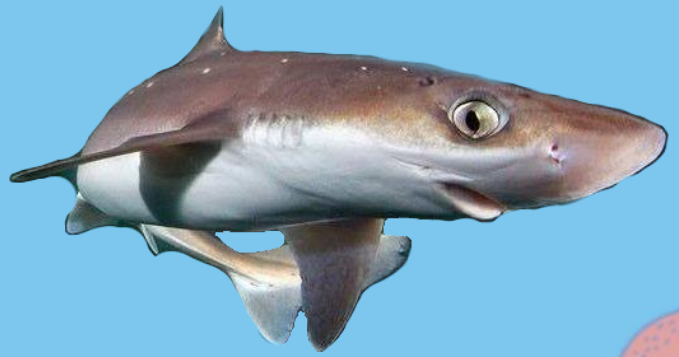
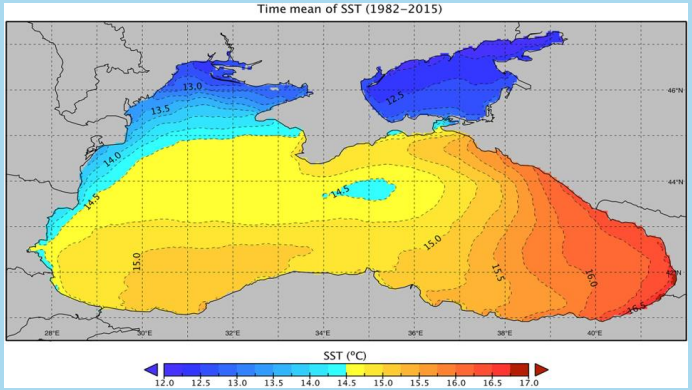


Sea warming

- The Black Sea is essential for all aspects of human well-being and livelihood
- It provides key services like climate regulation, through the energy budget, carbon cycle and nutrient cycle.
- Carbon emissions from human activities are causing **sea warming**, acidification and oxygen loss with some evidence of changes in nutrient cycling and primary production
- The warming sea effects:
  - impacting marine organisms at multiple trophic levels, including fisheries
  - observed changes in biogeography of organisms ranging from phytoplankton to marine mammals
  - changing community composition
  - altering interactions between organisms
- Many ocean ecosystems are warming, and this trend will continue for decades even if strong action is taken to mitigate climate change. Temperature is an important driver of species' growth, reproduction, and survival, and many marine organisms have responded to warming ocean temperatures by **shifting their spatial distributions**
- Differential changes in the spatial distribution of predators and prey can result in the elimination of prey spatial refugia, and the existence of such refugia can mediate the potential top-down control of predators
- **Asymmetries** in species responses to climate therefore have the potential to disrupt key species interactions like predation
- Such asymmetries can drive considerable changes in the potential for their interaction. Warming events in the Black Sea removed prey species' cold-water refugia, resulting in greater predator–prey overlap and prey consumption



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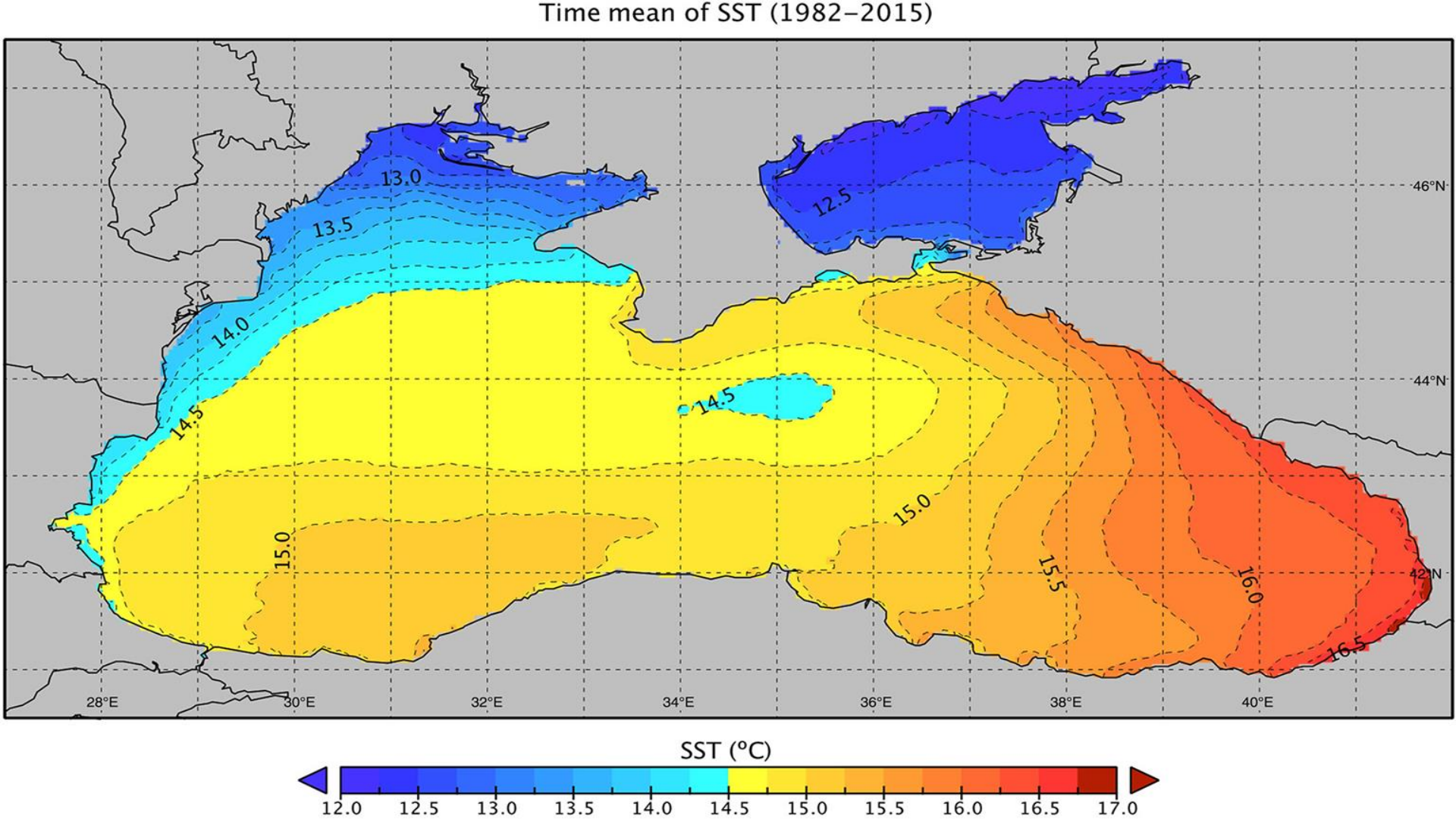
Time mean of SST (1982–2015)
13.0
13.5
14.0
14.5
12.5
14.5
15.0
15.0
15.5
16.0
16.5
46°N
44°N
42°N
28°E
30°E
32°E
34°E
36°E
38°E
40°E
SST (°C)
12.0
12.5
13.0
13.5
14.0
14.5
15.0
15.5
16.0
16.5
17.0

Overfishing

- Humans pose a threat to the Dogfish. The shark population has seen a big decrease over the years. At one time, they were the most abundant species of sharks, but now the International Union for Conservation of Nature has given them a classification of **vulnerable** globally
- Reasons they are so impacted by **overfishing**:
  - longer gestation period than many other species of fish
  - smaller litters of young
  - it takes females longer to reach sexual maturity, which makes it harder for the population to grow quickly

- These sharks are fished both commercially and recreationally
- Their meat is particularly popular European countries
- The fins and tails of these sharks are used to make fin needles
- Spiny Dogfish are sold as:
  - "huss" in England
  - "small salmon" in France
  - "sea eel" in Germany and Belgium

Overfishing

- In the recent past the European market for spiny dogfish has increased dramatically, which led to the overfishing and decline of the species. This drastic increase led to the creation and implementation of many fishery management policies placing restrictions on the fishing of spiny dogfish. However, since the species is a late-maturing fish, it takes a while to rebuild the population.
- In 2010, Greenpeace International added the spiny dogfish to its **seafood red list**. "The Greenpeace International seafood red list is a list of fish that are commonly sold in supermarkets around the world, and which have a very high risk of being sourced from unsustainable fisheries"
- In the Romanian fisheries, Spiny dogfish was mainly as **by-catch** in the trawlers catches; when the number of trawlers has been high, also the dogfish catches were higher
- In the Black Sea area is a common practice to don't report the catches and this situation may exceed the officially reported
- The lack of an adequate management in the Black Sea fisheries is evidenced by the fact that in spite of decline of stocks, the fishing effort continued to increase
- The fishing is carried out in a competitive framework without any agreement between the countries on limits to fishing
- The catches, both regionally and nationally, are clearly increasing, due to the over-exploitation and the use of inappropriate fishing gear

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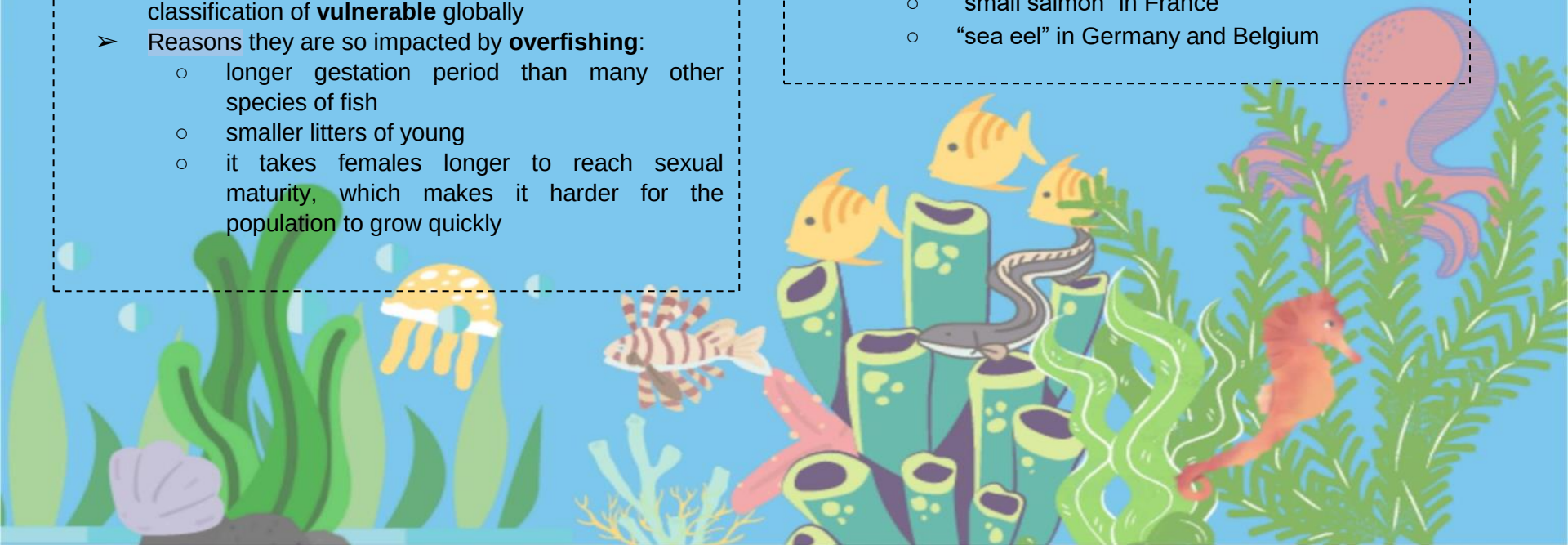

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Other causes of spiny dogfish population reduction

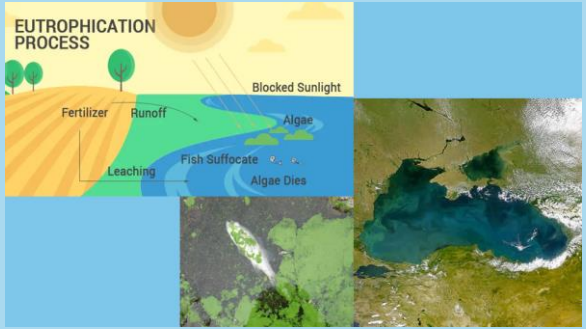
Historical analysis shows that the state of spiny dogfish stock has been influenced not only by fishing (which was at quite high level due to the bigger number of trawlers and high levels of the spiny dogfish by-catch), but also by ecological changes due to **eutrophication** and **Mnemiopsis leidyi invasion and outburst in Black Sea**.

Eutrophication sets off a chain reaction in the ecosystem, starting with an overabundance of algae and plants. The excess algae and plant matter eventually decompose, producing large amounts of carbon dioxide. This lowers the pH of seawater, a process known as ocean acidification. Acidification slows the growth of fish and shellfish and can prevent shell formation in bivalve mollusks.

credit: https://oceanservice.noaa.gov/facts/eutrophication.html

Invasions of marine habitats by native and/or non-indigenous gelatinous species, which are occurring throughout the world, are a major ecological concern. The cumulative effects of mounting global warming, ocean acidification, eutrophication and risk of accidental spread worldwide through shipping traffic favour their settlement and sometimes domination of local food webs that are heavily stressed by pollution, eutrophication and overfishing. In some cases, their extent and impacts on ecosystems may be rather detrimental, such as diminishing the size of native populations and even extinctions, as well as significant alterations in community structure and ecosystem functioning.

credit: https://academic.oup.com/plankt/article/30/12/1385/1445187



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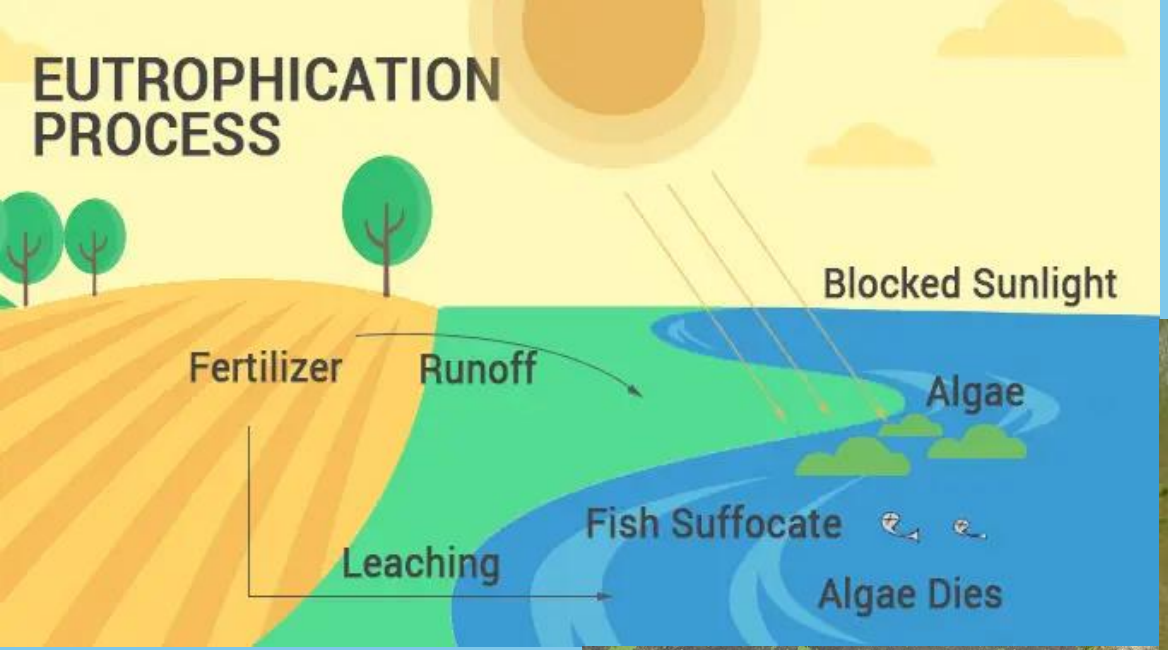
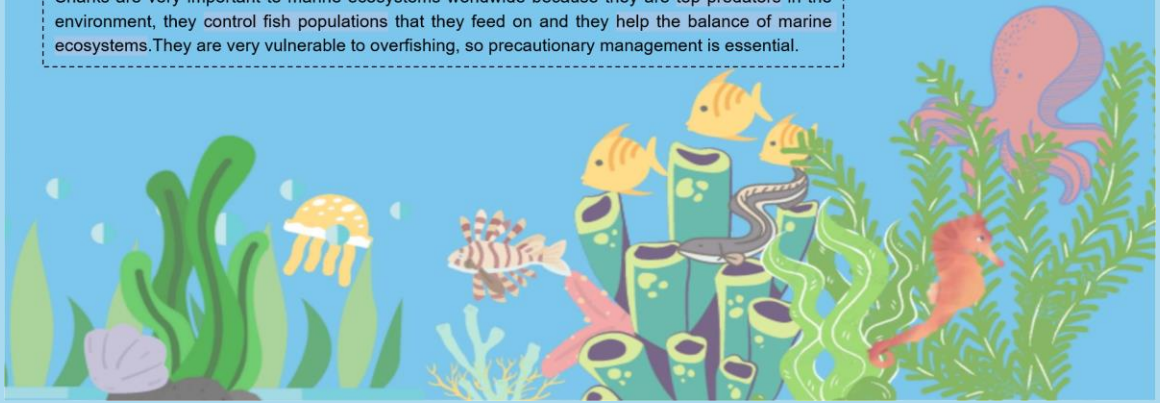

EUTROPHICATION PROCESS
Blocked Sunlight
Fertilizer
Runoff
Algae
Fish Suffocate
Leaching
Algae Dies

Why is shark conservation important?

Sharks are of great conservation concern worldwide because they've been overfished in every ocean where they've been accessible to foreign fishing fleets. They are the world leader when it comes to shark conservation.

Sharks are very important to marine ecosystems worldwide because they are top predators in the environment, they control fish populations that they feed on and they help the balance of marine ecosystems.They are very vulnerable to overfishing, so precautionary management is essential.



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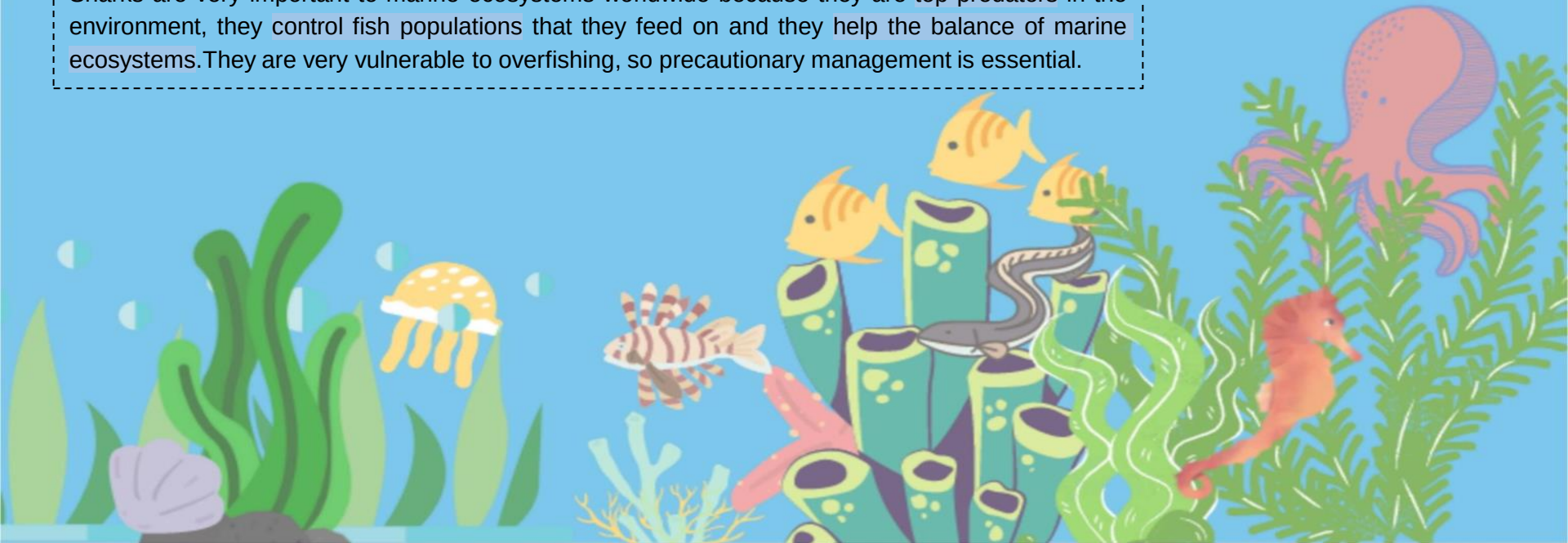

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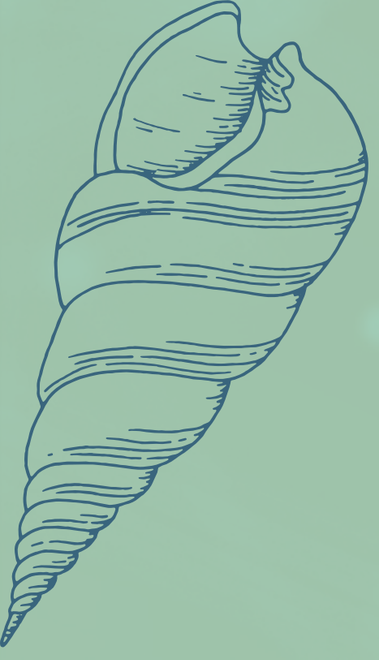
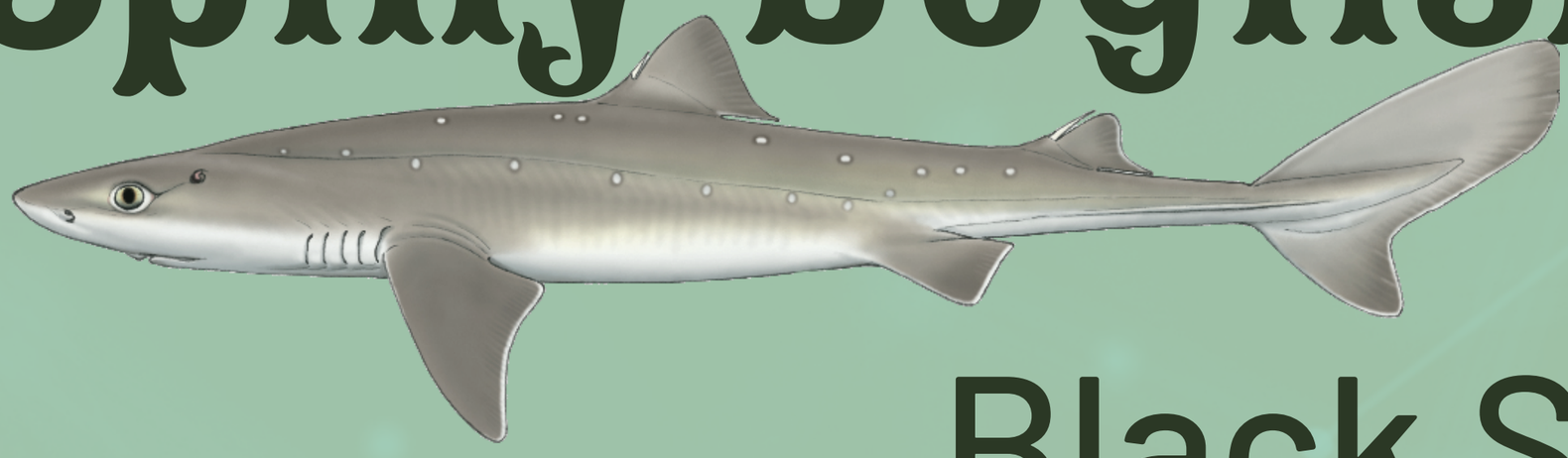
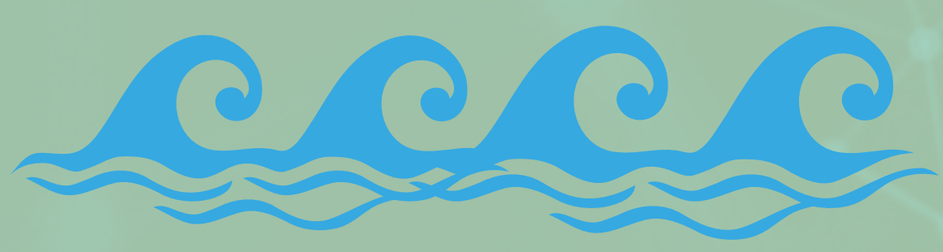


Spiny Dogfish

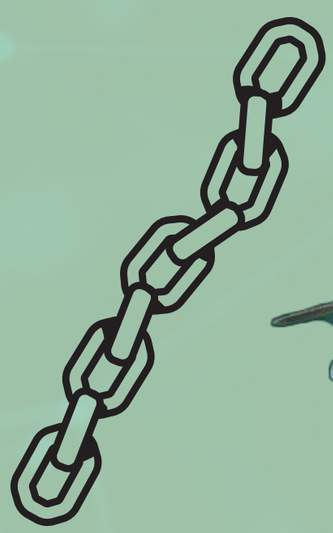


Black Sea

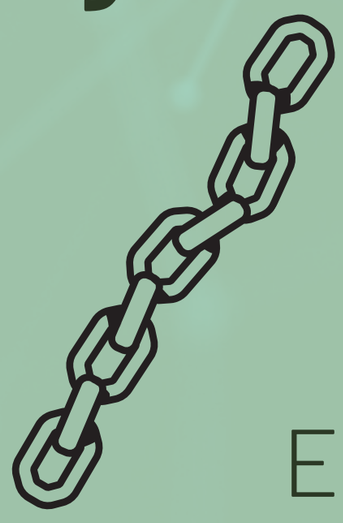


Why are they endangered?

Overfishing

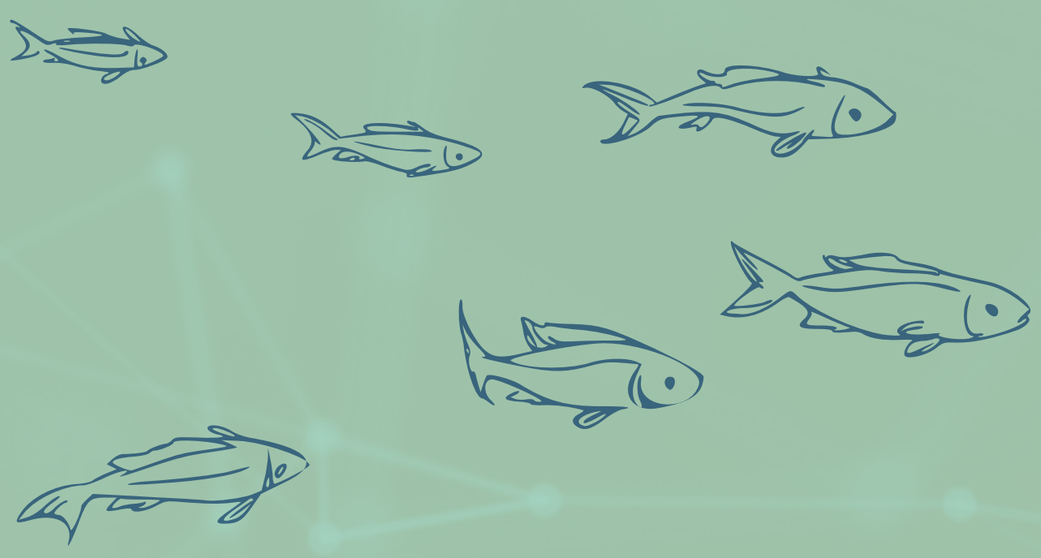


By-catch



Eutrophication

Sea warming



Why are they important?