

Teacher's Background Information

Program 4: Who Are the Predators of the Plankton?

During this program we will survey the predators of the plankton community. Predators include other zooplankton, vertically migrating fishes, and whales. We will also survey human impacts on the plankton community and discuss their impacts. Student activities include: Create Your Own Marine Food Web, Human Impacts on the Meadows of the Sea, and A Food Pyramid (Supplemental Activities are also provided to compliment program four).

What is a marine food web?

A marine food web is the passing of nutrients from one animal or plant to another, progressing from the simplest to the most complex organisms. The food web begins with the microscopic algae (phytoplankton), which billions of minute, floating animals (zooplankton) eat to build their bodies. Then the younger fish, plankton-feeding fishes (such as the menhaden and herrings), crustaceans (such as crabs, lobsters, and shrimp), and many other sea animals feed on the plankton. They, in turn, are eaten by larger carnivores such as tuna, halibut, shark, and squid. When these animals die, the nutrients are recycled by bacteria and returned to the ocean to be used by succeeding generations.

Some predators of the plankton:

- Phytoplankton are consumed by numerous filter feeding zooplankton
- Herbivores copepods prey on small and large phytoplankton cells. Smaller, more abundant cells are captured in a filter basket formed by the complex, feathery head appendages.
- Some zooplankton take daily or diurnal migrations to and from the food-rich photic zone to feed and to escape predators
- Non crustacean holoplankton are translucent or even transparent, making them appear invisible to predators as ambient light passes through them
- Large jellyfishes and ctenophores prey on zooplankton and small fish
- Planktonic mollusks, single celled protozoans, and salps (tunicates) have complex, highly efficient filter feeding adaptations
- Gelatinous herbivores rely on mucous nets or webs to capture food particles (diatoms)
- Appendicularians (larvaceans; tad pole shaped invertebrates) are enclosed within delicate, transparent mucous bubbles. Food enters at one end, is trapped by mucous filter, then eaten
- Chaetognaths are voracious predators of zooplankton and small fish; in large numbers they can devour entire schools of young fish
- Numerous marine fishes (planktivorous) consume both small and large zooplankton
- The largest predators of plankton are the baleen whales, who consume tons of krill

Some Human Impacts:

- oil spills
- toxic wastes such as pesticides or heavy metals
- eutrophication: nutrient run-off

What is a red tide?

A red tide, with its mass fish kill, occurs when either natural or human factors cause a rapid increase in the production of one-celled organisms (dinoflagellates), which ordinarily grow in waters rich in nitrogen and phosphorus. These destructive red tides, also known as paralytic shellfish poisoning, have occurred since biblical times but are becoming much more prevalent today. Sewage effluent and runoff from farms and lawns contain nitrogen and phosphorus, and when added to the ocean, the dinoflagellates gobble them up and reproduce or "bloom" profusely and spread across the water like a carpet, absorbing oxygen and shutting off

sunlight from plants. Then, when these organisms die and decay, they absorb more oxygen, literally suffocating marine life.

Further details about marine food webs can be found in the specific activities for this section.

From the food webs students construct determine 5 predators of phytoplankton and 5 predators of zooplankton. Are there predators of both the zooplankton and phytoplankton?