

Marine Food Webs

Objective

To appreciate the inter-dependence of life in the Moray Firth and highlight the importance of the marine environment to life on land.

Experiences and Outcomes

SCN 2-02a

I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area.

Background Information

Teachers may find it useful to refer to Marine Food Chains in the Moray Firth in First Level resources before exploring Marine Food Webs.

The shores around the North East of Scotland and the Moray Firth have a rich diversity of living things, some of which are permanent residents in our seas and coasts such as anemones, crabs and ballan wrasse and some species come and go with the seasons. Gannets gather on the rocky cliffs to breed in the summertime, mackerel and minke whales visit our seas when plankton is in abundance and curlews visit the shores in winter to eat the worms in the intertidal zone. The species may come and go from the Moray Firth environment but they are all tied together in an intricate web.

The sun is the primary source of energy in most food webs. Plants are able to produce their own food by using light energy from the sun and converting it into sugars in a process called photosynthesis.

Photosynthesis

The process of photosynthesis is a chemical reaction in plants whereby plants use light energy to convert carbon dioxide and water into sugars and oxygen.



Like trees on land, marine plants and plant plankton (phytoplankton) produce sugars from sunlight and this enables them to grow and reproduce. The plants and phytoplankton are called producers and are at the bottom of the marine food chain. The consumers include herbivores, carnivores and detritivores.

Having fixed the sun's energy into sugars in plant tissues, plants are then eaten by herbivores and the energy is transferred from one level in the food web to the next. Carnivores then consume the herbivores and the energy is then transferred to the next level.

When plants and animals die, their bodies fall to the sea floor or wash up on a beach. Dead organisms and animal waste are then consumed by detritivores and become part of the food web again.

The food web is a complex system and changes to the numbers of one species will impact on others further up the food chain. For example, overfishing of one species such as sand eels will impact on species of bird such as puffins that rely on sand eels to feed their young.

→ Marine Food Webs continued

An oil spill from a boat may create a barrier between the sun and the plant plankton living on the surface waters of the sea and so the population of plankton would decrease and this in turn would affect the herring and mackerel. A drop in the numbers of herring and mackerel will affect the numbers of gannets that feed on them.

Fossil Fuels

Dead plants and animals that fall to the sea floor in large numbers can also be buried under the sand and mud. Over millions of years the dead plants and animals are put under pressure and the process changes them into fossil fuels in the form of oil, and coal. The energy that was transferred within the food web is then trapped underground as fossil fuels. For hundreds of years, this trapped energy has been used by humans as forms of energy to heat homes, power vehicles and manufacture products that we use everyday.

Activity

Marine Food Web Activity Worksheet 1

Identify the producers, herbivores, carnivores and detritivores within the Moray Firth food web. Use crayons or coloured pens and draw on the food web

P = Producer
H = Herbivore
C = Carnivore
D = Detritivore

Provide the class with the following scenarios:-

Question:

A disease has spread through the gannet colony along the shore and has halved the number of gannets living near the sea. What happens to the number of sand eels?

Answer:

The lack of a major predator in the food web results in an increase in the population of the prey (sand eels) and so supplies food for the other predators such as puffins, which causes their numbers to increase.

Question:

A scallop dredger visits the area and damages the sea floor. Which animals are affected?

Answer:

The animals living on the sea floor will be affected, but also the carnivores that depend on those animals.

Question:

Perfect warm, sunny conditions have caused the plant plankton to grow in huge numbers (this is known as a bloom). How does this affect the food web?

Answer:

The increase in plant plankton increases the population of animal plankton which then provides food for the rest of the animals within the food chain.

Marine Food Web Activity Worksheet 2

Read the information about the animals and draw arrows to link the plants and animals in the food web. Cut out the images and glue them onto the food web.

Discussion Points and Follow-on Activities

Study the animals within the food chain and investigate how they are adapted to finding, catching and eating their food. Investigate the impact of overfishing on the marine ecosystem such as the herring and cod declines in the North East of Scotland. Investigate how fossil fuels are created and how we use fossil fuels in our everyday lives.