**The Antarctic Food Web Level 3 & 4**

**Making sense of the Living World**

**Main ideas;**

1. **Definition of a food chain.**
2. **The arrow in a food chain or food web points in the direction of the energy flow or means “is eaten by”**
3. **Producers start a food chain as they are able to make their own food using sunlight for energy and CO₂ and water**
4. **Any organism is able to be classified according to how it gets its energy**
5. **A food web will be affected by any increase or decrease of a species population**
6. **Climate change and ocean acidification may be affecting some species and therefore the Antarctic food web, and the distribution of some species, will be affected.**

**Key words**

**Food chain, food web, producer, herbivore, carnivore, omnivore, consumer, decomposer, predator. Krill, phytoplankton, zooplankton, baleen whale, toothed whale**

**The Antarctic Food Web**

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| https://farm6.staticflickr.com/5133/5536987424_e684c38e92_o_d.gif | **Food chains** make up the more complex food webs that describe the feeding patterns of any ecosystem. A food chain must start with a **producer** because these organisms are the group that makes their own food. A producer uses photosynthesis to convert the sun’s energy into food. A producer is usually a green plant, anything from microscopic algae, (as in phytoplankton), to a tree. The raw materials are sunlight for energy, with carbon dioxide and water providing the raw materials for growth. Producers drive all food chains and food webs. The next animal in the chain are **herbivores** that eats the producer. **Carnivores** are next in the chain. These are animals that eat herbivores. **Omnivores** eat herbivores and producers. The “top carnivore” or “top predator” is the last animal in the food chain. This animal eats others but is not eaten by any other organism. The arrow in a food chain always points in the direction of the flow of energy and can be translated as “is eaten by”. At each step only 10% or less energy is passed along the chain.  **Decomposers** This group of animals break down dead plants and animals as a food source releasing nutrients back into the food chain. Bacteria are an example of decomposers in the Antarctic marine system. In the Antarctic the food chain is very efficient as there are not very many organisms in each chain.  **Example of an Antarctic food chain**  **Phytoplankton Krill Whale**  **Producer Herbivore Carnivore**  **Plankton** are the basis of the Antarctic food chain. They are marine and freshwater organisms that, because they are non-motile or too small or weak to swim against the current, exist in a drifting state in the water they live in. The plantlike community of plankton is called **phytoplankton**, and the animal-like community is known as **zooplankton.**  **Phytoplankton** are tiny plants that capture the energy of the sun and turn it into food, these are the producers of the Antarctic food web. As they are so tiny, they can divide and grow very quickly when the more intense and longer lasting light of summer arrives.  **Krill**  http://www.theozonehole.com/images/krill_mareco.jpgKrill are small crustaceans that are found in all the world’s oceans. It is a herbivore that feeds on phytoplankton and zooplankton. It uses a “basket” made from its front legs to filter out the plankton from the water. The name krill comes from the Norwegian word krill meaning “small fry of fish”. Krill are considered an important part of the Antarctic food web. They are near the bottom of the food chain because they feed on phytoplankton converting these plants into a form suitable for many larger animals for whom krill makes up a large part of their diet. In the Southern Ocean the Antarctic krill make up an estimated biomass of around 379,000,000 tons, more than that of humans. Of this, more than half is eaten by whales, seals, penguins, squid and fish each year.  **Whales**  Whales are the largest animals to have ever lived, larger even than the dinosaurs. There are two reasons why they have managed to attain such enormous size; well over 100 tons for the largest blue whales and nearing this amount for some other whale species.   1. **Whales live in the ocean** and so the buoyancy of the water can support their great bulk rather than having to be propped up and moved on land by legs and muscles. Like most other animals, the density of a whale is very close to that of water. 2. **Whales tap the food chain low down** close to the producers so there are few steps and so little energy is lost meaning more is available to the whales, so they are able to grow to enormous sizes.   The alternative consequence of this is that the higher up a food chain you get, the lower the biomass of animals (that is the number of animals multiplied by their weight) because there are more steps and so more energy is lost.  A simple Antarctic food chain is the secret to the success of the baleen whales – keep the chain short and transfer as much energy as possible as efficiently as possible.  http://www.learnz.org.nz/sites/learnz.org.nz/files/oa124-food-chain.jpg  **Food web**  A food web shows the complex interactions of the plants and animals in an ecosystem or habitat, showing what is eaten by what. This is a more accurate picture of the ecosystem than the food chain.  **Antarctic food web**  The Antarctic food web is relatively simple compared to ecosystems in other parts of the world. There are fewer different species, but greater numbers of them. For example, the second most numerous mammal in the world, (after man), is the crab-eater seal.  A key part of the Antarctic food web are krill, small shrimp-like crustaceans that the great majority of Antarctic animals, seals, whales, penguins and other birds and fish feed on.  https://s-media-cache-ak0.pinimg.com/originals/c9/88/be/c988be3461637fb1de4ebe915a7fa943.jpg |
| http://www.thebestcareerforme.com/wp-content/uploads/Orange-Question-Mark.png | **Questions / think, pair, share / discuss**   1. Why must a producer start a food chain? 2. What will happen to the food web if one plant or animal becomes more or less abundant? 3. How has the Antarctic food web been affected in the past? ( Whaling and sealing ) Which organisms would have become more abundant? What else do you think might have happened? 4. Are any animals in the food web threatened now? Will this have any effect on any other organisms? |
| consent-clipart-pen_and_paper_legal_document_with_pen_signing_the_paper_0515-0909-2116-0233_SMU.jpg (300×257) | **Activities**   1. Draw a New Zealand food chain labelling the producer, herbivore and carnivore. 2. Draw as many Antarctic food chains as you can from the food web illustration. 3. Make a food chain bookmark. 4. Using cut out illustrations of the organisms in the Antarctic food web, reconstruct the feeding patterns. 5. Study of one animal in the Antarctic food web. What does it feed on? What feeds on it? 6. Whale study. Investigate the difference between baleen and toothed whales. 7. Seal study. Investigate the difference between crab-eater seals and leopard seals. |
| https://pixabay.com/static/uploads/photo/2014/04/02/16/20/chemistry-306977_960_720.png | **Practical work**  **An Antarctic food chain dish**  **Ingredients**  White rice  Green food colouring  Red food colouring  Whole shell on prawns  Small squid  **Method**  Cook the rice by the absorption method. Half a cup of rice for three times volume (one and a half cups) of water.  Add green food colouring at the start of cooking. Wash the starch off once its cooked.  Cook about a third as much of this rice and add red food colouring  Cook the squid and prawns by frying in a little oil. Remove and pat dry, removing excess oil with a paper towel.  **Assemble**  On a suitable plate; blue or aluminium foil  Green rice are phytoplankton, spread around  Sprinkle the red rice, zooplankton, on top  Prawns are krill on top of the rice  Squid is squid  You could add white rice and sweet chili sauce  The top predator is you |