Sea Change Teaching Module: Seafood & Human Health

Contents

1. Background Information

The Ocean makes planet Earth a habitable place to live and the marine environment is a source of vital human health benefits. Some of the invaluable benefits and services the Ocean provides include:

Food: Seafood is a major food staple and protein source.
Transportation: 90% of all EU external trade is transported by sea and European ship owners control almost 40% of the world fleet.
Recreation: The benefits that can be derived from spending time around the Ocean are intangible. Marine tourism is the second most valuable world marine industry after shipping and transport.
Medicine: Biomedical products derived from marine plants and animals provide important medicinal products and health benefits.
Climate Regulation: The Ocean plays a key role in climate regulation - especially in buffering the effects of increasing levels of greenhouse gases, such as carbon dioxide, in the atmosphere and by moderating rising global temperatures.
Economy: Ocean-related industries provide revenue through fishing, seafood distribution, tourism, recreation and transportation. According to the EU Blue Growth programme, the 'blue' economy in Europe represents 5.4 million jobs and generates a gross added value of almost €500 billion a year, with further growth possible.

The Ocean is vitally important to Europe. The 28 Member States have between them the largest maritime territory in the world (approximately 3.9 million km^2) and all of us depend on the Ocean and its resources. Despite the importance of Europe's sea areas, their sustainable development and protection faces threats from natural and human pressures. By better understanding the relationships between ourselves and the Ocean, we will be better able to protect these precious resources.

1a. Ocean Literacy

Ocean literacy is an understanding of the Ocean's influence on you—and your influence on the Ocean. An ocean-literate person:

- understands the Essential Principles and Fundamental Concepts about the Ocean;
- can communicate about the Ocean in a meaningful way; and
- is able to make informed and responsible decisions regarding the Ocean and its resources

The Seven Principles of Ocean Literacy

1. The Earth has one big ocean with many features.
2. The Ocean and life in the ocean shape the features of Earth.
3. The Ocean is a major influence on weather and climate.
4. The Ocean made Earth habitable.
5. The Ocean supports a great diversity of life and ecosystems.
6. The Ocean and humans are inextricably interconnected.
7. The Ocean is largely unexplored

1b. Oceans & Human Health

Humans have altered - and will continue to alter - their environment, while remaining dependent upon marine ecosystems as resources of food, water and materials. Human populations are both moving to, and growing in coastal areas globally. Consequently, there is an increased reliance on, and use of, these coastal resources, ranging from fishing and aquaculture activities to desalination for drinking water and recreational use of beaches and coastal areas. Increasing our knowledge of the connections between human health and the ocean has many public health applications, ultimately allowing us to:

- improve our understanding of the potential public health benefits from marine and coastal ecosystems;
- reduce the burden of human disease linked with marine environmental causes; and
- anticipate new threats to public health before they become serious.

What do we mean by 'Oceans & Human Health'?

There is increasing recognition that the health of the Ocean is inextricably linked to human health and wellbeing. In other words, the marine environment impacts human health in a number of ways. These impacts are a complex mixture of negative influences (e.g. from extreme weather events such as cyclones to water-borne illnesses and pollution) and beneficial factors (e.g. from natural products including seafood to marine renewable energy and wellbeing from interactions with coastal environments). Humans also impact the Ocean in a number of ways. Through our activities, including pollution and overfishing, as well as global climate change, we are directly and indirectly affecting the health of the Ocean. This in turn has significant implications for human health, particularly if future potential medicines from the seas, as well as important sources of protein in seafood, are lost due to contamination as a result of human activity and the effects of climate change. Considering these factors together, the study of human health and the Ocean is the study of all the ways in which the Ocean influences our health and wellbeing, and in turn, how we influence the health of the Ocean.

2. Seafood and human health

Background Information

From ancient times, fisheries and aquaculture (the farming of fish, shellfish and aquatic plants) have been an important source of food. These activities also provide economic benefits to millions of people engaged in harvesting, culturing, processing and trading along the world's seashores and waterways. Today, we are facing the challenge of growing demand for seafood together with declining catches from the world's marine fisheries. Therefore, well-managed fisheries are essential to continue providing food into the future. We can help to protect the Ocean as a provider of food and health by supporting sustainable fishing practices when we buy seafood.

Ocean Food:

- ✓ Fish contributes approximately 17% to the world's animal protein intake. In some small developing island states populations rely on fish for up to 40% or more of their protein intake.
- ✓ Worldwide demand for seafood in 2010-2012 was 19kg per person. Currently, average seafood consumption in the EU is 23kg per person per year.
- ✓ Other types of seafood also serve as important sources of protein and micronutrients. For example, various types of seaweed contain protein, dietary fibre, vitamins, minerals and amino acids.
- ✓ Mussels, rainbow trout and Atlantic salmon are the top 3 species farmed in the EU by volume, followed by oysters, sea bream, common carp, clams and sea bass.
- ✓ Aquaculture accounts for about 20% of Europe's fish production.
- ✓ Well-managed fisheries are very important to future food security.
- ✓ The world's marine fisheries catches are declining and fishing is threatening a number of fish stocks. Recent assessments indicate that approximately 29% of fish stocks are overfished while 61% are sustainably (fully) exploited.
- ✓ Adoption of better management practices will contribute to sustainable fishing

Source: Sea Change Factsheet "Human Health & the Ocean":
http://www.seachangeproject.eu/images/SEACHANGE/Media_Centre/HumanHealthOcean_Factsheet_set.pdf

Your role as responsible citizens: support sustainable fisheries

You can help to protect the Ocean, the source of your future seafood, as well as the fishermen and communities that rely on it for their food and livelihoods, by only buying seafood from sustainable sources. Some tips below can help you identify what those sustainable sources are:

Get to know your seafood: Ask your fishmonger about sustainable choices or alternatively, look up a sustainable seafood guide for your country.

Become familiar with EU seafood labelling: Fishery products sold in the EU must contain information such as the type of fishing gear used and where the product was caught. This enables you to make informed choices.

Try something new: High demand for a small number of popular seafood such as cod, mackerel and herring, can lead to overfishing of these species. Choosing lesser-known, more plentiful fish eases pressure on more vulnerable species. Your fishmonger can always advise you on how to prepare them.

Seafood & Human Health – The Good & the Bad

- As well as being an important source of protein, vitamins and minerals, seafood has the highest concentrations of omega-3 fatty acids of any foods. Omega-3 fatty acids improve heart health, benefit brain health and development and protect against the development of certain cancers.

- Increased fish intake is also associated with positive health outcomes such as reduced depression symptoms in adults and fewer asthmatic and respiratory allergies in children.
- Environmental factors, such as pollution and poor ecosystem health threaten seafood quality and safety. For example, the contamination of filter-feeding bivalve shellfish such as mussels, clams and oysters with norovirus (a common cause of viral gastroenteritis in humans) from human sewage is an important human health risk.
- Long-term exposure to pollutants that accumulate in seafood may also pose risks to human health. For example, methylmercury is a neurotoxin that can accumulate to high concentrations in predatory fish, such as tunas and swordfish, which are at the top of the food chain. Today, levels of such pollutants in fish are carefully monitored.

3. Teacher's Notes

From ancient times, fisheries have been an important source of food. Today, we are facing the challenge of growing demand for seafood together with declining catches from the world's marine fisheries. Complex marine food webs can be put at risk if commercially important species on which other species rely as a food source are removed by commercial fishing. Well balanced marine food webs can be kept healthy through well-managed, sustainable fisheries, which is vital to ensure the ocean will continue providing food and other services into the future. We can help to protect the ocean as a provider of food and health by supporting sustainable fishing practices.

The activities proposed in this pack focus on:

1. Marine food webs;
2. Sustainable fisheries.

The aim is to help students understand the links between seafood and ocean and human health. The activities can be adapted to teaching pupils aged 6-14, and cover Ocean Literacy Essential Principles 5, the ocean supports great diversity of life and ecosystems, and 6, the ocean and humans are inextricably connected.

Keywords: ocean literacy, food chains, food webs, photosynthesis, fishing, sustainable fisheries, biodiversity

Learning Outcomes

- Recognise that the Ocean is important to humankind and a source of vital health benefits
- Explain that the Ocean provides many services, including food
- Recognise that humans have altered the marine environment, sometimes harmfully
- Identify and use key vocabulary associated with food chains
- Understand that the Sun is the primary source of energy for the food chain. Light from the Sun is converted to plant tissue by seaweeds and microscopic 'phytoplankton' which are then consumed by herbivorous marine animals. These animals are eaten by other carnivorous animals (including human beings).

- Understand that each organism may eat and be eaten by many others, so food webs become very complex and interconnected
- Explain how organisms are linked together in a food web, including interdependence and knock-on effects
- Identify some common types of seafood on sale in shops and how to find out if it has been caught sustainably
- Define by-catch and describe the magnitude of global fisheries by-catch
- Identify and describe how some fishing practices can damage ocean habitats
- Identify what needs to be taken into consideration to create sustainable fishing practices

If possible, the activity “Look! Fresh fish!” would be good way to kick start this topic. If time and resources are available, take the students to a local market to talk with the fishmongers. Analyse the different species available at the stall and discuss why they are different. This way students start becoming familiar with marine biodiversity and important species for human consumption.

4. Resources & Activities

Activity 1: Marine Food Webs[1]

Aim: To introduce students to key concepts in understanding marine food webs, interconnectedness between different trophic levels, human consumption of seafood and overfishing.

Lesson Plan:

Start the activity by asking the students what does every living thing need to grow? Write the terms 'Producer' and 'Consumer' on the board and ask if the children know what they mean. Can you give examples of a producer and consumer? Repeat this with the terms 'Herbivore', 'Carnivore' and 'Omnivore'. Can you think of examples of animals in each of these groups? Now introduce the term 'food chain' and point out that all food chains begin by harnessing energy from the Sun. Explain that plants grow by combining energy from the sun (light) with water and nutrients through a process called photosynthesis (producers), and that animals get their energy from eating food (consumers), either by consuming the plants directly (primary consumers/ herbivores) or by eating other animals (secondary consumers/ carnivores/ omnivores/ predators). In the Ocean, 'producers' are primarily seaweeds and microscopic floating plants called 'phytoplankton'.

As a class, think of some simple marine and terrestrial food chains, write these on the board to see how energy is transferred up the food chain (represented by arrows). Next, discuss how most animals rely on different food sources, leading to many different predator-prey interactions. Explain that if organisms relied on just one food source then they would be vulnerable to hunger or starvation if that source became scarce. Ask the children for ideas to construct a very simple food web. Explain that the Ocean is home to many different creatures, many of which are connected by their feeding relationships through complex food webs. An exception is the sea slug *Onchidoris bilamellata*, which only eats acorn barnacles. An example of a simple marine food chain would be: Phytoplankton – zooplankton – common mussel – common starfish.

Figures 1 and 2 provide examples of simple and complex marine food webs, respectively which may be used to display in the classroom or distribute to the students. The simple marine food web (Figure 1) is intended to reflect the interconnectedness nature of food webs and the role of humans, whereas the complex marine food web (Figure 2) begins to demonstrate the sheer complexity of natural trophic relationships.

[1] This is an adapted version of the activity developed by the Marine Biological Association (MBA) as part of the project Life *Around the Turbines* funded by COWRIE (Collaborative Offshore Wind Research Into the Environment).

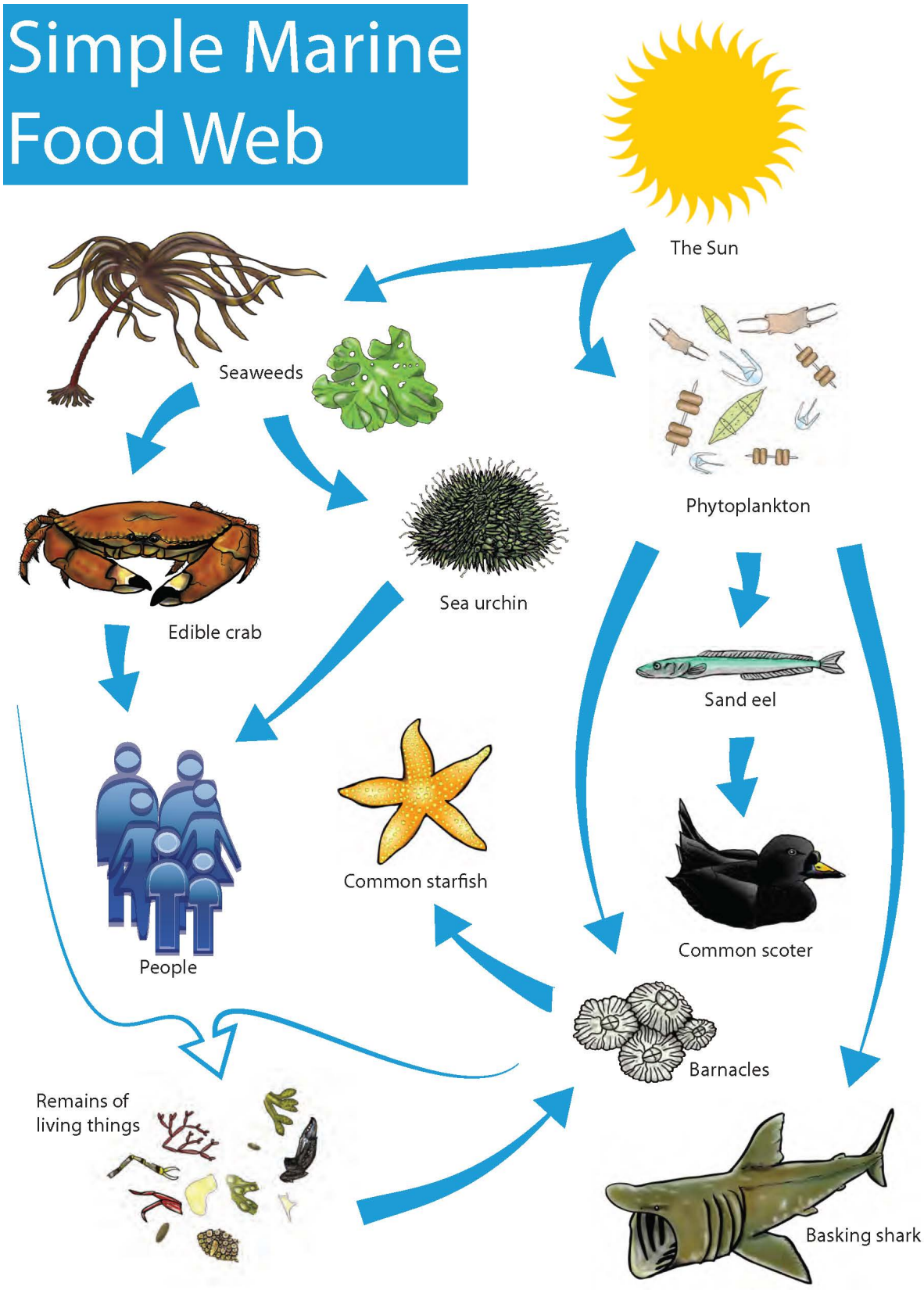

Figure 1: Example of a simple marine food web

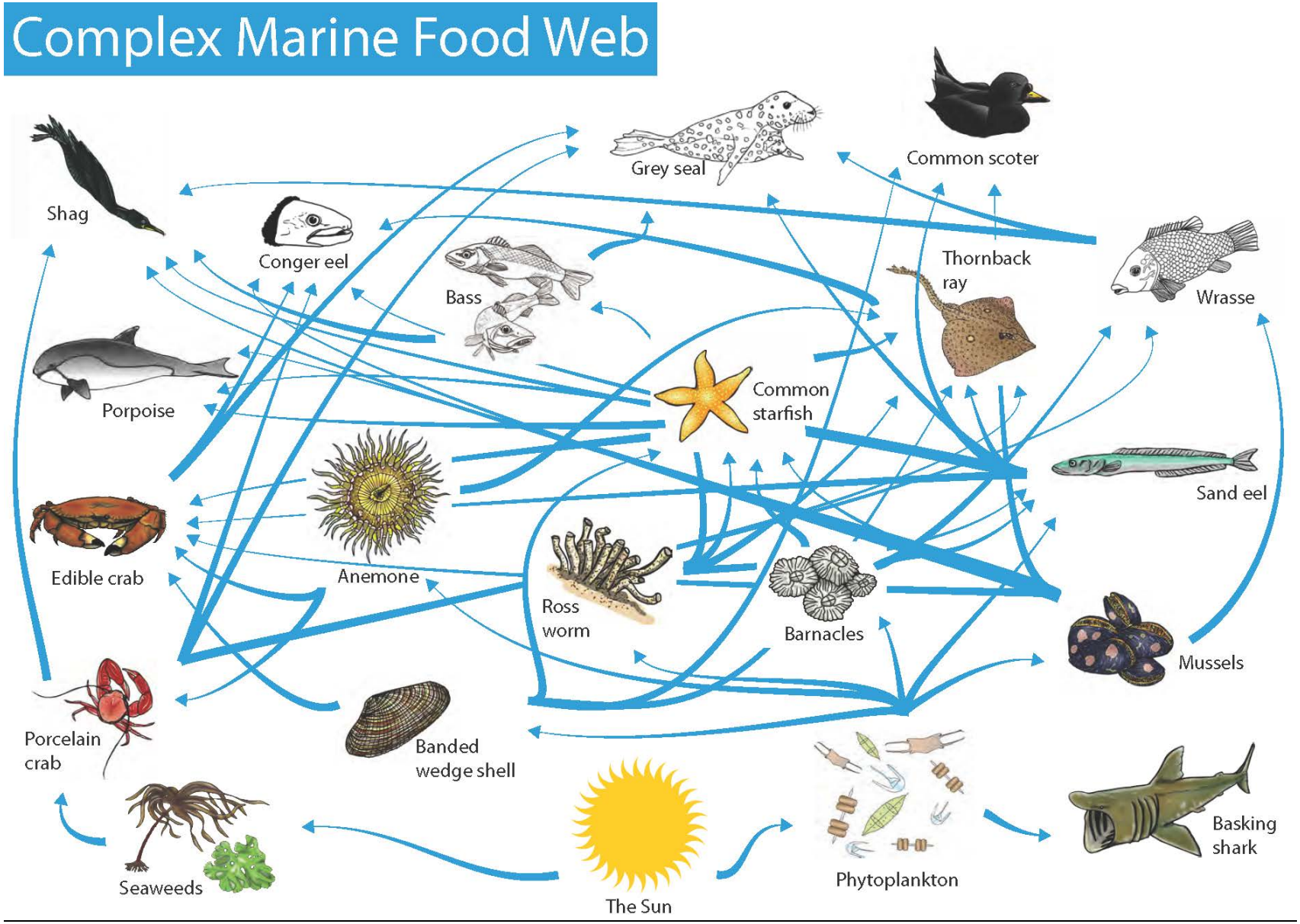

Figure 2: Example of a complex marine food web

Materials:

- Food chain species printable cards (provided in Annex 1)
- Scissors
- Wool or string
- Additional resources (including *PowerPoint presentation* that can be adapted to suit your teaching style and time available, and *printable worksheets*, visit https://www.mba.ac.uk/learningzone/educators/classroom/foodwebs/)

Protocol:

1. Print and cut out the species cards with facts about what this species eats and is eaten by
2. Give each child a species card and play Food Web Game 1, and then Food Web Game 2
3. *Food Web Game 1:* Each child pretends to be the species named on their card. They must then find something that they can eat before they are eaten! Whilst searching for prey, children should be encouraged to hold their species card out, so that the other children can clearly see what they are. When prey and predator meet, they must link arms/hold hands and not let go, but can still find more food! This should result in a tangle of children!
4. Now, with the children untangled, ask the children to retain their species card and move on to Food Web Game 2.
5. *Food Web Game 2:* One child has the Sun card and stands in the middle of the room with a supply of rope, wool or string. The other children also have one species card each and are spread out around the room. To begin, the 'Sun' holds on to the end of the string and passes the ball of wool/string on to any producer (seaweed, phytoplankton). The wool is then passed onto anything which eats those producers (herbivores) and then onto anything which eats these herbivores (carnivores/ secondary consumers). Eventually, all of the children should become connected in a complex food web. Once they are connected begin asking certain species to tug their string and ask anyone who feels the tug to sit down or nod their head. Explain that this shows how anything which affects one species in the Ocean can have a knock-on effect on many other species. Explain also that although this food web seems complicated, it is in fact extremely simple when compared to food webs in real life, which may contain hundreds of different species. Explain how many marine species are opportunistic and will scavenge whatever food they find. Introduce the concept of 'biodiversity' – in that many different species are needed to create the complex food webs found in nature. If species are fished to extinction or destroyed by pollution, entire food webs could collapse. This could have profound consequences for species at the top of the food web – including human beings!

Marine Food Webs – Activity Log Sheet

- How does energy travel through the food web?

- What happens when creatures in the food web don't have several different prey species?

- What happens if you lose one species in a food web?

- Where are humans placed in the food web?

Activity 2 – Let's go Fishing![2]

Aim: This activity aims to understand the consequences of unlimited fishing practices on natural populations targeted for human consumption. It demonstrates the importance of sustainable management and conservation practices to protect fish populations (including considerations about the growth, development and reproduction of species).

Lesson Plan:

- Start the activity by explaining how over the years human fish consumption has led to overfishing of many fish stocks to near extinction.
- Explain how these circumstances highlighted the need to adopt sustainable fishing practices that will secure the preservation of biodiversity and fish populations for future consumption.
- Set up the protocol below and continue to discuss with the students what is meant by sustainable fishing practices.
- Together reach the conclusion that such practices allow the inclusion of a variety of fish species in human diets without threatening the health of fish stocks.
- Explain that fisheries legislation and regulation allow maintaining healthy fish populations while minimising the potential impact of overfishing on ecosystems.
- Ask the students what happens when too many fish are removed from the ecosystem by overfishing and if they can give any examples. Students may base their answers on what they learnt from activity 1, and other examples of potential impacts include habitat degradation and by-catch.
- Explain that these policy measures oversee all aspects of the industry from fisheries to consumers, meaning that everybody has a role to play, for example by choosing to buy sustainable seafood in a restaurant or supermarket.
- Explain that this is a continuous process with international organisations working together to set annual fishing quotas that are regulated both at sea and on land.

Materials:

- Two plastic bowls filled with polystyrene balls or another appropriate media resembling the ocean (these should be fit for contact with food items)
- Seafood-shaped jelly sweets (big and small of different colours) representing the populations of aquatic organisms targeted for human consumption (fish, octopus, shellfish) and their life-cycle stages (juveniles, adults, reproductive season, etc)
- A small aquarium fish net

Protocol:

1. Label both bowls (e.g. Aquarium 1 and Aquarium 2)

[2] This activity was developed by CIIMAR (Interdisciplinary Centre for Marine and Environmental Research) and is part of CIIMAR *na Escola*, the institution's educational programme.

2. Prepare two identical portions of jelly sweets. Each portion should include an equal number of small and big sweets of the same colour (of our choice) to represent juvenile and adult seafood specimens, respectively
3. Count and make a note of the number of sweets in each portion
4. Add a portion of sweets to each of the previously labelled aquaria
5. Ask the students to go fishing in Aquarium 1, using the net. Set no restrictions and allow the students to eat the sweets caught
6. Make a note of the number and types of sweets caught from Aquarium 1
7. Discuss with the students the effects of fishing with no restrictions including reflection on what seafood will be available to eat the next day, on the sustainability of fish populations and biodiversity. Ask students to suggest possible measures that could be implemented to avoid these effects and discuss their suggestions
8. Make a note of the restrictions decided by the group to be implemented when fishing in Aquarium 2 (e.g. size quotas, reproduction season, size of fish caught and fishing net to be used, etc)
9. Let the student go fishing in Aquarium 2 following the restrictions agreed by the group. Remind them to return to the bowl any fish caught that do not meet the restrictions agreed
10. Make a note of the number and types of sweets caught in Aquarium 2

Suggestion: Fishing should be more difficult in Aquarium 2. Discuss with the students the need to employ different nets and techniques that are more suitable for different species (pelagic vs benthic species) and size quotas in place.

Note: Unregulated fishing can easily lead to extinction of populations, which in turn results in loss of biodiversity and consequently less fish and other seafood is available for human consumption. The main regulations to be implemented should consider:

1) The need to preserve juveniles (smaller sweets) by implementing a minimum size guide for fish caught (age/length correlation);

2) The life cycle, i.e. fishing should not occur during the breeding season. The bigger sweets of the colour established in point 2 represent fish in their breeding season;

3) Adequately large size of the mesh of fishing nets (increasing the mesh size of fishing will allow smaller fish to escape and grow to full commercial size).

Let's go fishing – Experiment Log

1. Indicate the hypothesis to be tested in this experiment.

2. For each species and life cycle stages (juveniles, adults, reproductive adults), indicate how many fish (sweets) were caught from Aquarium 1 and 2.

3. Build a percentage graph for the classes and values registered. Include labels for each axis and the graph itself.

4. What happened in the aquarium where unconditional fishing was allowed?

5. What can you conclude about the need (or not) to implement fishing restrictions?

6. What stages in the life cycle should be preserved in order to sustainably manage fisheries?

7. What measures were agreed to be implemented when fishing in Aquarium 2?

8. What are the ecosystem problems or effects caused by trawl fishing (where heavy nets are dragged across the bottom of the ocean to catch fish)?

5. Additional Information and Further Reading

a)https://coast.noaa.gov/data/SEAMedia/Lessons/G5U5L3%20Seafood%20and%20Human%20Health.pdf
b) http://www.nmfs.noaa.gov/stories/2012/10/docs/dish_on_your_fish.pdf
c) http://www.seachoice.org/wp-content/uploads/2011/09/SeaChoiceKit_DL_01062011.pdf

European Commission (2014) A pocket guide to the EU's new fish and aquaculture consumer labels. Available at: http://ec.europa.eu/fisheries/documentation/publications/eu-new-fish-and-aquaculture-consumerlabels-pocket-guide_en.pdf

European Commission (2015) Aquaculture. Available at: http://ec.europa.eu/fisheries/cfp/aquaculture/index_en.htm

European Commission (2016) Farmed in the EU. Available at: https://ec.europa.eu/fisheries/inseparable/sites/inseparable/files/AQC_EN.pdf

European Commission, (2015) The Common Fisheries Policy (CFP). Available at: http://ec.europa.eu/fisheries/cfp/index_en.htmhttp://ec.europa.eu/fisheries/cfp/index_en.htm

European Food Safety Authority (2015) Statement on the benefits of fish/seafood consumption compared to the risks of methylmercury in fish/seafood. EFSA Journal;13(1):3982. Available at: http://www.efsa.europa.eu/sites/default/files/scientific_output/files/main_documents/3982.pdf

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Gribble, M.O., Karimi, R., Feingold, B.J., Nyland, J.F., O'Hara, T., Gladyshev, M.I. and Chen, C.Y. (2016) Mercury, selenium and fish oils in marine food webs and implications for human health. Journal of the Marine Biological Association of the United Kingdom 96(1), 43-59

Jennings, S. et al., (2016) Aquatic food security: insights into challenges and solutions from an analysis of interactions between fisheries, aquaculture, food safety, human health, fish and human welfare, economy and environment. Fish and Fisheries. doi: 10.1111/faf.12152

Larsen, R., Eilertsen, K-E., Elvevoll, E.O. (2011) Health benefits of marine foods and ingredients. Biotechnology Advances 29, 508-518

Lloret J. (2010) Human health benefits supplied by Mediterranean marine biodiversity. Marine Pollution Bulletin 60, 1640–1646.

Lloret, J., Rätz, H.J., Lleonart, J. and Demestre, M. (2016) Challenging the links between seafood and human health in the context of global change. Journal of the Marine Biological Association of the United Kingdom 96(1), 29-42

Tacon, A.G.J. and Metian M. (2013) Fish matters: importance of aquatic foods in human nutrition and global food supply. Reviews in Fisheries Science 21, 22–38.

United Nations (2014) Report on the role of seafood in global food security. Open-ended informal consultative process on oceans and the law of the sea. Available at: http://www.un.org/depts/los/consultative_process/documents/adv_uned_mat.pdfhttp://www.un.org/depts/los/consultative_process/documents/adv_uned_mat.pdf

Further Reading

What is Sea Change?

The *Sea Change* project aims to establish a fundamental "Sea Change" in the way European citizens view their relationship with the sea, by empowering them, as Ocean Literate citizens, to take direct and sustainable action towards a healthy ocean, healthy communities and ultimately a healthy planet.

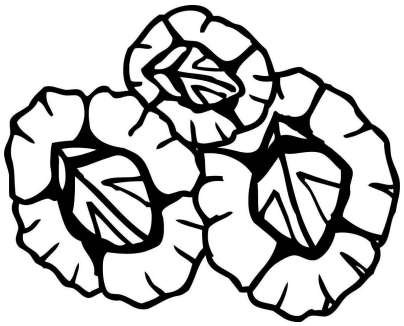
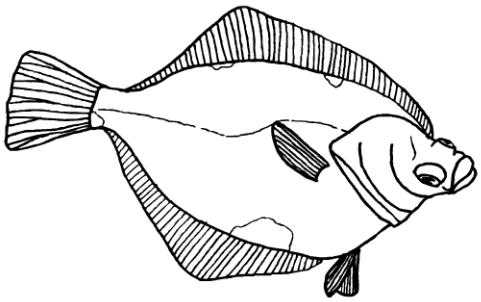
Sea Change will create a deeper understanding of how the health of European citizens depends on the health of our ocean, and how the health of our ocean depends on the actions of our citizens.

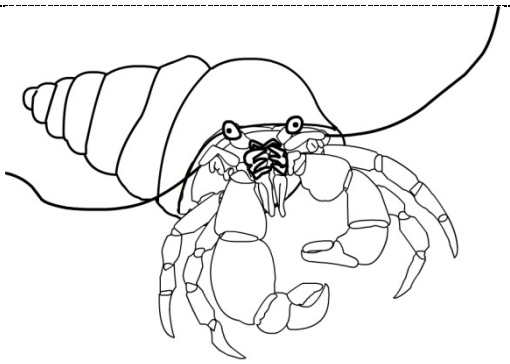
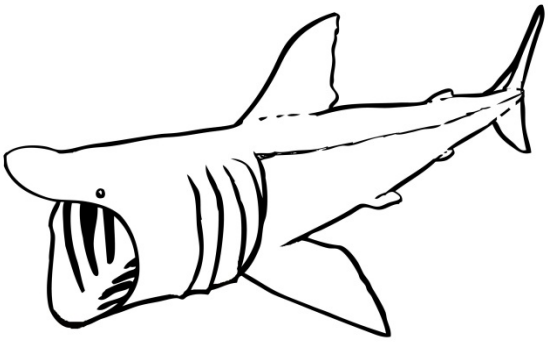
For more information on the project, and ways in which you can get involved, please visit http://www.seachangeproject.eu/http://www.seachangeproject.eu/.

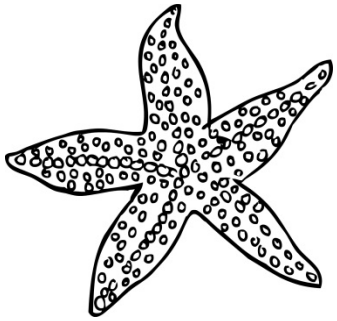
Ocean Literacy for Empowered Citizens

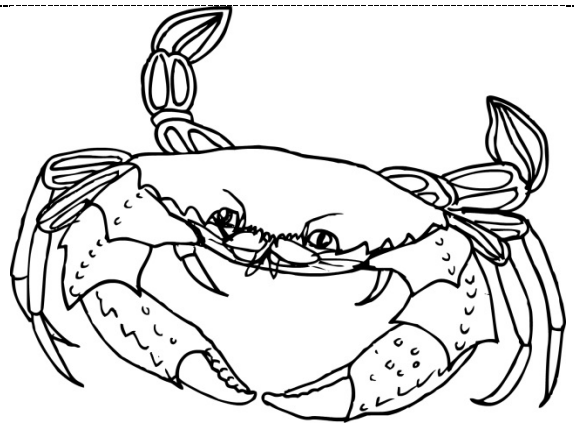
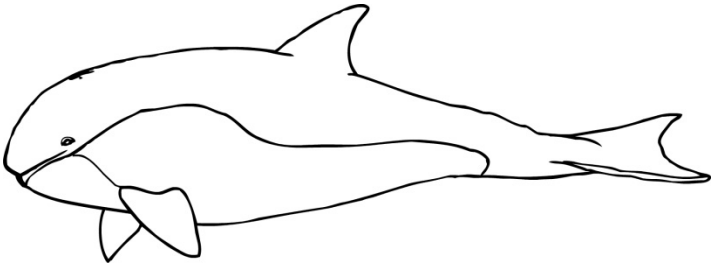
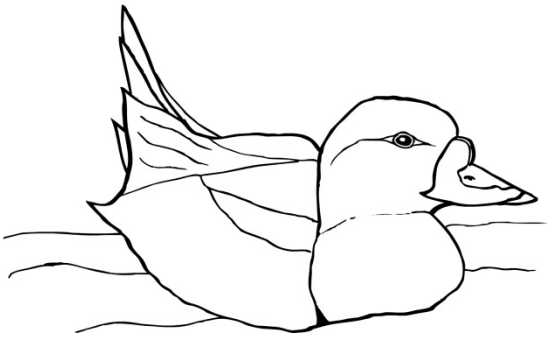
Most European citizens are not aware of the full extent of the medical, economic, social, political and environmental importance of the Ocean to Europe and indeed to the rest of the world. Many of us are not aware of how our day-to-day actions can have a cumulative effect on the health of the Ocean – a necessary resource that must be protected for all life on the planet Earth to exist. In other words, European citizens lack a sense of "Ocean Literacy" - an understanding of the ocean's influence on us and our influence on the Ocean. AN OCEAN-LITERATE PERSON: - Understands the importance of the ocean to humankind - Can communicate about the ocean in a meaningful way - Is able to make informed and responsible decisions regarding the ocean and its resources.

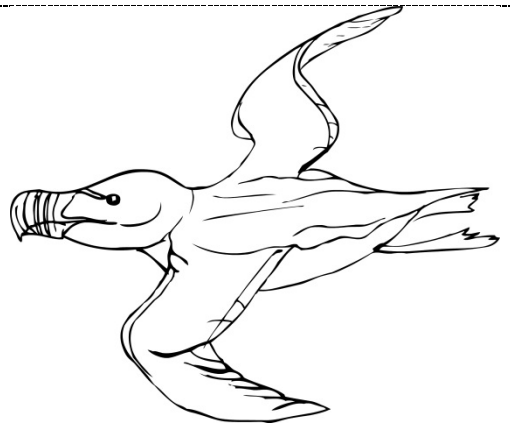
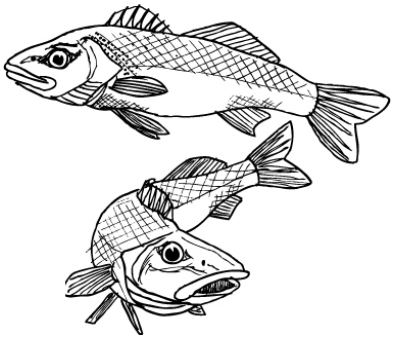
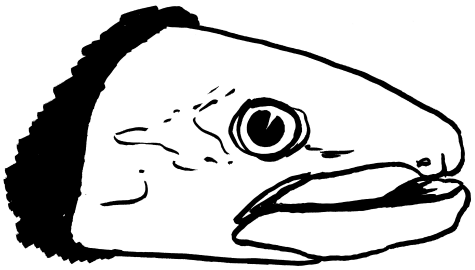
6. Annex 1 – Marine Food Webs Printable cards

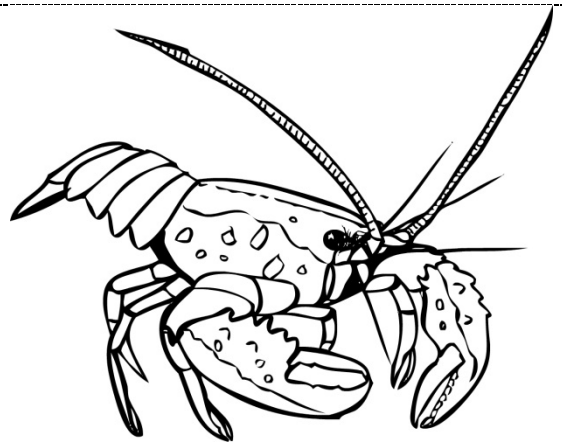
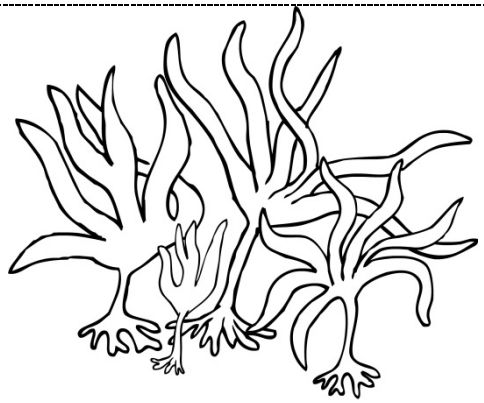
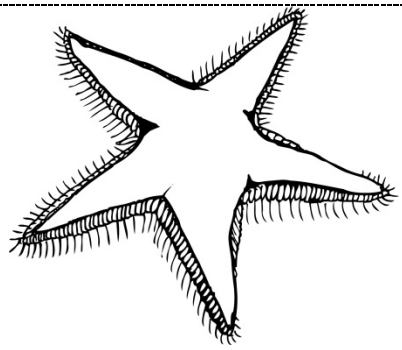
 **Barnacle**	Barnacles attach to hard surfaces and use their legs to catch tiny particles of food, including plankton from the water around them
 **Edible crab**	Edible crabs use their powerful claws to crush the shells of their prey. They eat a variety of small animals, like mussels and other small crabs, and seaweed.
 **Plaice**	Plaice lie hidden on the seabed read to ambush small animals such as shrimps ar smaller fish like sand eels. They also eat worms and bivalves like clams.

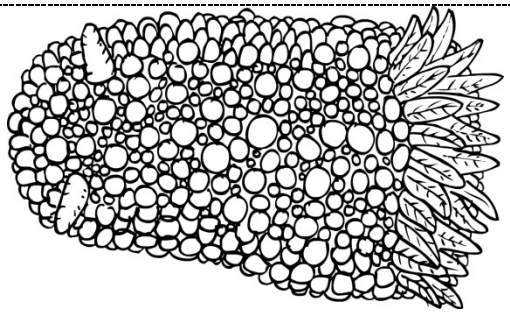
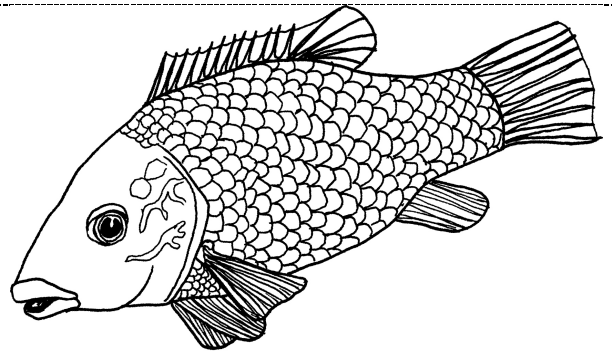
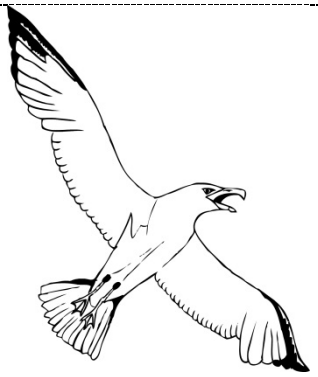
 **Hermit crab**	Hermit crabs are scavengers and eat dead plants and animals on the seabed. They eve use the shells of dead snails to protect thei own soft bodies.
 **Basking shark**	The basking shark swims through the wate with its mouth wide open, sieving plankto to eat.
 **Green seaweed**	Green seaweed uses energy from the sun and lives attached to hard surfaces.

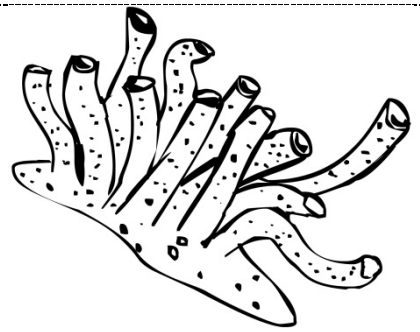
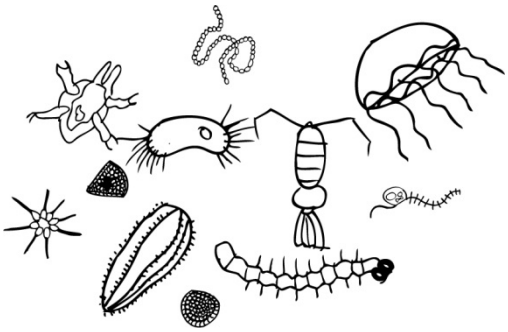
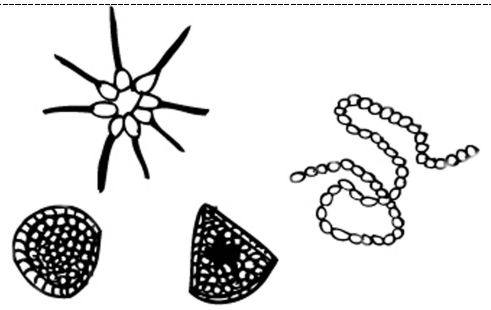
 **Common starfish**	Starfish eat animals such as mussels by prizing open their shells with their strong arms.
 **Common mussel**	Mussels use strong threads to attach themselves to hard surfaces and filter food from the water around them, including plankton.
 **Sand eel**	Sand eels hunt for small animals including zooplankton.

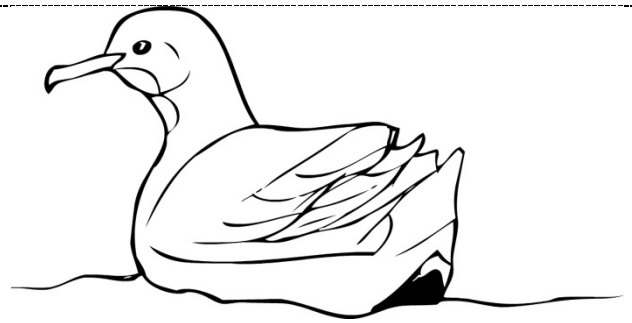
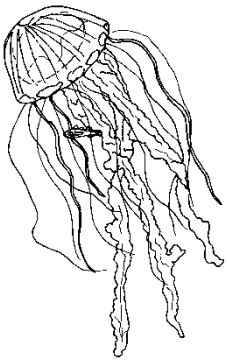
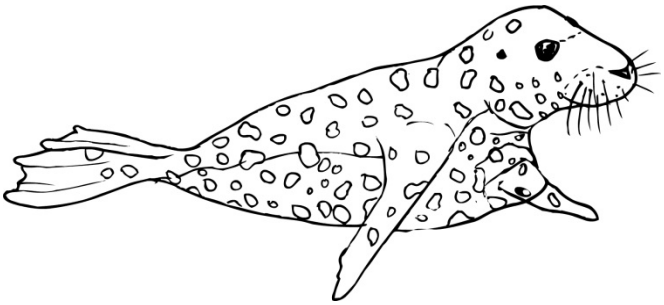
 **Velvet swimming crab**	Velvet swimming crabs are active predator and use their sharp claws to tear apart sma animals like mussels and small crabs and break their shells.
 **Harbour porpoise**	The harbour porpoise hunts for small fish lil sand eels using sound.
 **Common scoter**	The common scoter dives below the surfac to hunt for bivalves such as mussels and clams.

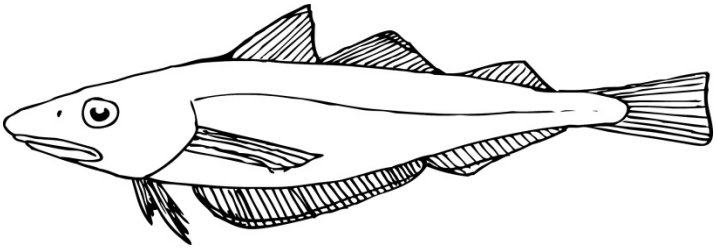
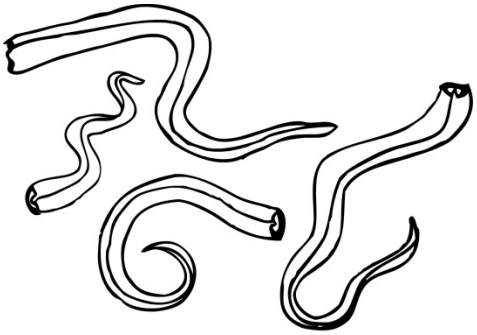
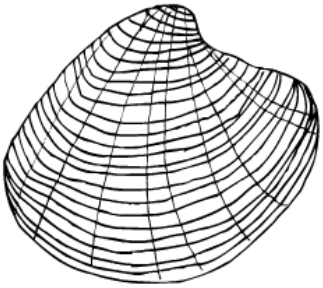
 **Razorbill**	Razorbills are birds that ‘fly’ under the wate hunting for small fish, including sand eels.
 **Bass**	Bass actively hunt for small fish like sand ee and other small animals like crabs.
 **Conger eel**	Conger eels eat a range of smaller fish anc invertebrates such as crabs and bivalves (e. mussels and clams).

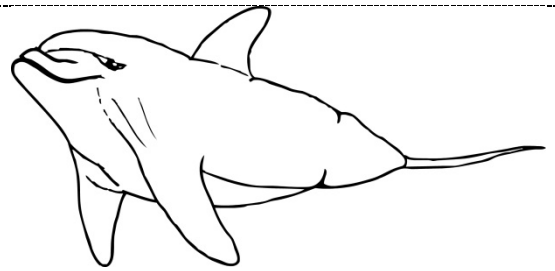
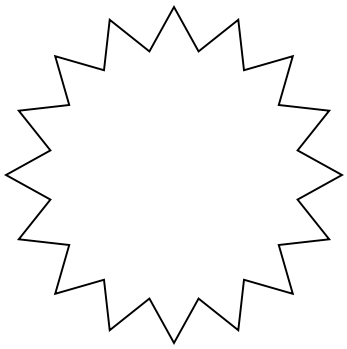
 **Common Lobster**	Lobsters use their strong claws to crush th shells of the animals they feed on includin clams, mussels and crabs.
 **Oarweed**	Oarweed is a large seaweed that lives at o just below the low tide mark. It uses energ directly from the sun.
 **Sand star**	Sand stars are active predators and hunt fo clams and other small animals buried unde the sand.

 **Sea slug** *(Onchidoris bilamellata)*	This sea slug is specially adapted to feed exclusively on barnacles.
 **Wrasse**	Wrasse have strong teeth to crush and eat small, shelled animals (e.g. hermit crab).
 **Herring gull**	Herring gulls eat small fish like sand eels an other animals from near the surface of the water.

 Ross worm	Ross worms make protective tubes from sand and eat plankton and particles of dea plants and animals from the water around them.
 Zooplankton	Zooplankton are animals which are transported around on ocean currents. The may be the larvae of larger animals includir fish, crabs and snails, or may always be plankton. They usually feed on phytoplankton or other species of zooplankton.
 Phytoplankton	Phytoplankton are tiny plants, which are transported on ocean currents. They obtai energy from sunlight.

 **Manx shearwater**	Manx Shearwaters can swim below the surface to hunt for small fish.
 **Compass jellyfish**	The compass jellyfish uses its stinging tentacles to capture small animals like san eels floating past in the water.
 **Grey seal**	The grey seal dives below the surface to hunt for fish like whiting and large crustaceans (crabs and lobsters).

 **Whiting**	The whiting hunts for small animals including fish like sand eels, crustaceans lik crabs, worms and bivalves like mussels an clams.
 **Keel worm**	Keel worms live permanently attached to hard surfaces catching and eating food passing in the water, including plankton.
 **Venus clam**	Venus clams live buried under the sand, filtering food from the water, including plankton.

 **Bottlenose dolphin**	The bottlenose dolphin uses sound to hun for medium to large fish like whiting.
 **Sunlight**	The Sun - the source of light and heat whic drives the food chain.
Cards for use in food chain activities. Print, fold (so the clue is on the back) and cut-out to use. The images are designed to be coloured in as an addition to the activity	