



Educational resources pack for teachers and educators

Key stage 3/4

Produced by R.MacDonald BSc (Hons), MSc, PGCE
Illustrations by Liara K Crane

Introduction

Seahorses are often considered to be mysterious and magical creatures that live in wonderful tropical seas. What many people do not realise is that there are two species, the spiny seahorse and the short snouted seahorse which can be found here in the UK. Unlike other seahorse species, the UK seahorse populations are not heavily exploited for their use in traditional medicines or as aquarium fish but are instead threatened mostly by human activities and a lack of understanding regarding their behaviour in the wild.

The aim of this educational resource pack which can also be used around the world, is to not only provide you, the educator, with informative resources but also to raise awareness for these wonderful creatures and the current UK and worldwide conservation projects that need your support.

The Educator notes provide guidance on how to use the resources and there are also example lesson plans for you to use if you wish. The wide range of activities has been designed for a range of abilities and there is an example of a higher-order thinking skills lesson that can be modified and adapted for all abilities.

Finally, we have included a section on how you and your students can help The Seahorse Trust.

List of resources:

- Species fact files
- Match up food chain/web cards
- Food web game
- Seahorse dilemma roleplay
- Seahorse dilemma diamond rank
- What you can do to help The Seahorse Trust
- Line drawings of species

For all resources please laminate them so that they can be reused over and over.

[Please note that images of animals are not to scale.]

Curriculum links:

Key stage 3

1 Applications and implications of science

- a. Exploring how the creative application of scientific ideas can bring about technological developments and consequent changes in the way people think and behave.
- b. Examining the ethical and moral implications of using and applying science.

2 Communication

- use appropriate methods, including ICT, to communicate scientific information and contribute to presentations and discussions about scientific issues.

3 Organism, behaviour and health

- All living things show variation, can be classified and are interdependent, interacting with each other and their environment.

4 The environment, Earth and the universe

- Human activity and natural processes can lead to changes in the environment

Key stage 4

1 Data, evidence, theories and explanations

Pupils should be taught:

- a. How scientific data can be collected and analysed.
- b. That there are some questions that science cannot currently answer, and some that science cannot address.

2 Communication skills

- a. Recall, analyse, interpret, apply and question scientific information or ideas.
- b. Present information, develop an argument and draw a conclusion, using scientific, technical and mathematical language, conventions and symbols and ICT tools.

3 Applications and implications of science

- a. To consider how and why decisions about science and technology

are made, including those that raise ethical issues, and about the social, economic and environmental effects of such decisions

- b. How uncertainties in scientific knowledge and scientific ideas change over time and about the role of the scientific community in validating these changes.

4 Organisms and health

- a. Organisms are interdependent and adapted to their environments.
- b. Variation within species can lead to evolutionary changes and similarities and differences between species can be measured and classified.

5 Environment, Earth and universe

- The effects of human activity on the environment can be assessed using living and non-living indicators.

Resource: Species fact files

The fact file on the animal species can be used for:

- a. As information for use when comparing species adaptations – print off the line drawings of the species for students to label using information from the fact files.
- b. Producing individual or group posters on coastal habitat (including adaptations of species / food webs / food chains)
- c. For use when producing food chains / webs

Fact file: Spiny Seahorse (*Hippocampus guttulatus*)

Group:	Fish.
Distribution:	All around the coast of the UK.
Size:	15-20cm.
Habitat:	Summer: shallow weedy areas especially eel grass beds Winter: deeper water.
Diet:	Carnivorous as they eat Mysis shrimp. Seahorses eat between 30 and 65 times a day.

Adaptations:

- Excellent eyesight for finding prey.
- Eyes move independently of each other (like a chameleon).
- Long thin nose which can suck up prey like a vacuum cleaner from up to 2 cm away.
- Body shape, allows them to strike at distant prey.
- Prehensile tail helps them to hold onto the seagrass so they are not carried away with the tide/current.
- Can change their colour to suit their environment and for courtship display.
- They have an exoskeleton covered in skin but no scales.
- Dorsal fin beats at 30-70 times per second to help it swim.
- Pectoral fins on their head help with stability and steering.
- Fleshy appendages (cirri) on their body allow them to camouflage with weed.
- True reversed pregnancy; this means that the male becomes pregnant as the female puts her eggs into his pouch where he self-fertilises them.
- Gestation period 28 days.



Female Spiny Seahorse

Picture by Beccy McDonald

Fact file: Short Snouted Seahorse

(*Hippocampus hippocampus*)

Group:	Fish.
Distribution:	All around the coast of the UK.
Size:	15-17cm.
Habitat:	Summer: shallow areas, all types of habitats Winter: deeper water.
Diet:	Carnivorous as they eat Mysis shrimp. Seahorses eat between 30 and 65 times a day.

Adaptations:

- Excellent eyesight for finding prey.
- Eyes move independently of each other (like a chameleon).
- Short thin nose which can suck up prey like a vacuum cleaner from up to 2 cm away.
- Body shape, allows them to strike at distant prey.
- Prehensile tail helps them to hold onto the seagrass so they are not carried away with the tide/current.
- Can change their colour to suit their environment and for courtship display.
- They have an exoskeleton covered in skin but no scales.
- Dorsal fin beats at 30-70 times per second to help it swim.
- Pectoral fins on their head help with stability and steering.
- Fleshy appendages (cirri) on their body allow them to camouflage with weed.
- True reversed pregnancy; this means that the male becomes pregnant as the female puts her eggs into his pouch where he self-fertilises them.
- Gestation period 28 days.



Pair of Short Snouted Seahorses
Picture by John Newman

Fact file: Peacock fan worm

(*Sabella pavonina*)

Group: Polychaeta (segmented worm)

Distribution: All around the coast of the UK.

Size: Tubes can be up to 45 cm in length with the worm itself growing up to 25 cm

Habitat: Lower shore in areas with gravel /sand /mid

Diet: Omnivorous as they eat plankton

Adaptations:

- They construct a tube in which they live, made out of grains of sand which they stick together with mucous.
- The tube hides all of their body when they are feeding and they can quickly dart inside when they are threatened.
- Their gills spread out like a feathery fan through which they can filter the water and remove food and oxygen.



Peacock fan Worm
Picture by Beccy McDonald

Fact file: Spider Crab (*Maia squinado*)

Group: Crustacea

Distribution: All around the coast of the UK.

Size: Shell up to 17-18 cm across
Legs up to 20 cm

Habitat: April-August they are found on the lower shore on sandy flats and among rocks.

Wintering grounds offshore

Diet: Scavengers and herbivorous

Will eat most things but prefers dead meat and seaweed.

Adaptations:

- They have a hard shell which is shed periodically to allow the crab to grow
- The shell is covered in hard spines for defence
- Long narrow, hairy legs to allow them to move fast and to climb over all sorts of objects.
- Long but small claws, allowing them to pick and snip at items.



Spider Crab

Picture by Beccy McDonald

Fact file: Seagrass (*Zostera Marina*)

Group: Plants

Distribution: Wide and patchy distribution.

Size: Long dark leaves up to 100 cm long

Habitat: Sand to fine mud and forms large and small meadows

Diet: They photosynthesise for their food

Adaptations:

- They form large beds called meadows
- They have a rhizome that forms mats under the sand, holding the plants in place
- Can hold on in the strongest sea states
- They are nature's natural wave diffusers in shallow water and so are invaluable to mankind and other species that get protected by them.
- They absorb large amounts of CO₂ which is perfect in the fight against global warming.



Seagrass

Picture by Neil Garrick-Maidment FBNA

Fact file: Seagrass anenome

Group:	Cnidaria (animal with stinging cells)
Distribution:	Found on seagrass
Size:	1 to 7 cm across the base
Habitat:	Attached to seagrass
Diet:	Carnivores, Including small fish and Zooplankton (microscopic animals).

Adaptations:

- Their base can attach to thin seagrass stems
- They catch prey with stinging cells on the end of their tentacles
- They are pale in colour which does not give much warning of the powerful sting they can give.
- Can breed by sub dividing.



Seagrass anenome
Picture by Beccy McDonald

Fact file: Common Cuttlefish (*Sepia officinalis*)

Group: Cephalopods

Distribution: Wide distribution around the UK

Size: Up to 45 cm long

Habitat: Breeds in seagrass but found in wide range of habitats

Diet: Crabs and fish

Adaptations:

- Can change colour depending on their mood
- Use their colour change 'talk' to other cuttlefish
- They have eight arms and two tentacles to catch their prey
- If threatened they can squirt ink to create a 'smoke screen'
- They have a bone in the back which helps them to stay neutrally buoyant
- This bone is often washed up on beaches and used to keep budgies beaks sharp
- Their large eyes give them superb eyesight



Common Cuttlefish

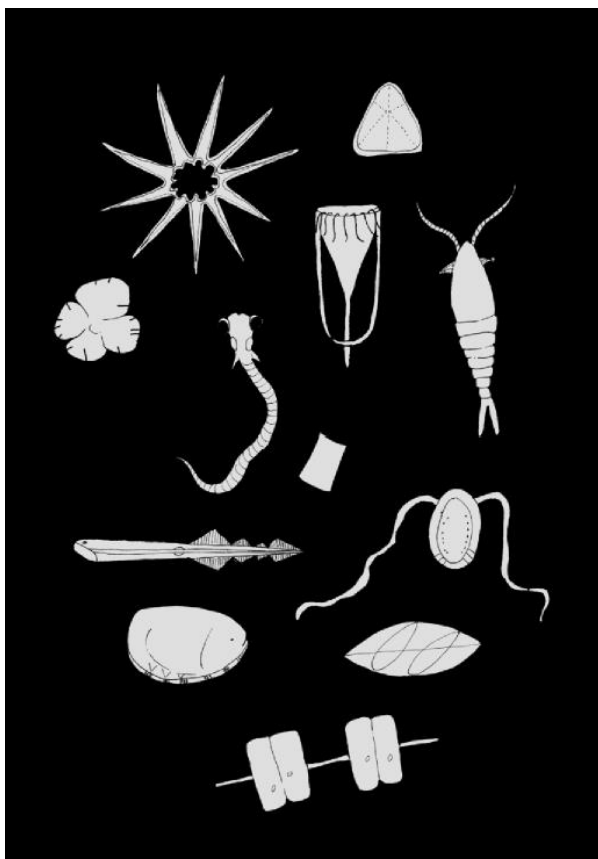
Picture by Neil Garrick-Maidment

Fact file: Plankton

Group:	Mixed plants and animals
Distribution:	Wide distribution around the UK
Size:	60 – 150 micrometers
Habitat:	Breeds in all the oceans
Diet:	Depends on the species but if they are phyto plankton they photosynthesise and if they are Zoo plankton they can be carnivores or herbivores.

Adaptations:

- A lot of fish fry or crab larvae are plankton in the early stages of their lives.
- Plankton are highly adaptable and found in all oceans of the world.
- To help them float they have a range of adaptations including flat bodies, floats filled with gases and oil droplets.
- As zooplankton they are the main food source for many animals they have adaptations such as transparent bodies or bright colours to hide from or deter predators.
- They are eaten by some of the largest animals on the planet such as the Blue Whale and Basking and Whale sharks
- There is more plankton in a swimming pool than there are and have been people on the planet.

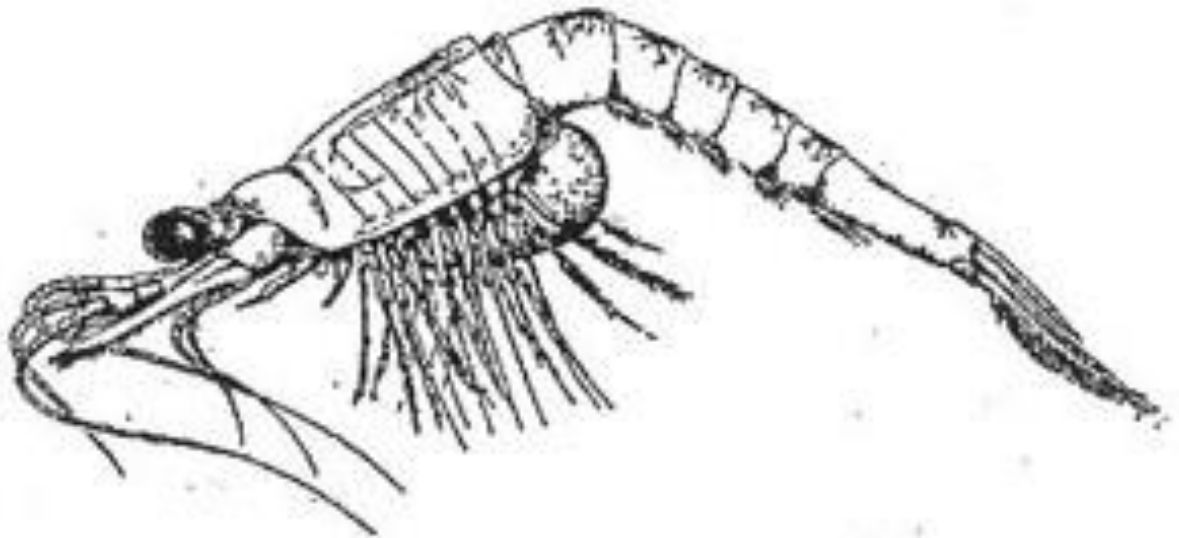


Fact file: **Mysis shrimp** (*Neomysis integer*)

Group: Arthropod
Distribution: Wide distribution around the UK
Size: 1.5 to 2 cm
Habitat: In the ocean and up estuaries
Diet: They sieve plankton

Adaptations:

- Live in large swarms for protection
- Has a transparent body for camouflage
- Have 'basket like' legs to catch plankton
- Graze on algae as the tide rises
- Have big eyes for good vision in low light
- Their offspring are planktonic when newly born
- Have long antennae to act as feelers
- Carry their fry in pouches like seahorses

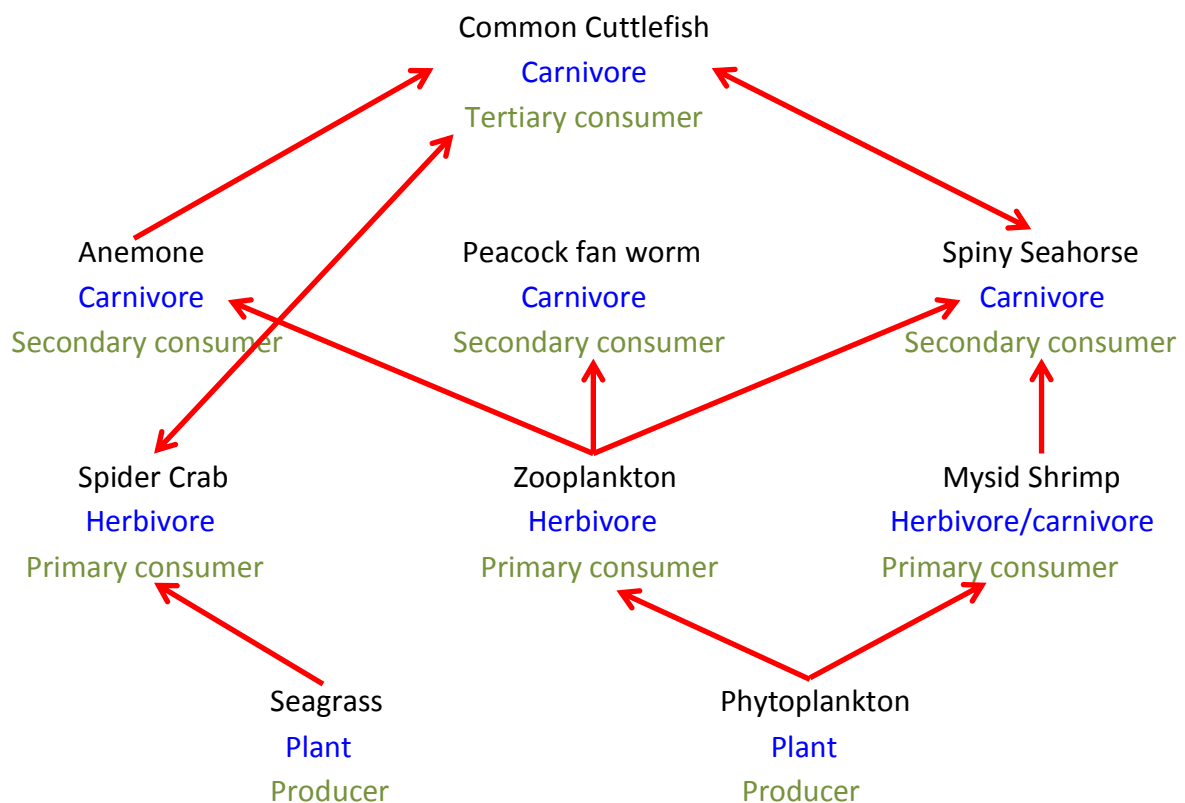


Resource: Match up food chain/webs cards

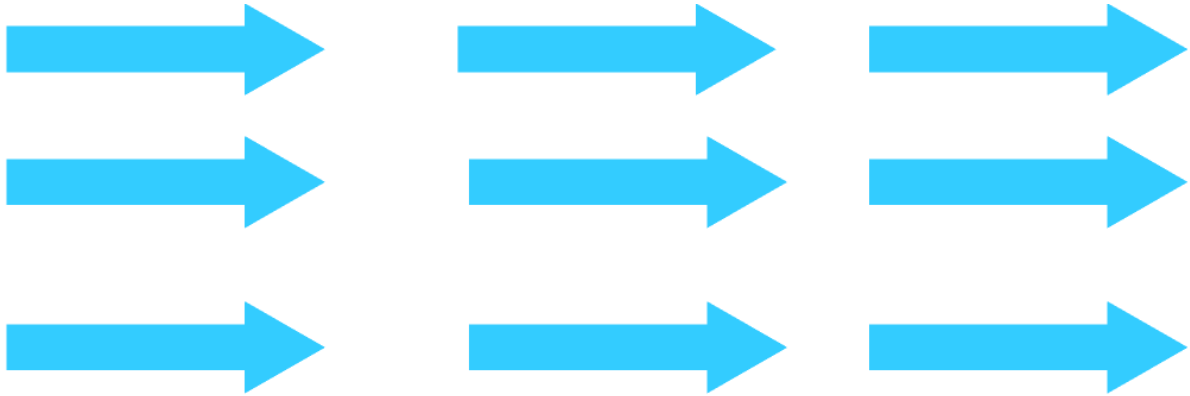
These cards can be used for students in a variety of ways:

- To produce a simple food chain.
- To develop an understanding of key terminology such as primary, secondary and tertiary consumers in a food chain.
- To develop an understanding of producers, carnivores, omnivores and herbivores
- To be able to understand the impacts on a food chain when one species is removed due to human impacts.
- To develop a simple food chain into a more complex food web.
- To demonstrate how to use the terminology for a food chain/web.
- You could develop the activity, once students have produced their food web, to discuss the effects of biodiversity loss and the forms of biodiversity that we have in the UK. Many students tend to connect the term biodiversity with rainforests and coral reefs.
- You could use this activity as a starter/plenary.
- You could use it as part of an ICT lesson where students have to learn more to further develop the food chains/webs and could look into the human impacts that affect these species i.e. fishing, anchoring, pollution of coastal waters and the use of coastal waters for recreational activities.

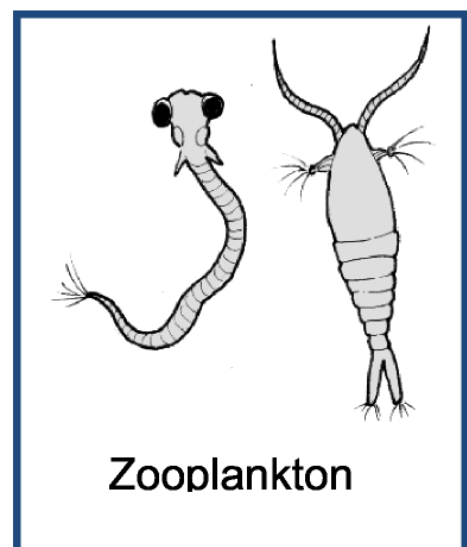
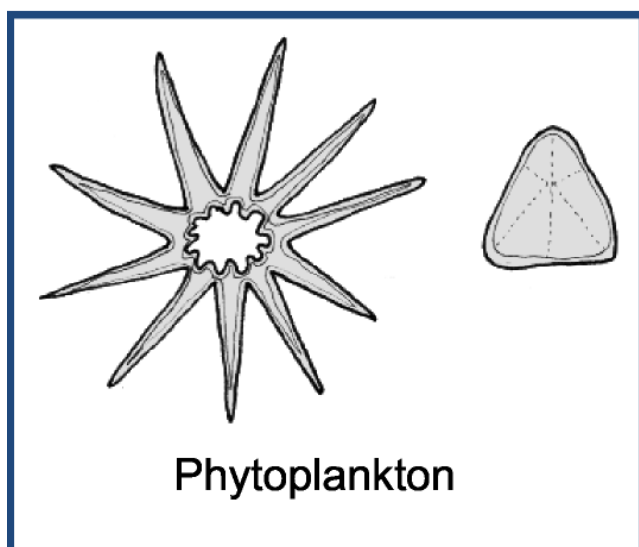
Simple web of life

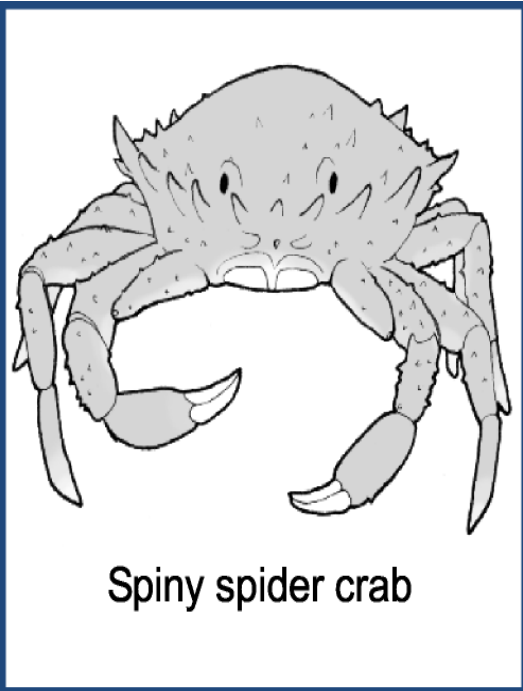
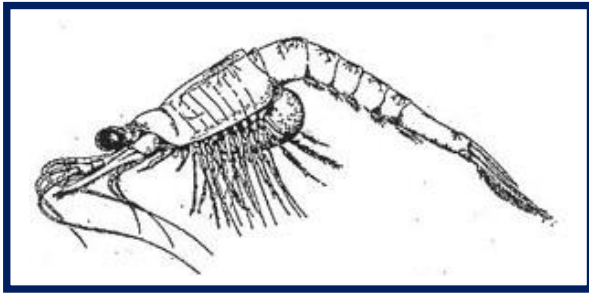


Cut out the shapes and make a simple food web

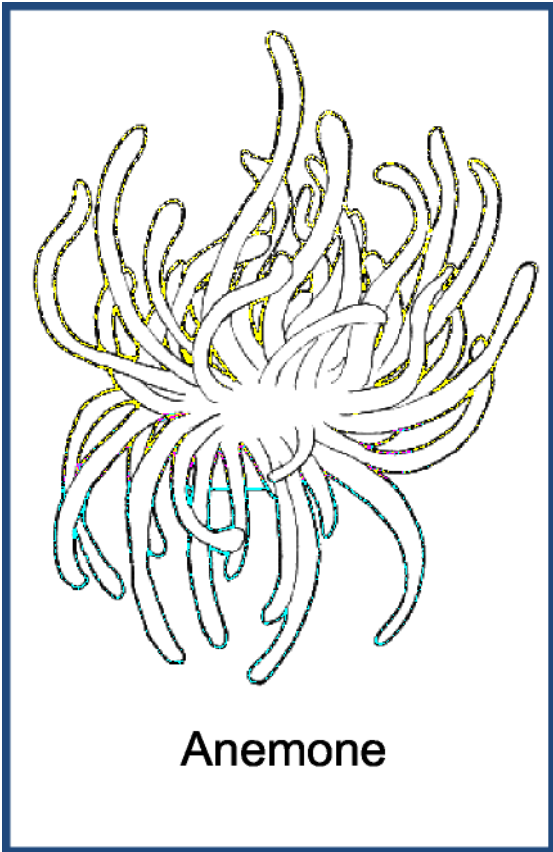


Producer	Producer	Herbivore	Herbivore
Herbivore	Carnivore	Carnivore	Carnivore
Scavenger	Detritivore	Carnivore	
Primary consumer	Primary consumer	Primary consumer	
Secondary consumer	Secondary consumer	Secondary consumer	Tertiary consumer

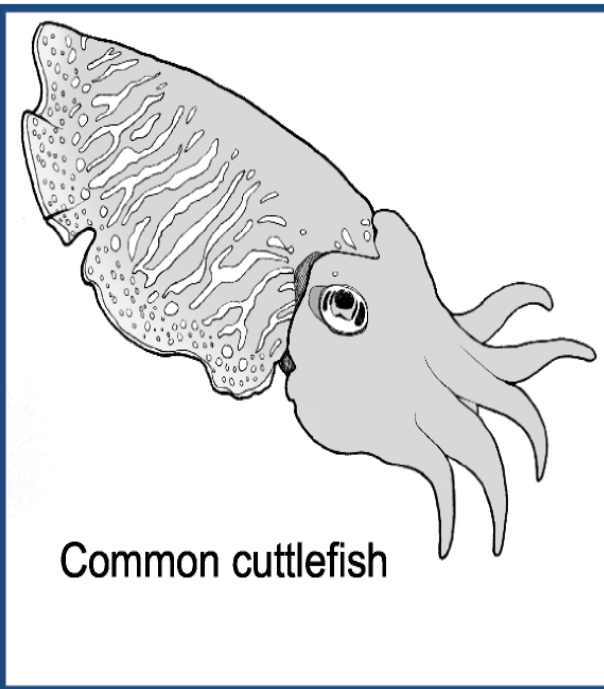




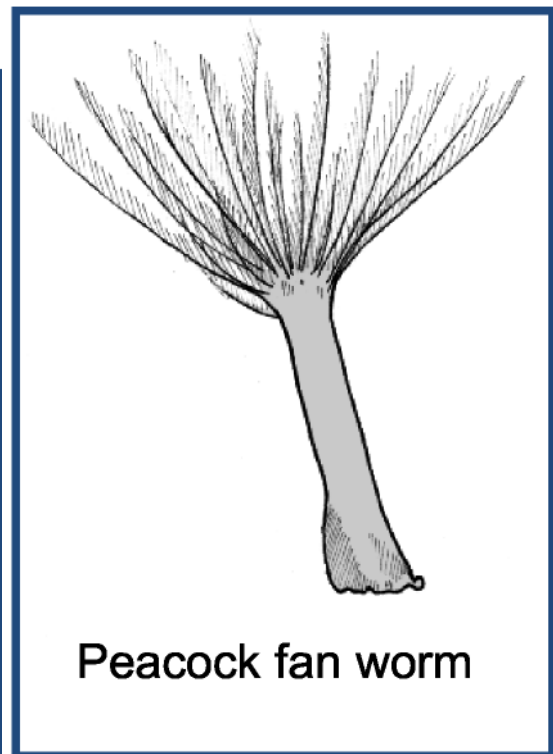
Spiny spider crab



Anemone



Common cuttlefish



Peacock fan worm

Resource: Food web game

The aim of this game is to illustrate the importance of biodiversity and how all species within a food web are inter dependent upon each other. Refer to 'Simple web of life' example up above for ideas.

Please note that the cards must be printed out two-sided with one side showing the species and the related information on the reverse.

This is an ideal starter or plenary activity to recap food webs and interactions within them.

To run the activity:

- Gather the class to the front of the room or in an open space
- Choose seven volunteers to be certain species and have them stand at the front of the class and hand out one card to each person – they
 - should show the picture of the species and have the information on the back facing them
 - have the rest of the students stand in a line or alternatively have them sat around in a circle
- Choose one person and ask them what their species needs to survive; they should then read out the information on the reverse of the card
- From the information that they have read out, ask one of the other species (from the group of seven) who they need and so on until all the species have read out their information. It should be that each species needs another species to eat or live on.
- Then say that something has happened and that there has been a drop in the number (population) of one of the species; the most effective examples that you could use are that of chemical pollution killing off the plankton, seagrass being pulled up on anchors, overfishing of spider crabs etc..
- See what confusion happens when the food chain is broken and discuss this with the class
- Talk about what would need to be done to repair the environment and/or food chains
- Once they have got the hang of food chains, and then get the students to think about their own food chains, such as sharks, fish, smaller fish and plankton.
- Use this game to make your students understand about chains and consequences

Explain a food chain in depth

Use the seagrass as an example

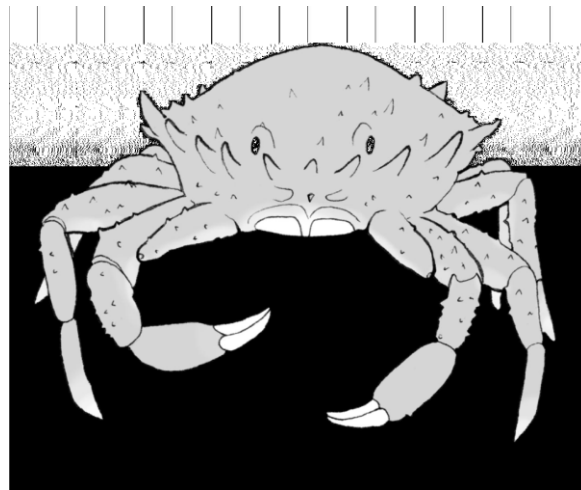
Seagrass



To survive, I need:

- Sunlight for photosynthesis
- Sand or silt to anchor my roots in

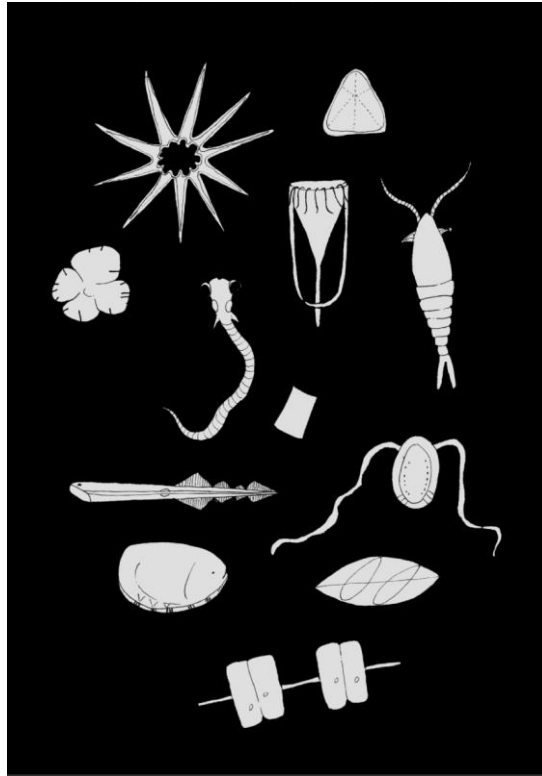
Spider crabs



To survive I need awesome spider crabs who

- Eat seagrass (herbivores)
- Eat dead animals and plants (scavengers)
- Seagrass to camouflage in

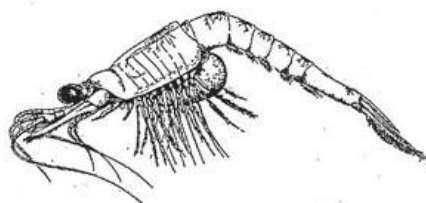
Super small phyto and Zoo-plankton



To survive, I need:

- Sunlight for phyto plankton to make food through photosynthesis
- Zooplankton need phytoplankton to eat (herbivores)

Mysis Shrimp

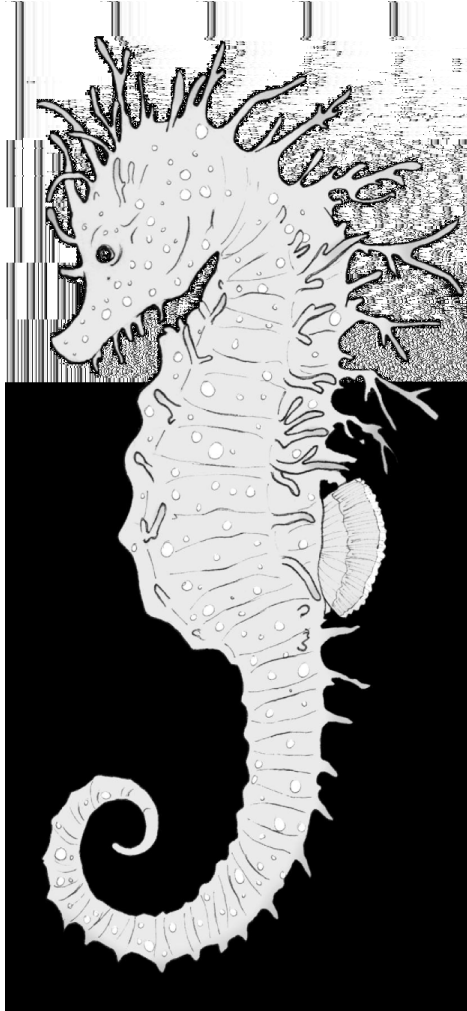


Ro survive, I need:

- Zooplankton and phytoplankton to eat

- I need slime algae on muddy banks to eat
- I need other Mysis shrimp to eat

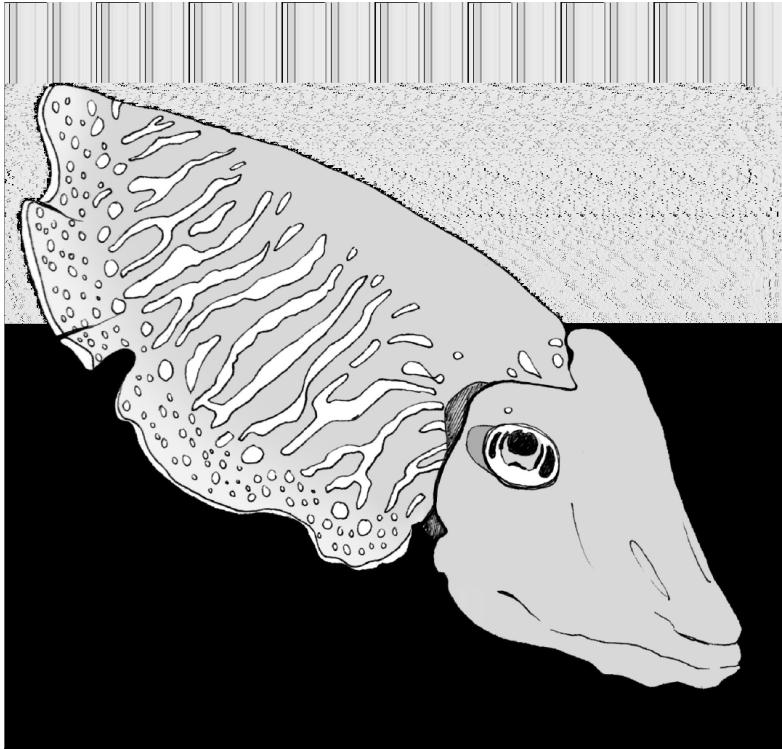
Spiny Seahorse



To survive, I need:

- Seagrass to hold onto and to camouflage in
- Mysis shrimp to eat when I am an adult
- Zoo plankton to eat when I am a fry or juvenile

Common Cuttlefish



To survive, I need:

- Seagrass to lay my eggs in
- Seagrass to hide in
- Spiny Spider crabs to eat
- Spiny seahorses to eat
- Mysis shrimp to eat when I am young

**I AM AN APEX PREDATOR BECAUSE I AM AT THE TOP
OF THE FOOD CHAIN**

Resource: Seahorse dilemma roleplay

This activity involves students taking on the role of a stakeholder involved in the current conflict occurring at Studland Bay in Dorset.

Studland Bay is the main breeding ground for the Spiny Seahorse (*Hippocampus guttulatus*) and with only low numbers of individuals being found each year it is essential that this site is managed effectively.

This however raises conflicts as Studland Bay is a beautiful site which many seek out for recreation in the summer months; as many as 350 boats have been counted in the bay on one day.

These boats either using the moorings that are already present or anchor to the seabed. Both the chains of the moorings and the anchors are responsible for the destruction of the seagrass habitat through scouring of the seabed and through direct removal of the seagrass.

Before running the activity please show them one of the videos from the trusts website to give students background on the issues and the audio of the BBC radio interview between the different stakeholders. Students should be given the opportunity to watch/listen again to take notes to help them with the task.

To run the activity, split students into six groups: conservationists, local people, local business owners, local government, boat users and tourists.

Set the scene by explaining that they are going to take part in a debate about the future of Studland Bay and that they must come up with an option of what should happen with this area.

Give students time to prepare by reading through the stakeholder sheets and completing the sections. You could include ICT by getting students to research their roles. For the roleplay itself, it works best if you act as the chair and give one group the opportunity to state their thoughts then, depending on which other group has been mentioned, ask another group to comment on the views of the first and then give their ideas and so on.

Further background:

<https://www.theseahorsetrust.org/default.aspx>

Conservationists

You are the conservationists therefore you are interested in the protection of the marine environment and all the species that live in it, including seahorses.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

Your Task:

Working together as a team, you need to come up with three possible options for the future of Studland Bay.

For each of these options you should consider if you need the support of the other stakeholders and whether you things such as money, equipment or anything else.

Then as a group work out the advantages and disadvantages of your options to decide which one s the most likely to work.

During the discussion with the other stakeholders put forward a sensible, balanced argument as to why your option is the best solution.

Local people

You live in the area surrounding the picturesque Studland Bay. Some of you are new to the area whilst others have had families living there for many generations.

You may have moorings and boats in the bay.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

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Local business owners

You own a business at Studland Bay; this could be a café, shop, hotel or public house.

The tourists bring a lot of money to spend in the local economy.

Should you worry about the conservationists or those people that do not want anything to change.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

Your Task:

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During the discussion with the other stakeholders put forward a sensible, balanced argument as to why your option is the best solution.

Local government

As the local government you have been democratically elected to look after the area and its people.

You are interested in managing the bay and trying to keep everyone happy.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

Your Task:

Working together as a team, you need to come up with three possible options for the future of Studland Bay.

For each of these options you should consider if you need the support of the other stakeholders and whether you things such as money, equipment or anything else.

Then as a group work out the advantages and disadvantages of your options to decide which one s the most likely to work.

During the discussion with the other stakeholders put forward a sensible, balanced argument as to why your option is the best solution.

Tourists

You want to visit Studland bay to enjoy its beauty and have some fun.

You may arrive by foot, car, and local transport or by boat.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

Your Task:

Working together as a team, you need to come up with three possible options for the future of Studland Bay.

For each of these options you should consider if you need the support of the other stakeholders and whether you things such as money, equipment or anything else.

Then as a group work out the advantages and disadvantages of your options to decide which one s the most likely to work.

During the discussion with the other stakeholders put forward a sensible, balanced argument as to why your option is the best solution.

Boat users

You visit Studland Bay by boat and feel it is your right to visit no matter what happens.

Some of you do not care about the environment and what to do whatever you like.

Others want to visit but be very careful about the environment.

Option	Who or what do you need for this option?	Advantages of your options	Disadvantages of your options
1			
2			
3			

Your Task:

Working together as a team, you need to come up with three possible options for the future of Studland Bay.

For each of these options you should consider if you need the support of the other stakeholders and whether you things such as money, equipment or anything else.

Then as a group work out the advantages and disadvantages of your options to decide which one s the most likely to work.

During the discussion with the other stakeholders put forward a sensible, balanced argument as to why your option is the best solution.

Resource: Diamond rank solutions

Print the tables onto card and then cut them into strips.

As a plenary to the debate you can either get the students as a class to rank the options that each stakeholder group came up with or in pairs they can rank the solutions below to see which they think are the most suitable solutions.

With diamond ranks there is no right or wrong answer but they are a great way to see how the students have interacted with the debate.

Make areas of Studland Bay into a Marine Conservation Zone (MCZ) and stop all boat use
Captive breeding of seahorses and release young ones back into the wild to increase seahorses in the wild
Make the whole of Studland bay into a Marine Conservation Zone (MCZ) and stop all boat use.
Ban anchoring in the bay
Change all the moorings to environmentally fiendly moorings that do not harm
Do nothing

What can you do to help the The Seahorse Trust?

To help support the work of The Seahorse Trust you or your class can:

- Make posters to put up around school to highlight the issues at Studland Bay
- Fundraise for The Seahorse Trust through activities such as sponsored silences, making and selling friendship bracelets etc.
- Adopt a seahorse
- Remember if you are snorkeling or diving and see seahorses you must not touch or take photos of them; just enjoy being lucky enough to see one!
- Don't forget if you are lucky enough to see one anywhere in the world let the trust know
- Avoid buying dried seahorses as souvenirs.
- Avoid buying seahorses as pets.

Most importantly we hope that you enjoy using this resource pack.

We have lost more information on our website so please don't forget to get your students to visit the site as pre course work before you use this pack.



www.theseahorsetrust.org