



3 What is special about our local west coast marine biodiversity?

Teacher Notes

3b My HWDT Sea animal project book

Time: 1 to 4 hours.

Resources: My sea animal project book (photocopied and printed back to back), materials for students to use for research - books, computer, magazines etc., coloured pencils/pens.

Aims: Students will learn about one chosen sea creature via independent research. They will develop research skills including finding information, reading and note taking.

Suggested method:

Students will each need a copy of the sea animal project book. They may need guidance on how to choose their creature and how and where to find out information. They should also use their general knowledge to complete the boxes. For lower ability or younger classes, students could work together in small groups on the same animal. This way they could collaborate to support each other. The project book is designed to be adapted to suit your students. Some may draw their answers, write or complete a combination to fill boxes. Differentiation is by outcome.

Final work would make a great display, or could be combined into one to make a large book on sea creatures which could later be used by other students.



3c Design a sea creature Teacher notes

Time: 1 to 3 hours

Resources: Design a sea creature background notes for teachers, worksheet for students, example worksheet

Aims: Students will learn about adaptations of marine life to its environment. They will then use their creativity and knowledge of the marine environment and its life to design their own sea creature.

Suggested method:

Explain to students that their task is to design a sea creature from their imagination. The end product is to produce a large picture (at least A4 size) which is annotated with information to explain the main features and adaptations of their created creature.

First read through and discuss the design a sea creature student worksheet. This raises questions for students and directs them to consider possible answers. Once this has been discussed either as a class or in small groups, look at the example sheet about dolphins to help students further understand the task. The additional teacher background sheet is to support staff in discussing the content with their students in greater depth.

Encourage students to be creative in their designs and also to be realistic.



3c Design a sea creature - background notes

Where does your creature live and what special features does it need to live there?

Encourage students to consider the habitat of their creature and also to think carefully about the adaptations it will need to survive in this environment.

Deep sea creatures must search for and find food in near or complete darkness. Some use bioluminescence to attract or scare prey and predators. Many deep sea creatures adopt a 'sit and wait' approach to finding food, relying on food to fall to them or relying on currents to bring food to them. Examples of these creatures would be barnacles, anemones, and tube worms which extend themselves above the seafloor to catch microscopic and small food particles which drift by. Thousands of shrimp-like creatures live off carcasses which float down to and settle on the sea bed. They can detect the smell of the carcass in water currents, quickly find the food and devour it with sharp teeth. Many worms either crawl over the sea floor to find food or catch floating particles using feather-like tentacles.

Ocean dwelling creatures are at home in the water column, being able to travel through it, gain oxygen and feed. Gills allow fish, crustaceans (crabs, lobsters, prawns, shrimps, barnacles) and molluscs (sea snails, bivalves, octopus, squid) to absorb oxygen from the water. There are different designs of gills and many have thin plates of tissues which allow the oxygen to absorb through thin walls straight into the blood. Carbon dioxide is excreted back into the water through the gills. Mammals, in contrast, need to come to the surface to breathe air even if they spend most of their time below the water. Whales and dolphins are adapted to breathe at the surface through their blowhole which is located on top of their heads so that it reaches the surface first, thus reducing the disruption to swimming.

Rockpool animals cope with changing conditions in their habitat. When the tide is out, water warms up, oxygen levels drop and animals are more exposed to predators. When the tide is in conditions are similar to the wider ocean with currents, waves, more space, reduced salinity levels and lower temperatures. Many rock pool creatures which attach to rocks (anemones, barnacles) are adapted to find microscopic food by catching it in the currents as they drift by using tentacles and fine feather like structures. Other creatures such as goby fish catch prey which is trapped inside the pool and hide under seaweed.



What does it eat and how does it eat its food?

Mouth parts of sea creatures are cleverly adapted to suit the prey that each creature eats. Dolphins grasp slippery fish using sharp teeth and then swallow them whole head first so they slip down their throats easily without the scales catching. Minke whales catch small fish such as sandeels from the water using huge mouths which are extendable by throat pleats to engulf even more water and baleen to then sieve out the small food from the water. Lobsters and crabs find food using a very good sense of smell and then catch them using quick movements and strong claws. Many crabs and lobsters have one pincer larger than the other so that one is for slicing (the smaller one) whilst the other is adapted for crushing. Their mouths are on the underside of their shell within easy reach of these pincers.

How does it move?

Some sea creatures do not move (e.g. barnacles and mussels) and are attached to the rocks permanently. Other creatures move very slowly. Anemones, for example, slide slowly over rocks by extending and contracting their foot; limpets also move to forage for food when the tide is in and move back to their 'home scar' at low water. Sea snails slide over sea weeds, kelps and rocks, similar to terrestrial snails. Creatures that walk include crabs, lobsters, sea urchins and starfish. Crabs leg joints are not ball and socket joints and the top of their legs are fused to the carapace (shell) so they have restricted movement and walk sideways. Every spine on a sea urchin has a ball and socket joint allowing the spine and the urchin to move in all directions. These spines are used to wedge the urchin in to rocks and it has thousands of tube feet to walk around on. Star fish also have retractable tube feet on their undersides which they use to walk over surfaces. Some sea creatures use water to propel themselves forwards including octopuses and scallops. Scallops (clams) open and shut their shell to rapidly move backwards and octopuses also shoot water from their siphons either side of their bag-like body. Octopuses also move more slowly using their tentacles. Active swimmers use strong muscles in their tails to move forwards. Fish move their tails sideways and cetaceans move them up and down. Skates and rays swim using 'wings' to 'fly' through the water. Other creatures passively float and drift on the currents including jellyfish and other microscopic plant and animal plankton.

How does it escape being eaten?

Small creatures have the chance to hide themselves from prey while large creatures will need to move fast or have other techniques to escape being someone else's dinner. As the second largest fish in the world basking sharks rely on their size for defence and they can swim surprisingly fast too.



Octopuses, squid and cuttlefish can quickly change their skin colour and pattern to match their surroundings and confuse their enemies. Additionally they can ward off their enemies with ink by releasing a disorienting black cloud of ink into the water. The secretion is also thought to dull the attacker's sense of smell to confuse them even further. Octopuses can also fight predators off by biting with their sharp beak, and have venom too. Hermit crabs have defence which is portable - their shell. Jelly fish and anemones have stinging cells in their tentacles which automatically sting anything they touch to catch prey and for defence. Spider crabs are also known as decorator crabs because they attach camouflage to their shell and legs including sponges and seaweeds. They hook the 'decorations' to the spikes and hairs which cover their body and legs, positioning them with their pincers. When they move environment the crabs can change their camouflage so they are better hidden.

3d Dilemma cards - teacher notes

Time: 1 hour

Resources: Dilemma cards (one set per group)

Aims: Students will discuss scenarios concerning the marine environment and wildlife and decide their actions. They will develop discussion skills and consider moral and ethical issues. They will develop awareness of citizenship and its responsibilities.

Suggested method:

These cards are most suited to older primary pupils. Students work in small groups (2-4) to discuss the dilemma cards and decide what they would do in this situation. It is worth emphasising that there are no right answers, just better and worse suggestions. Importantly the group should be able to explain *why* they came to the decision that they did. There are various ways that this activity can be organised. Two successful ways to organise the activity are to a) give each group a whole set of cards which they work through at their own pace and follow up with a whole group discussion of a selection of the cards, or b) give all groups the same card and give approximately 3 minutes for the groups to discuss the dilemma and come to conclusions about what they would do. Then compare ideas as a whole group, before moving on together to the next card.

Here are ideas which you may want to draw attention to in follow up discussion of each card:



1. If the bucket is dry the crab will only be able to breathe and survive if its gills (located with its mouth parts) stay wet. How long this will be depends on the weather and the type of species. Some are hardier than others. When putting the crab back it should be placed in the same location as it came from.
2. Animals strand (wash up) for various reasons. Usually they are dead, having died at sea and their bodies have been carried in by wind and currents. HWDT welcomes all reports of strandings and the more information we get given the more helpful it is to us. Photos are very helpful too. Please see our strandings page on our website for more details.
3. Marine litter is a threat to wildlife as it can be ingested or can entangle. Most marine litter is plastic and it is very persistent, never biodegrading in the environment. It breaks down into very small and microscopic pieces. Removing litter from the beach and disposing of it properly stops it being a threat to wildlife.
4. Often it's difficult to identify a sighting. It's best to keep looking, and try to get a better view when the animal comes up to breathe again. Report all sightings to HWDT either online or by calling our [Sightings Officer](#). Even unidentified animal sightings are useful to us.
5. Avoid disturbing nesting birds. If the birds do not fly away and are noisy it is a sign that they may be nesting.
6. 'Take only photographs.' Beach material is important to the long term health of the beach and its wildlife. Shells and pebbles break down to make the beach and provide habitats for animals. Shells which look dead can still be the home of live animals, so it's best to leave them on the beach where found.
7. Beach users account for a large proportion of beach litter. Results of the Marine Conservation Society's 2007 national Beachwatch survey show recreational and beach visitors accounting for 35% of the litter collected.
8. Reducing the use of plastic bags also reduces the chances of them ending up as marine and beach litter. Turtles and other animals mistake plastic bags for food and ingest them with devastating effects.
9. Encourage students to go outside and explore the real world, to be active and also enjoy the outdoors.
10. HWDT welcomes involvement in beach cleans from people of all ages and backgrounds.
11. A tricky dilemma. Effective tactics could be discussed.
12. Grey seal pups are born on land between October and December. Observe the pup from a distance until the next full tide, unless it is obviously sick or injured. Don't get too close and don't touch it. Call the Scottish Sealife Sanctuary if worried.