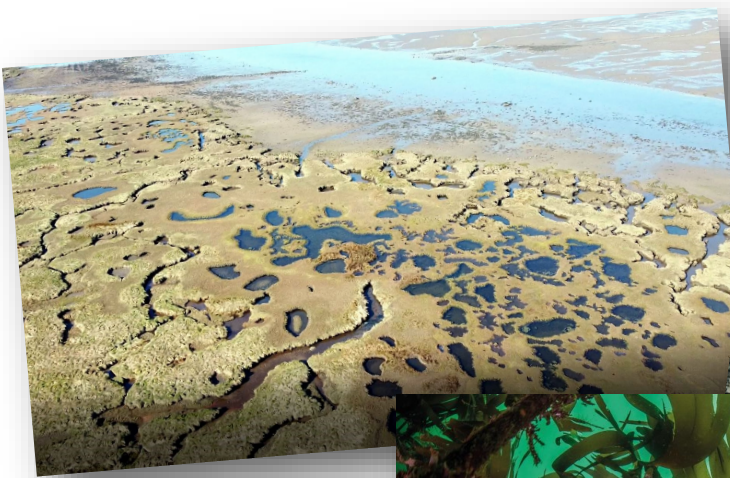




SSC DIVE IN!

HABITATS



© M Roden



© M Roden



© George Stoye





WELCOME!

Hello, and welcome to the Scottish Seabird Centre “Dive In” Packs of resources providing some seaside fun directly into family homes and classrooms.

This pack’s theme: **Habitats**

Scottish coasts and seas support a wide variety of different habitats—places where plants and animals can live and hopefully thrive. From high coastal cliffs to flat rocky shores, and swaying kelp forests to shaded coral reefs, the range of marine habitats around Scotland is diverse and dynamic. Dive into this pack to discover more about Scotland’s amazing marine habitats.

Inside this pack:

- **Introduction: What is a habitat?**
- **Blog: Squelchy Salt Marshes**
- **Craft: Habitat Diorama**
- **Quiz: Match the species to the habitat**
- **Discovery sheets: Spotlight on Key Habitats**
- **Factfile: Threats to Marine Habitats**
- **Activity: Camouflage Challenge**
- **Glossary**

We’d love to hear from you! If you’ve had fun having a go at activities, experiments and crafts, let us know. Any comments or pictures can be sent to marineengagement@seabird.org. More resources are available on our [website](#).

Enjoy using our packs and want to see more? The Scottish Seabird Centre is an environmental conservation and education charity. Every penny we raise helps us deliver our important education and conservation work. If you enjoy using our resources and would like to support our work, please consider making a donation to our [JustGiving page](#). Thank you.

We hope you enjoy diving in to the pack!

Scottish Seabird Centre Learning Team



INTRODUCTION

WHAT IS A HABITAT?

WHAT IS A HABITAT?

A habitat is a place where an animal or plant lives. Different habitats provide the required conditions for the species which live there, such as a suitable temperature range, shelter, space, food and water. Habitats can be either **terrestrial** such as rainforest, desert or grassland or **aquatic** such as rivers, wetlands and oceans.



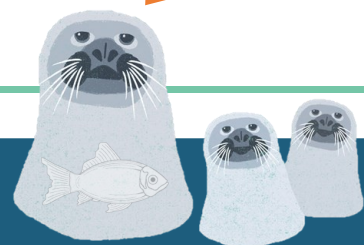
Species that share a habitat are known as a **community**. Together, the community and the physical environment in which they interact is known as an **ecosystem**. Often communities within an ecosystem need one another to survive. For example, a seal living in the ocean relies on a supply of fish to eat, while bees need nectar and pollen from plants. **Biodiversity** is a measure of the diversity within and between species and their ecosystems. The greater the number of different species in a habitat, the greater its biodiversity.

HABITATS FOUND IN SCOTLAND

A wide range of habitats can be found across Scotland. The largest in terms of area is mountains and moorland. Lochs, ponds, rivers and wetlands are widespread. Farmland also covers a significant amount of Scotland, which is a habitat influenced by human activity but which can include **microhabitats** such as hedgerows, reservoirs and uncultivated field margins. We also have woodland, forest, grassland, salt marsh, sand dunes, mud flats and many other marine and coastal habitats.



There are over 18,000 km of coastline, more than 900 islands in Scotland, making coastal habitats very important and varied. Read on to learn more about some of the amazing coastal and marine habitats found here.



SCOTLAND'S MARINE AND COASTAL HABITATS



Rocky Shore (Intertidal)



LOCATION:

Rocky shores occur on any hard substrate in the 'intertidal' section of the coast - areas submerged and exposed by the tide twice a day.

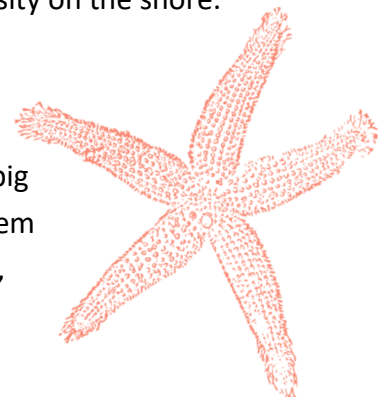
WHAT DOES IT LOOK LIKE?

The rise and fall of the tide leads to 'zonation' of species at different heights on the shore. There are typically 4 zones on a rocky shore; the low shore, middle shore, upper shore and splash zone. Each zone contains a different **community** of organisms adapted to the levels of air, freshwater, wave action, wind and heat found there.

Species more tolerant of **terrestrial** conditions occur higher up the shore whilst those less able to cope are restricted to lower down. The favourable conditions of the low shore means it supports a higher diversity of life than other zones. Whilst the tide is out, rockpools, crevices and the undersides of boulders provide respite from harsh terrestrial conditions, providing species typically associated with the low shore the opportunity to exist further up the shore. These **microhabitats** lead to a patchwork of species groupings within the zones, further increasing diversity on the shore.

FACTS:

Many of the rocky shores around Scotland have rockpools. These can be big or small, shallow or deep but taking the time to observe the life within them can be great fun. You might spot periwinkles, limpets, anemones, starfish, crabs, seaweeds and even small fish. Why not use our handy [rock pool spotter sheet](#) and tick off the species that you see?



SCOTLAND'S MARINE AND COASTAL HABITATS



Saltmarsh



LOCATION:

Saltmarsh forms in sheltered environments such as bays and inlets, where the sea leaves behind fine sediment. The tide covers many saltmarsh plants twice daily. Saltmarsh may occur in bays in firths or in estuaries, at the head of sea lochs and on the landward side of spits and islands.

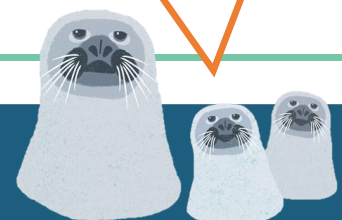
Saltmarsh occurs on most Scottish coasts – with by far the largest areas in the Solway Firth. Scotland has 7,076 hectares of saltmarsh, more than three-quarters of which lie within Sites of Special Scientific Interest (areas of land and water that best represent our natural heritage in terms of their plants, animals or landscape).

WHAT DOES IT LOOK LIKE?

Viewed from above, saltmarshes appear like a mosaic of land and pools of water. There are also narrow inlets which cut through the vegetation. The pools of salt water are often connected by an underground drainage network. Specially adapted plants flourish in the salty conditions such as the glasswort shown below.



Find out more
about salt marshes in our
blog on page 13.



SCOTLAND'S MARINE AND COASTAL HABITATS



© Callum Duncan

Kelp Forest



LOCATION:

Kelp forests are found all around Scotland's coastline and play an important role in maintaining a healthy marine environment. These dense swaying habitats are not only home to many marine species but protect coastlines from storms and absorb excess carbon from the atmosphere. Some species of kelp can be found during very low tides on rocky shores. Common species to look out for are: **oarweed** (*Laminaria digitata*), **cuvie** (*Laminaria hyperborea*) and **sugar kelp** (*Saccharina latissima*).

WHAT DOES IT LOOK LIKE?

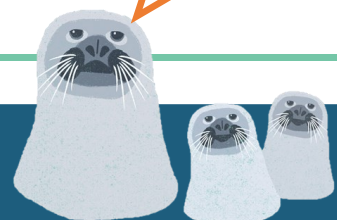
Kelp is a large brown seaweed that comes in three parts. At its base is a 'holdfast' which secures the kelp onto the rocks. A long 'stipe' grows upwards and is similar to a trunk of a tree. Leaf-like 'fronds' top the kelp. When clumped together in 'forests' the kelp provides a dense and dynamic habitat.

FACTS:



Kelp forests can support a variety of red seaweeds and animals such as anemones, sea squirts and sponges. Their many tiny spaces within the holdfasts can provide homes for worms, **crustaceans** and even the eggs of fish species. Kelp can provide food for grazers such as edible sea urchins (*Echinus esculentus*) (pictured left) and blue-rayed limpets (*Patella pellucidum*).

Find out about kelp and other seaweeds in our [Seaweed Dive In pack](#).



SCOTLAND'S MARINE AND COASTAL HABITATS



© Marie Seraphim



Seagrass meadow



© RJ Lilley

LOCATION:

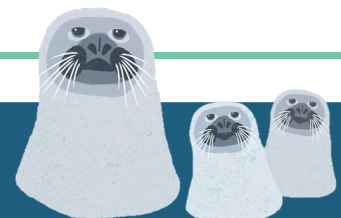
Although seagrass can be found around Scotland's coast it is considered to be an uncommon habitat which has greatly declined in recent years. Seagrass thrives in sheltered sites, and locations where it can be found include the Firth of Forth, the Tay estuary, the Moray Firth, the sound of Mull, Argyll and Bute, Dumfries and Galloway and in lochs in the Highlands.

WHAT DOES IT LOOK LIKE?

Seagrass is a flowering plant, unlike seaweed which is an **alga**. Seagrass anchors directly into the soft sediment of the seabed. Like **terrestrial** (land-based) plants, seagrass has leaves, roots and flowers that release pollen and eventually develop into seeds. These seeds are dispersed in the water currents until they find a new home and germinate (put out shoots). Inhabitants of seagrass meadows include Greater pipefish (*Syngnathus acus*), Stalked jellyfish (*Calvadosia species*) and Common cuttlefish (*Sepia officinalis*). Read more in our Seagrass Dive-In pack [here](#).

FACTS:

Seagrass provides most benefit while it is living and providing a natural habitat for wildlife. However, seagrass has been harvested, dried and used by people for many thousands of years. Indeed in some parts of the world, seagrass is farmed commercially. For example it can be grown in fields or marshes which are flooded by sea water. Seagrass can be dried, spun into yarn and woven to produce a variety of items from flooring to baskets and even furniture.



SCOTLAND'S MARINE AND COASTAL HABITATS



Coastal Cliffs



LOCATION:

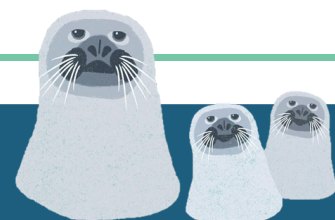
Cut off from the land and rising above the sea, cliffs provide a safe haven for any species that can reach them. Around Scotland's coastline, cliff habitats range from the gentle slopes of soft rock of Fife to the dramatic, wave-battered rocky cliffs of St Kilda.

WHAT DOES IT LOOK LIKE?

Cliffs come in a variety of forms depending on the geology of an area; cliffs made of soft rock erode quickly and are susceptible to land slips, whereas those made of hard rock are much more resilient and can form sheer walls of rock rising from the sea. Rocky cliffs are often interspersed with geological features such as caves, arches and stacks. **Stac an Armin** on St Kilda is the UK's highest sea stack, standing at 196.3m

FACTS:

Rocky cliff faces are globally recognised as important sites for seabirds. Across the UK coastline, millions of seabirds will nest and raise their young on cliffs each year. Cliffs are an ideal place for seabird colonies because their inaccessibility to land animals reduces the risk of **predation**. They also provide close proximity to good feeding grounds – essential for rearing a fit and healthy chick. Common seabird species that form breeding colonies on rocky cliff faces along Scottish coastlines include Northern gannet, Common guillemot and Blacked-legged kittiwake. Other species of non-colonial birds are also found including razorbill and various species of gull.



SCOTLAND'S MARINE AND COASTAL HABITATS



Sand Dunes



LOCATION:

Sand dunes are undulating mounds of sand formed along some stretches of the coast and colonised by specially adapted plants. These dramatic habitats change from bare sand at the back of sandy beaches to woodlands found miles inland.

WHAT DOES IT LOOK LIKE?

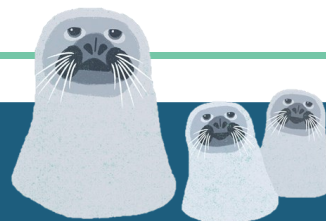
Look across a dune system and you'll notice dunes change in size, shape and inhabitants. Sand dunes form when sand blown from beaches gets trapped amongst objects at the back of the shore and gradually builds up above sea level. These small mounds of sand, called 'foredunes', consist of unstable, dry and salty conditions where only the hardiest plants can grow .

Once established, plants stabilise the sand and add organic material when they die, making conditions more favourable for other, larger plants to grow. Spiky marram grass is a common sight on our dunes. It is often planted in dune restoration projects.

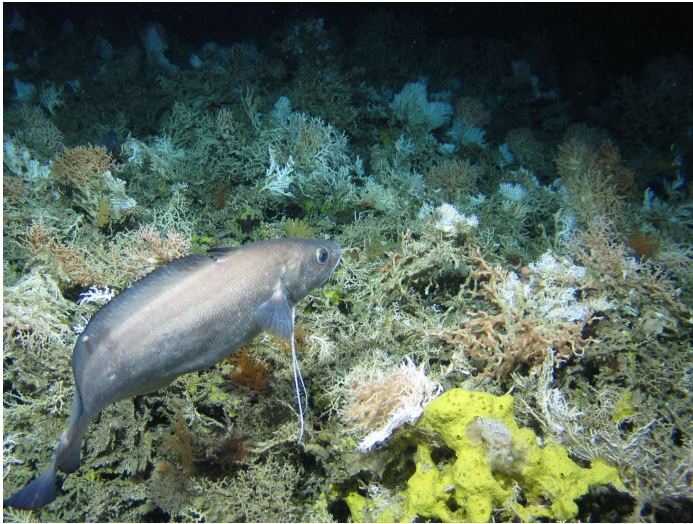


FACTS:

- Incredibly, if conditions are right, sand dunes can grow to heights of 100m.
- Scotland has 50,000 hectares of sand dunes, representing over 70% of Great Britain's coastal sand resource, but are at risk from a variety of threats. Loss of sand dunes results in the loss of specially adapted sand-dwelling species, some of which are only found in this habitat.



SCOTLAND'S MARINE AND COASTAL HABITATS



© Changing Oceans Group

Cold-water coral reefs



Lophelia pertusa specimen

LOCATION:

Around Scotland, reefs form mainly on the sloping seafloor off the west coast, where the sea becomes deeper. It typically forms at a depth of 200 to 400m. But *Lophelia pertusa* (pictured above) has also been found in shallower water above 150m in several places, notably near Barra and Mingulay.

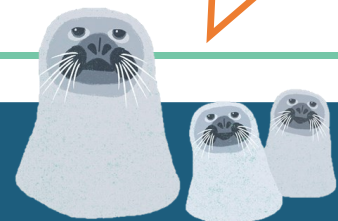
WHAT DOES IT LOOK LIKE?

The only reef-forming coral in Scotland is the *Lophelia pertusa*, which has translucent polyps (projecting growths) and up to 50 tentacles. The colour tends to be white, pink or yellowish. Cold-water coral reefs can reach thousands of metres long and provide a key habitat for many species, including the Atlantic wolf fish and squat lobsters.

FACTS:

- Cold-water coral reefs can grow in dark, cold water.
- The reefs are used for shelter, food and as a nursery for juvenile sharks, skates and rays.
- Unfortunately, cold-water coral is particularly vulnerable to human impacts e.g. pollution and fishing activities such as dredging and trawling.

Find out about other deep sea habitats in our [Deep Sea Dive In pack](#).



SCOTLAND'S MARINE AND COASTAL HABITATS



Horse mussel bed © Nature Scot

Horse mussel beds



Individual Horse mussel © Graham Saunders

LOCATION:

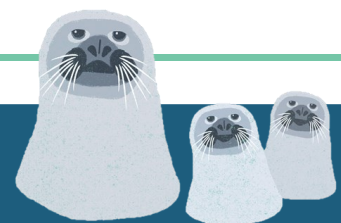
Thriving in more sheltered conditions, horse mussel beds can be found in Scottish sea lochs and the Shetland voes (small inlets) for example. Horse mussel beds are protected in 12 locations around Scotland by a suite of Marine Protected Areas.

WHAT DOES IT LOOK LIKE?

Horse mussels can grow as individuals, in small clumps, or grow together in such high quantities they form 'beds' on the sea floor. Horse mussels are bivalves (they have two shells hinged together). At up to 200mm in length, they grow much larger than the common mussels found on the seashore. The shell is dark blue or purple in colour.

FACTS

- These beds are full of life, supporting great biodiversity in their many nooks and crannies.
- Horse mussel beds are valuable for their ability to lock up carbon and filter water.
- In Gaelic, horse mussels are known as 'clabby dhu' meaning black mouth. This refers to their gaping mouth which filter feeds in the passing currents.
- The beds also provide a solid foundation for soft corals, tubeworms, barnacles, sea firs, sea mats and seaweeds and shelter for brittlestars, **crustaceans**, worms, scallops, **molluscs** and many other small animals.





© Sean Bell

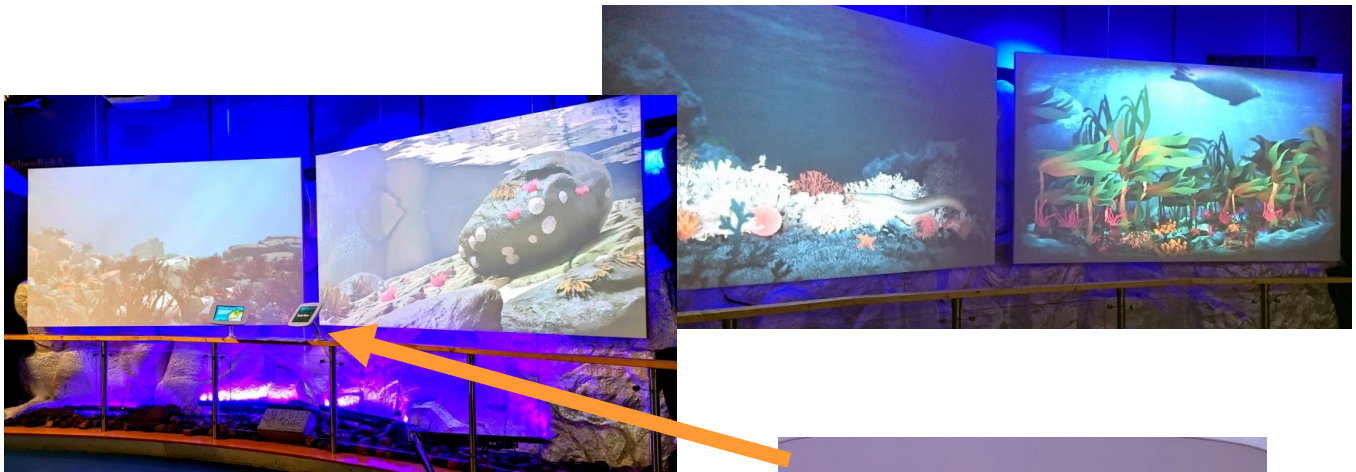
EXHIBIT

HABITAT ANIMATIONS

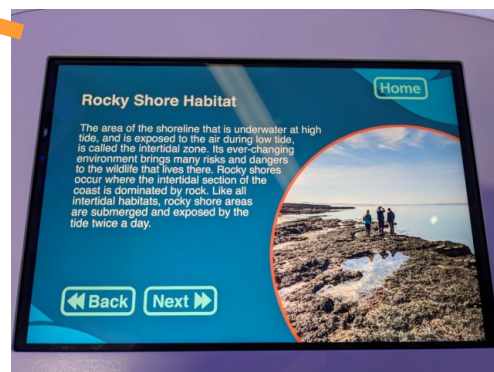


In our **Discovery Experience** exhibition at the **Scottish Seabird Centre** in North Berwick, we have an exhibit showcasing a few of Scotland's important marine habitats.

The photographs below from our exhibition shows our habitat animation exhibit. The two large screens show projected animations of various habitats. The four habitats, which we show on rotation, are the rocky shore habitat, horse mussel beds, cold water coral reef and kelp forest.



Each animation has a linked touch screen with an app full of information about that habitat and the species found within it.



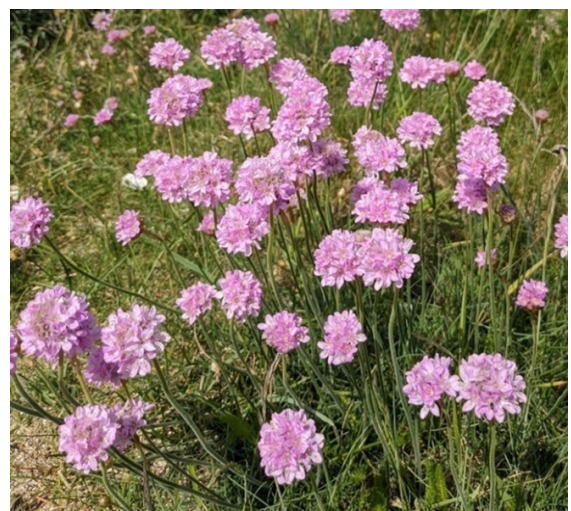
LET'S SAVE OUR SQUELCHY SALT MARSHES

Salt marshes are like muddy, seaside meadows. Here, grasses and small plants are regularly submerged in salt water as tides rise and fall. Only a tiny [3% of Scotland's coastline](#) is salt marsh, yet this habitat is hugely important!

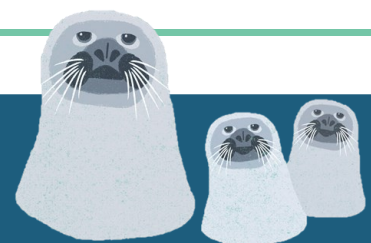


You can usually find salt marshes along the edges of estuaries (where rivers meet the sea) and lagoons. The water is salty and calm here. This means that seeds can germinate and send roots into the mud without being washed away.

However, it's still a harsh environment to live in. Too much salt is toxic to plants and sucks moisture out of their pores, whereas too much water in the soil will starve their roots of oxygen and cause them to rot. This means plants must be specially adapted to survive regular flooding and salty conditions.



Pink sea thrift has a high salt tolerance



LET'S SAVE OUR SQUELCHY SALT MARSHES

Adaptations of salt marsh plants include:

Salt glands – some plants, like Cord Grass, remove excess salt by secreting it from special structures (glands) in their leaves.

Succulency – although they get flooded a lot, plants here are exposed to the sun and desiccating sea breezes for long lengths of time. These plants therefore have thick, waxy leaves to lock in valuable moisture.

Narrow leaves – long, slender leaves have a smaller surface area from which they can lose water through transpiration.

Specialised internal cells – internal structures called “vacuoles” are much bigger in salt marsh plants than in most garden plants. Usually they store water, but in salt marsh plants they store lots of salt. Because there is more salt inside the plant than outside of it (meaning less water), water wants to move into the plant rather than out of it.

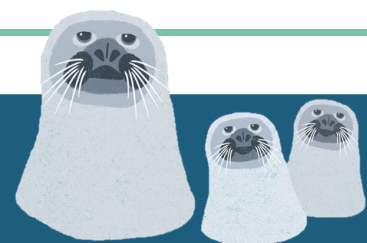


Sea aster



Glasswort

Most coastal plant species are salt tolerant, but there are some—such as glassworts—that actually prefer salty conditions! This is because they are so well adapted to this environment that they don't grow well anywhere else.



LET'S SAVE OUR SQUELCHY SALT MARSHES

Salt marshes improve the environment in 4 main ways:

- **Improve water quality:** Saltmarsh plants absorb water pollutants through their leaves and roots and store them in their tissues.
- **Stabilise coastlines and prevent floods:** Saltmarshes gather sand and mud between their roots and stems, keeping it from getting washed away. This builds up and up over time, raising the height of the land and acting as a barrier against rising sea levels.
- **Trap carbon:** Carbon is a “greenhouse gas”, meaning it speeds up climate change. Saltmarsh mud holds onto carbon and stops it from entering the atmosphere, which is where it causes the most problems.
- **Support wildlife:** Salt marshes provide refuge for many birds, insects, and marine creatures. Fish like young Atlantic Herring and Cod will use these as nurseries at high tide, as will mud shrimp, marine worms and snails, and crabs. These may be eaten by wading birds, which will use the protective cover of salt marshes to raise their young.



How can we help protect them?

Sadly, salt marshes are starting to disappear. They are being built on, eroded and polluted, which means they can no longer provide such amazing benefits to the environment. To help save them, we can:

- **Stick to marked footpaths** to prevent erosion by repeated footfall.
- **Find local restoration projects** and support them by volunteering or making a donation.
- **Spread the word** about how brilliant salt marshes are for people and wildlife! The more that people care about them, the more they may want to help protect them.



QUIZ

MATCH THE SPECIES TO THE HABITAT

Draw a line to connect each of the species below to the habitat in which it lives. Use the information in our fact files to help. We've done the first example for you. Find the answers on page 21.

PERIWINKLE

SEA THRIFT

GREATER PIPEFISH

BLUE RAYED LIMPETS

KITTIWAKE

SQUAT LOBSTER

MARRAM GRASS

SEAGRASS MEADOW

KELP FOREST

ROCKY SHORE

COLD WATER CORAL REEF

SALT MARSH

SAND DUNES

CLIFFS





FACTFILE

THREATS TO MARINE HABITATS

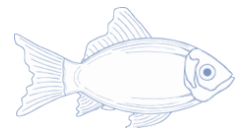
The over-riding threat to our coastal and marine habitats is the risk posed by **climate change**, which has a wide range of effects on our marine habitats, wildlife and seabirds. For example, acidification affects the ability of **mollusc** species, such as mussels and oysters, to develop their protective shells by reducing the process of calcification. A pattern of increases in sea temperatures and intensity of storms affect breeding seabirds through reductions in food availability and deaths during extreme weather.



Pollution comes in a variety of forms and from a variety of human sources both on land and at sea. It is estimated that 80% of all marine pollution comes from human activity on land and enters the sea through rivers and streams. The most visible of all sources of pollution is the litter that finds its way from land or from marine sources onto our shores and into our seas. Examples include waste from beach users, sewage-related debris, medical waste, shipping debris and discarded fishing lines, nets or gear.

Invasive species are those which have a negative impact on our native wildlife or on people's well-being or the economy. It is important to have processes in place to detect and then respond to invasive species in our coastal and marine environments. The best line of defence is to try to prevent these invasive non-natives arriving in the first place by having appropriate **biosecurity** measures in place.

Commercial fishing has damaged our marine environment in a range of different ways. Overfishing is when more fish stock is removed from the marine environment than can be naturally replenished. Certain forms of fishing gear, such as scallop dredgers, can also cause harm to our marine habitats and wildlife if they scour across sensitive habitats.



As the human population grows we demand more **physical infrastructure** as places to live, to help us travel around and to create space for our leisure activities. We also put in place hard physical structures to try to stem the effects of coastal erosion and to protect us from storm damage. These activities all reduce the amount of space available for our natural habitats and wildlife.





CRAFT

HABITAT DIORAMA

A diorama is a 3D miniature model of a scene, often enclosed in a box. For this craft you can make a diorama of any marine habitat using whatever materials you have to hand. Our example is a kelp forest inside a shoe box.



WHAT DO I NEED?

- Empty box
- Rocks, shells, sand, etc
- Paper or card
- Other props
- Paints, pens or pencils
- Scissors
- Glue or sticky tape

1



Remove the lid or flaps off your empty box then paint the inside of your box to suit your chosen habitat. For an underwater scene you may wish to choose a blue/green shade.

2



Once dry, place some rocks, pebbles, shells, sand or similar on the floor of your box. This will weigh down the box to stop it tipping over, as well as act as part of the scene.

3



Now start to populate the scene with some living things. We made lots of tall kelp by twisting strips of tissue or crepe paper. Stick one end to the top of the box and the other end to the base.

4



Next we added some smaller seaweed (using moss) to the rocks. Build up your scene with as much detail as you want.

CRAFT

HABITAT DIORAMA

5

You can draw or print, then cut out, some animals to add to your habitat. We added fish and seals.



6

Add a few finishing touches to complete your diorama. We Added a few more kelp fronds in the foreground.



If you enjoyed creating your habitat diorama, why not try making another one of a different habitat? We would love to see your finished work—send a photo of it to marineengagement@seabird.org



CHALLENGE

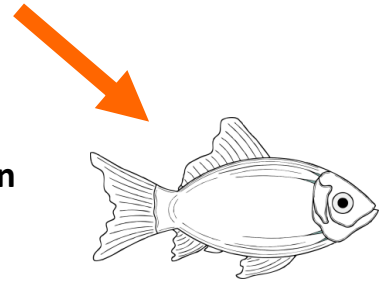


FIND THE CAMOUFLAGED FISH

Hidden throughout this pack are ten tiny fish like the one below (but not including this one). They are trying to blend in with their surroundings, like many creatures do in their own habitats. Can you find all of these camouflaged fish?

Answers are on the next page.

Write down below which pages you find them on and where on that page. Note the fish may be different sizes and colours.



Fish	Page Number	Location on Page
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		



ANSWERS



FIND THE CAMOUFLAGED FISH

Did you find ten fish hidden within the pages of this pack? Check your answers with the correct answers given below.

Fish	Page Number	Location on Page
1.	1	Foot of page, next to seals
2.	2	Top of page, next to seabird logo
3.	3	On the largest seal's front
4.	5	Inside the speech bubble
5.	7	Among the seagrass on the top left
6.	10	Beneath the coral reef photo
7.	16	At the top next to the seals
8.	17	At the lower right among the text
9.	19	In the blue wave
10.	19	In the blue wave (2 on same page)

Answers to the matching challenge on page 16: Periwinkle-Rocky Shore, Sea Thrift—Salt Marsh, Greater Pipefish-Seagrass Meadow, Blue-Rayed Limpets-Kelp Forest, Kittiwake-Cliffs, Squat Lobster-Cold Water Coral Reef, Marram Grass-Sand Dunes.



DISCOVER

GLOSSARY

ALGA

A simple, non-flowering plant which is usually aquatic. Seaweed is an example of an alga. The plural of alga is 'algae'.

AQUATIC

Living in or connected with water.

BIODIVERSITY

The variety of species or environments on the planet. The more variety, the healthier the planet.

BIOSECURITY

Procedures or measures designed to protect a population against harmful biological or biochemical substances.

CLIMATE CHANGE

Change in temperature and weather across the Earth that can be natural or caused by human activity.

CRUSTACEAN

An animal from the group that includes crabs, lobsters and shrimps which usually has a hard external skeleton.

COMMUNITY

Living organisms (plants and animals) that live within a habitat.

ECOSYSTEM

A community of living things which interact with each other and their environment.

INVASIVE

Something that goes or grows where it shouldn't.

POLLUTION

Something harmful that gets into the air, a water source or soil.

PREDATION

When an animal hunts another animal for food.

MICROHABITAT

A small area which differs from its surrounding habitat.

MOLLUSC

A subset of invertebrates, molluscs are soft-bodied animals including snails, slugs, octopuses, clams and oysters.

TERRESTRIAL

From the Latin word terra (meaning earth or land) this refers to anything that is related to land.