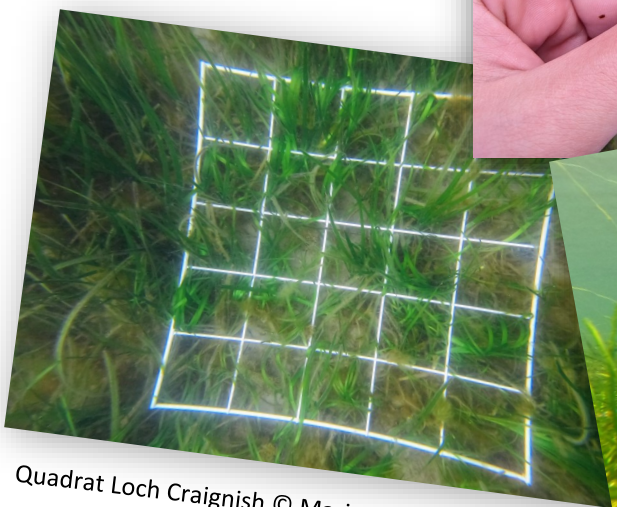
SSC Dive In!

SEAGRASS

Seagrass seeds
(c) Marie Seraphim



Quadrat Loch Craignish © Marie Seraphim

Reproductive seagrass shoot with seeds (c) Marie Seraphim

WELCOME!

Scottish Seabird Centre

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: Seagrass

Seagrasses are very important to the marine environment, providing a safe habitat for a range of species while also storing carbon and playing a key role in tackling climate change. Easily confused with seaweed, seagrass is different in several ways.

Dive into this pack to discover more about the seagrass around Scotland's seas.

Inside this pack:

- **Factfile: Seagrass**
- **Blog: Seagrass research**
- **Craft: Seagrass meadow in a box**
- **Seagrass colouring sheets**
- **Quiz: Test your seagrass knowledge**
- **Discovery sheets: Species found in seagrass**
- **Factfile: Threats to seagrass**
- **Activity: Fish biodiversity**
- **Factfile: Human uses of seagrass over time**
- **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

FACTFILE

Scottish Seabird Centre

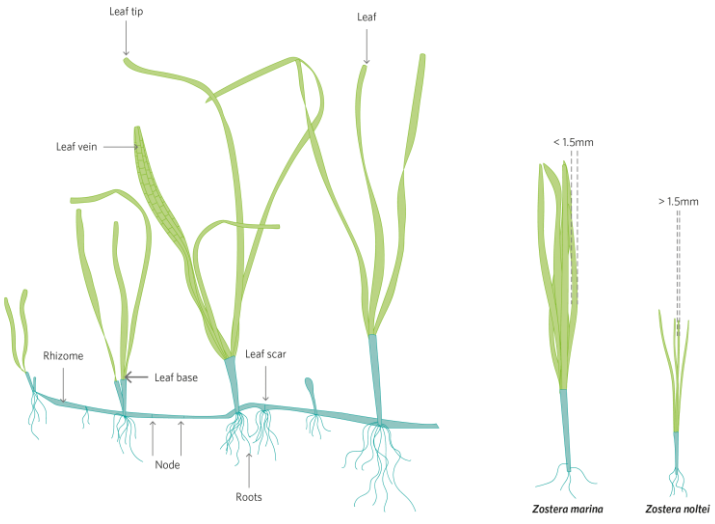
SEAGRASS IN SCOTLAND

What is seagrass?

Seagrasses are the world's only marine flowering plants. Their incredible **adaptations** have allowed them to successfully colonise all continents except for Antarctica. Seagrasses have been labelled as "ecosystem engineers"; they create lush habitats that host a huge variety of fish species, small **invertebrates**, burrowing anemones, urchins and **bivalve molluscs**. Aside from creating **biodiversity** hotspots, seagrass meadows also efficiently absorb large amounts of carbon dissolved in our oceans in a process described as "blue carbon".

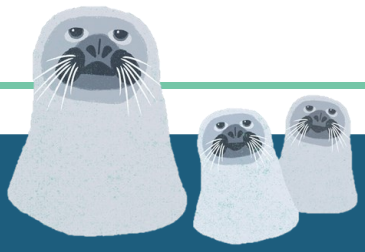
How many species are there in Scotland?

GENERALISED ILLUSTRATION OF *ZOSTERA* SPP. SHOWING PLANT STRUCTURE AND LEAF MORPHOLOGY



There are about 70 different species of seagrass in the world, ranging from tropical to cold-water seagrasses. Here in the UK we have just two; common eelgrass (*Zostera marina*) and dwarf eelgrass (*Zostera noltei*). They look very similar, the main difference being their size (dwarf eelgrass is small) and their position on the shoreline with dwarf eelgrass typically being found higher on the shore than common eelgrass which favours deeper habitats.

ZSL LET'S WORK FOR WILDLIFE | UNIVERSITY OF PORTSMOUTH | Environment Agency



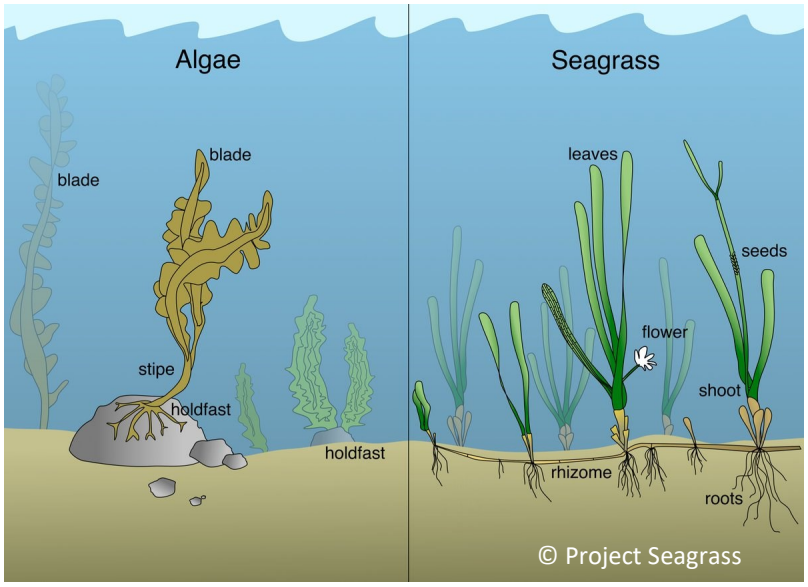
FACTFILE

Seagrass in Scotland

Scottish Seabird Centre

How does seagrass differ from seaweed?

Seagrass is a flowering plant, unlike seaweed which is an **algae**. Seaweed holds unto structures with a holdfast, unlike seagrass which anchors directly into the soft sediment. 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).



Where can I find out more about seagrass?

Project Seagrass is a conservation charity dedicated to the conservation of seagrass ecosystems through research, community and action. Their website holds lots of interesting information about the work they do and how to get involved in their activities. The Scottish Seabird Centre also has partnered with WWF-UK, Project Seagrass and others on the Restoration Forth project, a collaborative initiative that aims to bring back seagrass meadows in the Firth of Forth. Learn more about this existing project right here in Scotland here!

DISCOVER

Scottish Seabird Centre

SPECIES FOUND IN SEAGRASS MEADOWS

Greater pipefish

SYNGNATHUS ACUS

SIZE: Around 35 cm in length on average

DIET: Plankton such as copepods (small crustaceans)

LOCATION:

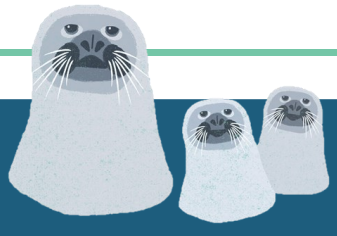
Pipefish are widely distributed in the UK, mainly along the south and west coasts of England and up the west coast of Scotland. Pipefish can be found in a wide range of depths, from shallow seaweed habitats to deeper waters of about 90 metres. They are common inhabitants of seagrass meadows although they are not always easy to spot.

WHAT DOES IT LOOK LIKE?

Pipefish are masters of disguise. They have long elongated bodies and snouts that they often hide in between the leaves of seagrass meadows. They are slow swimmers due to their tiny dorsal fin.

FACTS:

- Pipefish are often mistaken for sea snakes but are actually related to seahorses.
- Like seahorses, male pipefish are actually the ones to take care of the babies. The females compete for male attention in an elaborate courtship dance. Male pipefish nurture baby eggs in their pouch, and the young often remain with the father for a while after hatching for protection.
- Their mouth does not open and close like ours, they have to suck the tiny planktonic creatures they eat through their long snout similar to using a straw.



DISCOVER

Scottish Seabird Centre

SPECIES FOUND IN SEAGRASS MEADOWS

Spiny dogfish

SQUALUS ACANTHIAS

SIZE: Around 1 - 1.2 m

DIET: Fish, octopus and squid

Photo: *Spiny dogfish having a tracking device fitted to help scientific research into sharks in Scotland © James Thorburn.*

LOCATION:

Spiny dogfish are widely distributed throughout the UK. They can be found anywhere from shallow waters to more than 3000 feet (914 m) deep. They often hunt for juvenile fish in seagrass meadows.

WHAT DOES IT LOOK LIKE?

The spiny dogfish goes by many names, including piked dogfish, spurdog, rock salmon and spiky dog but it's actually a shark. Dogfish have a slender brown grey body with a much paler belly. It has white spots covering its entire back. It also has two dorsal fins each with large venomous spines. The females give birth to live young pups.

FACTS:

- Dogfish are one of the most common shark species in the ocean, but never fear, they are harmless to us humans.
- They are marked as vulnerable by the **IUCN Red List**. In some part of the world they are targeted for their meat and fins, particularly for shark fin soup.
- These sharks have the longest pregnancy of any vertebrate, and female stay pregnant for up to 24 months (two years).

DISCOVER

SPECIES FOUND IN SEAGRASS MEADOWS

Calvadosia campanulata © Dr Keith Hiscock

Stalked jellyfish

CALVADOSIA SPECIES

SIZE: Up to 5 cm tall

DIET: Plankton, larvae and tiny crustaceans

LOCATION:

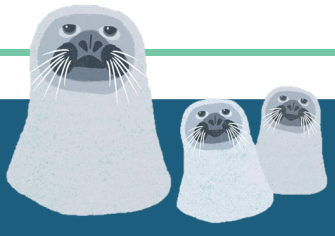
Various stalked jellyfish species can be seen around UK coasts. They are usually found in shallow coastal waters with good **currents** that bring lots of tiny floating food. They often attach to seaweed or seagrass blades.

WHAT DOES IT LOOK LIKE?

Stalked jellyfish are funnel shaped and can be brown, green or red in colour. Unlike true jellyfish, stalked jellyfish are stationary their entire lives. They do however have the same stinging cells in their tentacles know as nematocysts. These sting unsuspecting prey which are stunned and reeled back into the mouth of the jellyfish.

FACTS:

- Stalked jellyfish **larvae** will crawl along the sea floor looking for a suitable place to attach and morph into an adult.
- One species of stalked jellyfish (*Calvadosia campanulata*) is covered in turquoise coloured warts where stinging cells are stored.
- Stalked jellyfish have 8 arms, each with approximately 45 tentacles.



DISCOVER

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SPECIES FOUND IN SEAGRASS MEADOWS


© Lyle Boyle

European Plaice

PLEURONECTES PLATESSA

SIZE: Largest recorded was 1m long but usually 50-60 cm long

DIET: Worms, crabs, shrimp and shellfish

LOCATION:

Plaice are common all around Britain. They live mostly in sandy and muddy habitats, about 10 to 50 meters deep. Young plaice live their first year in very shallow water, and are often found sheltering in seagrass meadows. They move to deeper waters after they reach 15 cm in size.

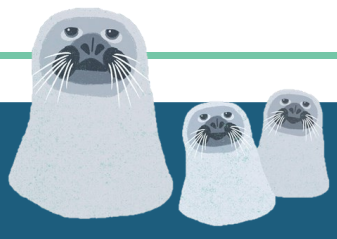

© Hans Hillewaert

WHAT DOES IT LOOK LIKE?

This funny looking fish is flat like a pancake. They are cream and yellow coloured to blend easily with sandy environments. The underside of their body is white. They have bright red or orange spots on their top side. They have both eyes on one side of their face, which helps them better see predators and prey above them while buried in the sand.

FACTS:

- Plaice are ambush **predators**—they bury themselves in the sand and look up until they see a tasty snack and strike.
- Plaice are nocturnal—which means they are mostly active at night, especially to hunt.
- Plaice are a commercially important species in the UK—you will often find them served in fish and chip shops.



DISCOVER

SPECIES FOUND IN SEAGRASS MEADOWS

Common cuttlefish

SEPIA OFFICINALIS

SIZE: Up to 45 cm

DIET: Molluscs, crabs, shrimp, fish, worms, even other cuttlefish

LOCATION:

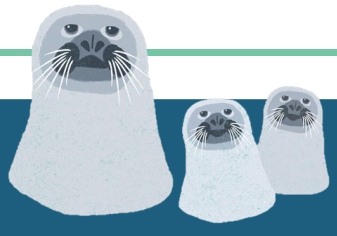
Cuttlefish are mainly sighted along the South and West coast of England and Wales but they are occasionally spotted around the West to the North coast of Scotland, including the Hebrides.

WHAT DOES IT LOOK LIKE?

Cuttlefish are the chameleons of the seas. They can change their skin colour and texture to camouflage and to communicate with each other. They have 8 arms and 2 tentacles covered with suckers to taste things. Cuttlefish are colourblind and have striking W shaped eyes.

FACTS:

- The cuttlefish is not a fish, but a **mollusc** closely related to squid and octopus.
- Cuttlefish have an internal shell called a 'cuttle bone' which they use for buoyancy. They fill this bone with gas, which helps them float around and orient themselves in the water.
- Cuttlefish are common visitor of seagrass meadows. They lay their eggs between the blades and cover them with ink. The eggs look a bit like 'sea grapes'. These eggs take 1-2 months to hatch.



BLOG

Scottish Seabird Centre

Being a seagrass researcher

By Issy Key, PhD Student

Hi! I'm Issy, and I am lucky enough to spend my working day researching the creatures that live in seagrass meadows.

At heart, I'm a lover of animals and the sea, but I also have a curious nature and so I enjoy doing scientific research. I'm a PhD student, which means I am a researcher in training. This means I get to design my own research project - I can think up questions I want to know the answer to, and work out how to answer these questions, using a range of equipment and methods. I get to be my own boss, with more experienced researchers there to guide me when needed.

Hydrobia snails on intertidal seagrass

What am I investigating?

Seagrass meadows aren't just grass – they're an important resource for a huge array of animals that interact with the meadow in different ways, such as using it for shelter or food. There's lots we don't know about these animals, especially in Scotland where the waters are cold, and studying their life-cycle and behaviour is a bit more of a challenge. It's important that we do learn more about seagrass and the animals that live within this habitat so that we can protect it into the future; especially as the climate changes.

Specifically, I'm using photographs, video and sound recordings to learn more about what animals live in seagrass, and what creatures visit it to hunt for food. In practice, this involves a fair bit of snorkelling and kayaking, as well as fiddling around with equipment and analysing photos, videos and sound recordings on the computer.

BLOG

Scottish Seabird Centre

BEING A SEAGRASS RESEARCHER

Seagrass soundscapes

People often think of the underwater world as silent, but it can actually be quite noisy! Some fish make grunting sounds, purrs or snaps. They do this by many different mechanisms, including vibrating the swim bladder (an organ filled with gas) or rubbing bones or teeth together. Meanwhile you can hear crabs eating, walking and rubbing their claws together. I'm using underwater microphones to listen to the noises that animals in seagrass make – it's a bit like being a spy! We might be able to hear animals that we can't easily see using cameras, because they're too well **camouflaged** or come out at night. The hope is that listening to all the sounds in a seagrass meadow (the soundscape) will allow us to accurately estimate what is living in the meadow and how healthy the **ecosystem** is as a whole. You can listen to some example fish sounds here.

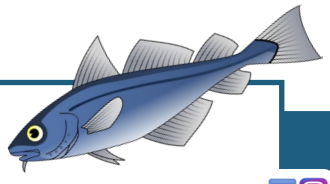
Microphone listening to the soundscape over sand

Snakelocks anemone on seagrass

Birds, otters and seals feeding in seagrass

The fish and crabs living in a seagrass meadow can make tasty meals for other animals, including larger fish, as well as semi-aquatic animals that only spend part of their time in the water – birds, otters and seals. These animals generally have large ranges, meaning they roam over a wide area of coast, land or sea. However, some of their favourite food, such as shore crabs and small fish are common in seagrass meadows, creating good hunting grounds. Very little is known about the extent to which these animals use seagrass meadows for hunting, and it's hard to observe this behaviour by eye because they don't always visit very often. Therefore I'm setting up video cameras looking at the sea surface, so that I can capture the predators diving in the seagrass. Once I've collected all my footage, I'll use a machine learning algorithm (a series of steps you give a computer program in order to solve a problem or achieve a task), which is available for anyone to use through the internet, to find the parts of the video containing animals. I can then identify and look at their behaviour.

See Page 13 for Issy's Fish Biodiversity Activity



FACTFILE

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Threats to seagrass

Does anything threaten seagrass?

Unfortunately, seagrass meadows in the UK and around the world are impacted by many threats. Big ones include pollution, climate change and physical damage from destructive activities such as dredging. Have a look at the diagram below for a full picture of current threats to our meadows.

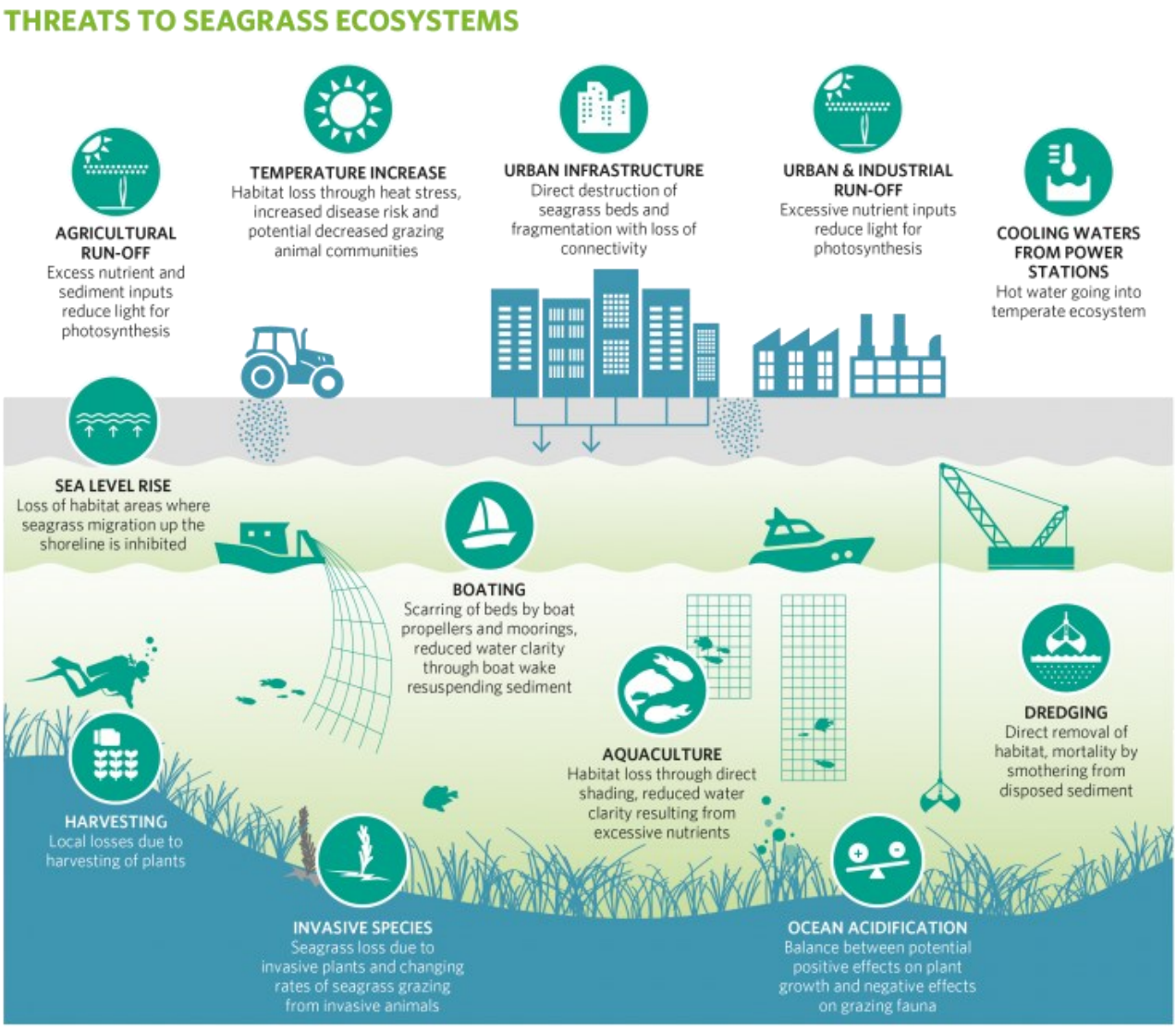
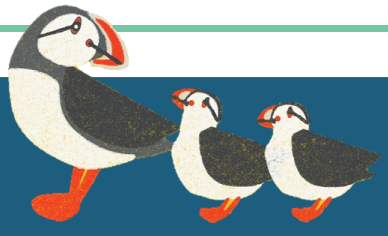


Figure modified from United Nations Environment Programme (UNEP) (2020).

ZSL | LET'S WORK FOR WILDLIFE | UNIVERSITY OF PORTSMOUTH | Environment Agency

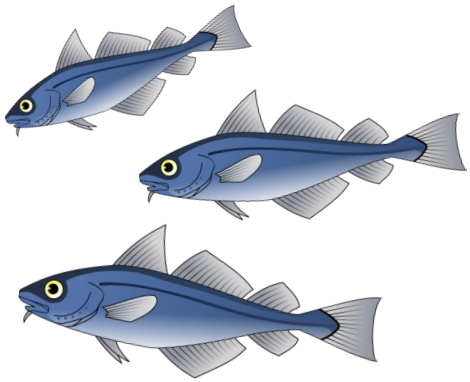


Activity

Fish biodiversity

Monitoring fish can be challenging, since they often blend in with the background or swim away from you quickly. One way to get past this problem is to use underwater cameras with bait to attract fish out from hiding. This method is called 'Baited Remote Underwater Video' or BRUV for short (scientists like to give things fun names whenever possible!).

Pollack in a seagrass meadow

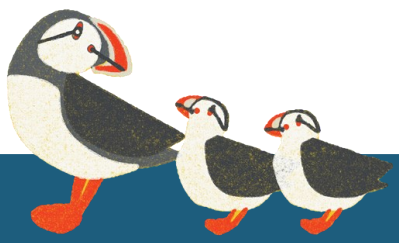


Take a look at this BRUV footage to investigate how the fish and crab community differs between seagrass and nearby areas without seagrass. For each video, count up the maximum number of each fish or crab species that you see at any one time. You can use this guide to help you identify the species!

Watch the videos here (we recommend you set the video quality to 4K).

Take a look at this guide to help you identify the species.

Record your findings on the table on the next page.



ACTIVITY

Fish biodiversity

Record your findings below after you have watched the videos linked to on the previous page.

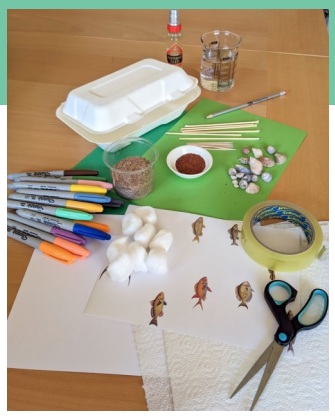
Clip	Species Name	Number of Individuals of each Species
Seagrass 1		
Seagrass 2		
Seagrass 3		
Sand 1		
Sand 2		
Sand 3		

Do you find any difference in the number of species, and number of fish found in the seagrass compared to the sand? How about the types of species? Lastly, can you think of any disadvantages of this method of surveying?

CRAFT

Seagrass meadow

Scottish Seabird Centre



Grow your own living seascape from seed. Designed to look like a seagrass meadow, you can adapt and personalise this craft to incorporate your own ideas.

What do I need?

- **Takeaway container**
- **Scissors**
- **Cress Seeds**
- **Card or paper**
- **Water**
- **Cocktail sticks**
- **Glue or sticky tape**
- **Pencil**
- **Sand (optional)**
- **Coloured pens**
- **Shells**
- **Cotton wool**

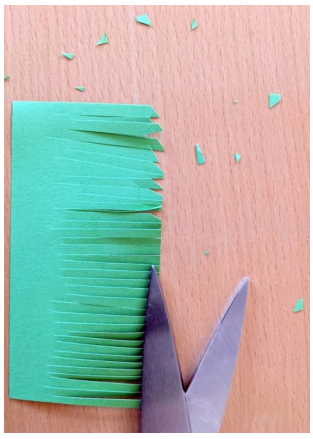
1

Open the food container and fill the base with cotton wool or kitchen roll or similar. Note: cress seeds do not need soil to grow. The cotton wool will hold its roots and some moisture.

2

Optionally add a layer of sand over the cotton wool to make a more seabed landscape then sprinkle your cress seeds onto the surface. Pour a little water over the seeds.

3



To decorate the box use some green paper or card (or paint white paper green). Cut into strips and then use scissors to create a ‘fringe’ effect like blades of grass. Optionally, you can snip the ends of the grass to be pointy.

4

Place your paper ‘seagrass’ around the inside edges of your box. You can use different shades of green in layers if you wish.

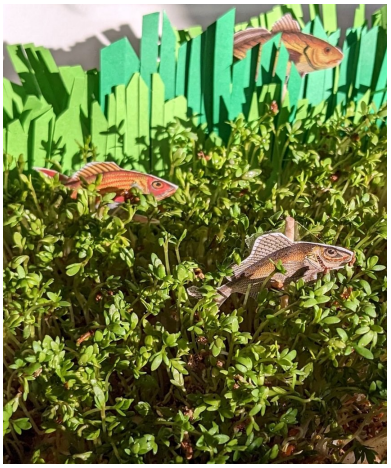
Please always supervise children around scissors.

5

Add some animals to your seagrass meadow. Try drawing some fish or printing and cutting out fish pictures. You can also place some shells on the seabed or draw other species of your own choice.

6

Now you will need to keep your seeds moist and wait for them to germinate and grow. You should see the results in a week or less.



You will notice the seeds germinating (putting out shoots) after a day or two. By 4-6 days your cress will be quite tall. Personalise your seagrass meadow box by adding a watery sea background inside the lid. Also, why not add your name to the outside of the top lid?

DISCOVER

Scottish Seabird Centre

HUMAN USES OF SEAGRASS

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.

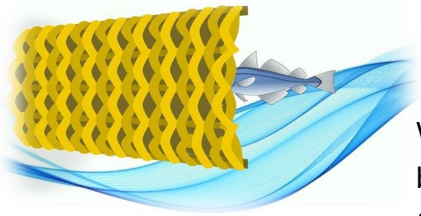
Seagrass can be dried, spun into yarn and woven to produce a variety of items from flooring to baskets and even furniture. Not only is it a very hard-wearing material, seagrass is non-porous (does not allow water or air to pass through it) which makes it less likely to stain or become damp. It is softer than other natural flooring materials such as jute. Another benefit is that being **biodegradable**, seagrass products will break down naturally when they reach the end of their useful life.

Here are a few more examples of how seagrass has been used by people over the centuries….

To fill mattresses and seats

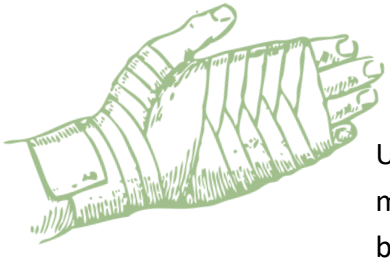
To thatch roofs and insulate homes.

Fertiliser to help crops grow



Woven into basket-style fishing traps

Bedding and feed for animals



Used in traditional medicines and for bandages

QUIZ

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Check what have you learned

Note: The answers can be found on page 22.

1. How many species of seagrass are found in Scotland?

2. Which produces flowers—seaweed or seagrass?

3. What shape is a cuttlefish's eye?

4. How have farmers used seagrass?

5. How does seagrass help with climate change?

6. Which species found in seagrass meadows is related to seahorses?

7. Which of the species highlighted in this pack is actually a shark?

8. What tool can you use to help record seagrass sightings?

FACTFILE

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HOW YOU CAN HELP

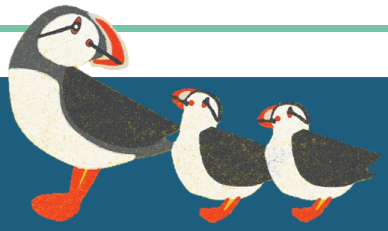
How can you help seagrass?

SeagrassSpotter is a tool for seagrass conservation globally designed by our friends at Project Seagrass. Harnessing the power of citizen science - meaning anyone in the world can contribute - we want to turn your sightings into conservation action. Please help us by submitting sightings of seagrass from all around the world via this app, or via seagrassspotter.org. The team at Project Seagrass, as well as other seagrass experts and government practitioners will use the data to learn more about seagrass meadows, their distribution, and range. We also hope to understand more about the threats they face so that management actions can be targeted accordingly.

It's super easy to use—just grab your snorkel or your wellies and head to your favourite coastal spot. We ask that you stay on the lookout for both species of UK seagrass, and if you find any that you take a snap with you phone and upload your sighting to the app.

Tip: Seagrass usually thrives in low-energy estuarine habitats (where a river meets the sea). On the West coast of Scotland you might find seagrass in sea lochs, while on the East coast you may find seagrass on the edge of the beach when the tide is low.

For more instructions, watch this simple video.



ACTIVITY

SEAGRASS COLOURING

On the next page is a scene from a seagrass habitat for you to colour in.
Can you correctly identify each of the following species within that scene?

Tick off each animal as you find it.

CAN YOU FIND...?

- 1 otter ☐
- 1 seal ☐
- 1 cormorant ☐
- 1 crab ☐
- 1 pipefish ☐
- 2 pollock ☐
- 2 sea gooseberries ☐ ← like jellyfish
- 3 two-spot gobies ☐
- 3 seasnails ☐
- 10 sand eels ☐

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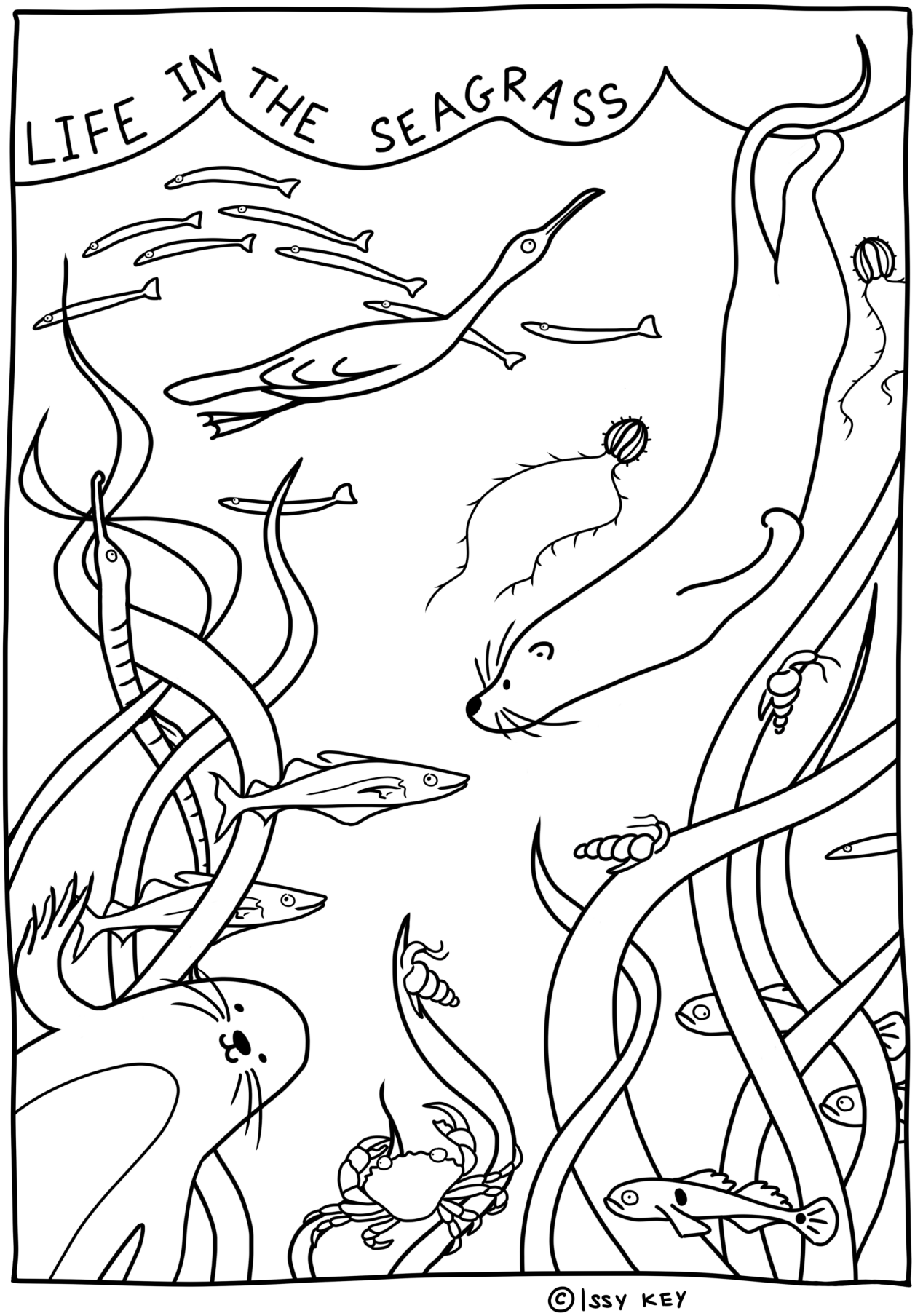
ACTIVITY

SEAGRASS COLOURING

Scottish Seabird Centre



QUIZ

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ANSWERS

1	How many species of seagrass are found in Scotland?	**Two**
2	Which produces flowers—seaweed or seagrass?	**Seagrass**
3	What shape is a cuttlefish's eye?	**Like the letter 'W'**
4	How have farmers used seagrass?	**As fertiliser for crops and also as feed or bedding for animals**
5	How does seagrass help with climate change?	**Seagrass can capture carbon and store it (known as 'blue carbon')**
6	Which species found in seagrass meadows is related to seahorses?	**Greater pipefish**
7	Which of the species highlighted in this pack is actually a shark?	**Spiny dogfish**
8	What tool can you use to help record seagrass sightings?	**Seagrass Spotter**

DISCOVER

Scottish Seabird Centre

Glossary

Adaptations	When a living thing adjusts to its environment in order to improve their chances at survival in that environment.
Algae	Simple, non-flowering, and typically aquatic plants of a large group that includes seaweeds.
Biodegradable	When something can be broken down naturally and return to nature without having a harmful impact on the environment.
Biodiversity	The variety of species or environments on the planet. The more variety, the healthier the planet.
Bivalve	Animals that have a shell with two halves, or valves.
Camouflage	When animals conceal themselves by blending into their surroundings, either by the pattern, colour or texture of their skin, or the use of materials around them.
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.
Current	Ocean currents are the continuous, predictable, directional movement of seawater driven by gravity, wind , and water density.
Ecosystem	A community of living things which interact with each other and their environment.
Invertebrate	An animal without a backbone or bony skeleton—ranging from microscopic mites to spiders, worms and even giant squid.
IUCN Red List	A system for classifying species at high risk of global extinction.
Larvae	An immature form of many animals that develops into a different adult form by metamorphosis.
Mollusc	A subset of invertebrates, molluscs are soft-bodied animals including snails, slugs, octopuses, clams and oysters.
Predator	An animal which hunts another animal for food.