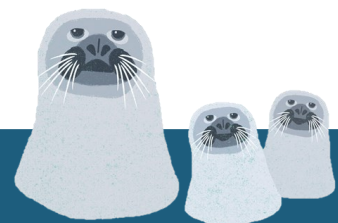
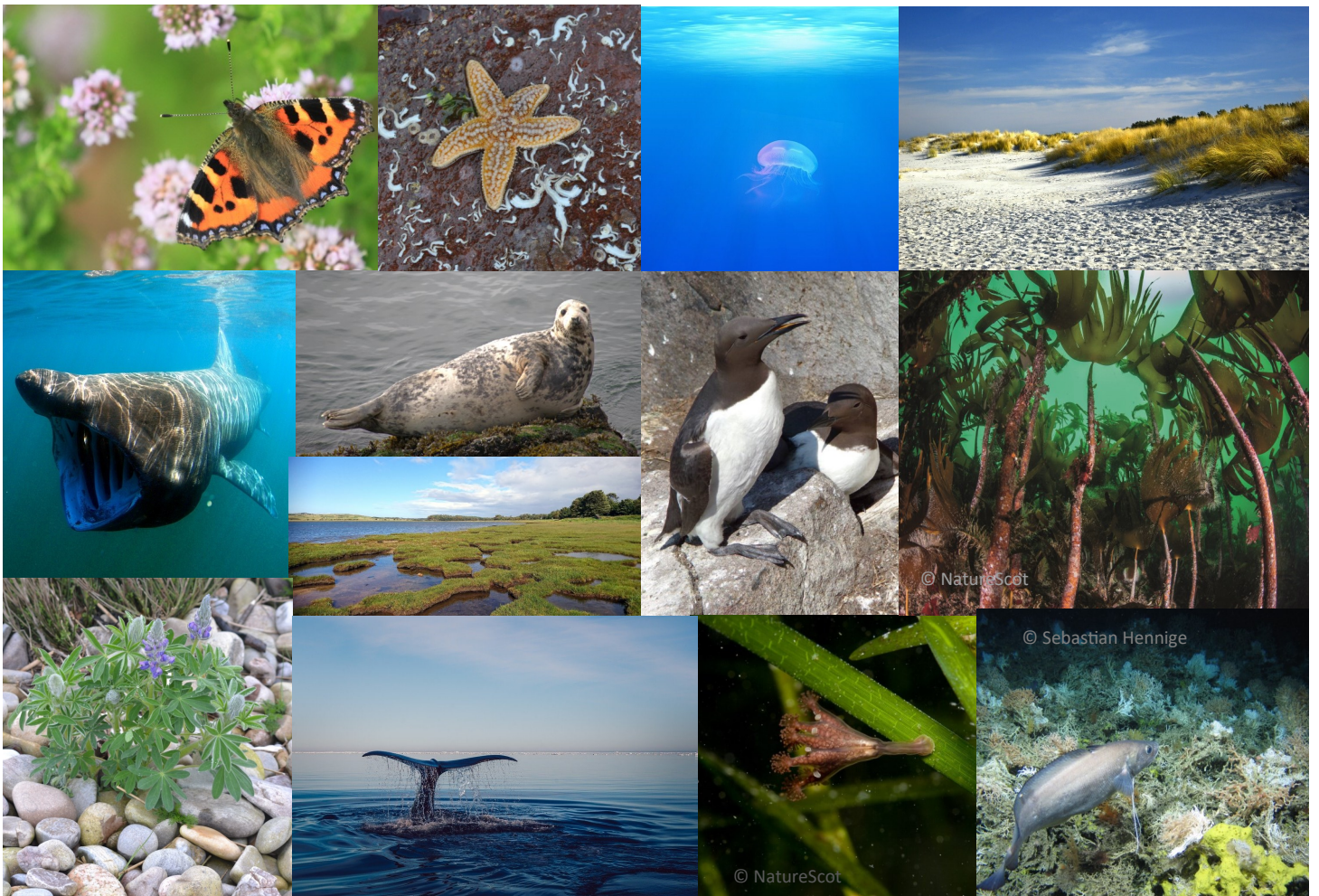




SSC DIVE IN! BIODIVERSITY





WELCOME!

Hello, and welcome to “SSC Dive In!”. Packs of resources providing some seaside fun directly into family homes and classrooms.

This pack’s theme: **Biodiversity**

Without a healthy planet, we wouldn’t be able to survive—it provides us with the food we eat, the air we breathe, beautiful places to explore, and materials for building our houses. A healthy planet is a world full of different environments and species.

‘**Biodiversity**’ is a word we use when talking about the variety of life.

Concerningly, climate change and other human impacts are damaging the environment and causing a loss of biodiversity. The good news though is people are trying to help - in December 2022, governments from all over the world are coming together for ‘**COP15**’, a big meeting to decide how to put a halt to this loss. Find out more and how you can help inside.

Inside this pack:

- **Fact file: Biodiversity**
- **Children’s blog: What is COP15?**
- **Guide: How to help the planet**
- **Film: Young Environmental Ambassadors**
- **Investigation: Gannet vs Kittiwake**
- **Spotter sheet: Coastal Butterflies**
- **Activity: Biodiversity Bingo**
- **Glossary**
- **Your chance to earn a certificate**

We’d love to hear from you! If you’ve had fun having a go at activities, or been inspired to protect the environment, 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 education and conservation 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 the our [JustGiving page](#). Thank you.

We hope you enjoy diving in to the pack!

Scottish Seabird Centre Learning Team





FACTFILE

BIODIVERSITY

WHAT IS BIODIVERSITY?

'**Bio**', shortened from 'biology', refers to living things.

'**Diversity**' means variety.

Put them together and '**biodiversity**' means the variety of life on Earth!

There are two ways to look at biodiversity:

1. The variety of **environments** - Our planet has lots of different environments: Mountains, seas, forests, deserts, grasslands, lakes and many more.
2. The variety of **species** - Each environment contains different types of animals, plants and other organisms. Some environments have a higher variety of species than others. When there are lots of different species living in one place, there is high biodiversity. If there are only a few species, there is low biodiversity.



© NatureScot

Kelp forests are found off the coast of the UK and are home to lots of different species— they have a high biodiversity.



WHAT IS THE STATE OF THE EARTH'S BIODIVERSITY?

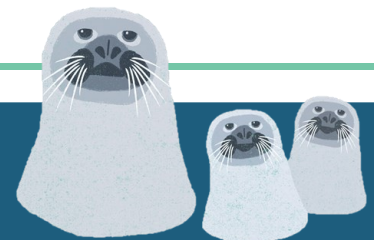
The amount of life on the Earth has changed over its 4.5 billion year lifespan. There have been times when there was no life at all and times when there are billions and billions of species.

50 years ago, humans were living in a time when there was much higher biodiversity than there is now.

Across the globe, biodiversity is in decline. Scientists have estimated that we have lost **60%** of mammals, birds, fish and reptiles since 1970 and predict **1 million species** are threatened with extinction over the coming decades to centuries.

In Scotland, we have seen big changes. Facts and figures are available [here](#).

However, not all species are in decline. In fact some are doing well. It's all to do with how **vulnerable** species are to change; where they live, what they eat (see our '**Investigation**' activity for an example) and how much they are impacted by human activities.





FACTFILE

BIODIVERSITY (CONTINUED)

WHAT'S HAPPENING IN THE OCEAN?



Research has suggested that marine species are disappearing faster than land species.

- Between 30% and 35% of the critical marine habitats around the world such as seagrasses, mangroves and coral reefs are estimated to have been destroyed.
- In the past 50 years, shark populations in the high seas have fallen by 71%.
- Without significant changes, more than half of the world's marine species may be on the brink of extinction by the year 2100.

WHY IS BIODIVERSITY DECLINING?

Biodiversity can naturally increase and decrease with gradual shifts in the world's climate, e.g. **Ice Ages**, or local changes such as fires and floods.

However, since 1970 the human population has **doubled** and with more people comes the need for more food, more buildings and more energy to power technology. This has led to:



- **Pollution**—when human rubbish, chemicals, light and sound damage the natural environment.
- **Destruction of natural habitats**—expanding towns, farmland, and collecting resources, such as coal and wood, has led to huge areas of land being cleared for human use.
- **Over-fishing and hunting** —when species are hunted so much they become **endangered**.
- **Invasive species** — species that are transported from different parts of the world by people, e.g. on the hulls of boats, and take over areas and replace native species.
- **Climate change**—a change to our climate across the globe, caused by burning fossil fuels for energy. Click [here](#) to find out more.

Together, these factors are causing much more widespread and larger disturbance than naturally occurs. Species aren't able to **adapt** to quickly enough to this change and the result is widespread biodiversity loss.





FACTFILE

BIODIVERSITY (CONTINUED)

WHY IS BIODIVERSITY LOSS A CONCERN?

All life, including us, depends on a healthy planet to survive.

Biodiversity provides us with the clean air, fresh water, food and resources that we take for granted. It helps us fight **climate change** (by taking in the greenhouse gas, carbon dioxide, from the air) and reduces the impact of natural hazards such as floods and stormy seas.

The more species disappear, the less able our planet is to provide us with the things we depend on.



Imagine the Earth is a jigsaw with each piece being a different species. All life is joined together and connected to make a complete puzzle.

Now imagine removing a piece— the connection is broken and the puzzle isn't complete anymore.

WHAT IS BEING DONE AND WHAT CAN I DO TO HELP?

In December 2022, governments from all over the world are coming together for **COP15** to decide how to put a halt to the loss of biodiversity around the world. Read our blog on the next page to find out more.

You can do something too. It may seem as though such a big problem can't be fixed by individuals, but we are all a part of this planet and can do our bit to help. Take a look at the '**How to Help the Planet**' section in this pack to find out more.



BLOG



WHAT IS COP 15?

Have you heard the term ‘COP 15’ in the news or in school? If you haven’t heard about it yet, you probably will over the coming months. It’s all to do with **biodiversity**.

When it comes to dealing with big, important issues such as protecting the variety of plant and animal life on our planet, people from all over the world need to work together. In December 2022, a big meeting or **conference** will take place in Montreal, Canada. Organised by the UN (United Nations), this Biodiversity Conference—called **COP 15**—will allow representatives from many countries to look at how to build a better future in harmony with nature.



Life on Earth has evolved over millions of years to be hugely varied or **diverse**. However, the actions of humans have resulted in a decrease in variety. This drop in diversity has sped up in recent years and many plants and animals have completely disappeared (become **extinct**). The UN Secretary-General has said that the COP 15 meeting can “halt the extinction crisis”. How could that happen?

Governments will be required to develop strategies and action plans that aim to halt the loss and restore biodiversity. This might include looking at how natural resources such as forests, rivers, seas and soil are used. It might involve setting rules around activities like farming, mining, fishing and house building—all the things that affect the natural environment.

QUICK FACTS

- COP stands for **Conference of Parties**
- The 2022 conference will be the **15th meeting** about biological diversity
- 2011-2020 was the **UN Decade on Biodiversity**
- 2021-2030 will be the **UN Decade on Ecosystem Restoration**





The purpose of the meeting will be to agree ways to minimize negative effects on the natural world, to use practices that are **sustainable** and that help and **conserve** biodiversity. Actions agreed by governments will filter down to the businesses and to the individuals who live in the countries involved. Ultimately, you too will be part of the effort to protect all life on Earth and to live in harmony with nature.



Here in Scotland 11% of species are threatened with extinction from Great Britain, according to the State of Nature 2019 report. What can you do to help?

If you have an outdoor space at home, you could make it wildlife-friendly by planting seeds, building a 'bug hotel', or putting out food and water for birds. You can help keep your local area safe for animals by carefully disposing of litter or helping at a beach clean. When you are enjoying the countryside, always follow the [Scottish Outdoor Access Code](#) to enjoy nature responsibly. And don't forget to keep your eyes and ears open for reports from **COP 15**. It's such an important event for the future of our planet!

Show your support for the planet by taking action and following the progress of the conference in the links provided. Why not have a go at something green? Let us know if you do—we could send you a certificate!

USEFUL LINKS

[YouthLink—Upcoming Events \(environmental\)](#)

Students:

[Convention of Biological Diversity Youth Pages](#)

Teachers/parents:

[Convention on Biological Diversity—conference updates](#)

[UN Environment Programme—conference updates](#)

[Living Nature Report 2020](#)





HOW TO..

HELP THE PLANET

Feeling inspired to protect the environment? There are many ways you can help.

Whether done on an individual basis, or done as a class or family, acting on some of the ideas below will help **conserve** life on our planet. Even a small change can make a difference!

Waste:

- ✓ **Reduce** – cut back on the amount that's thrown away, e.g. food waste, single-use plastic & clothing.
- ✓ **Reuse** – Buy reusable items e.g. water bottle, coffee cup, cotton bag. Fix or turn old clothes into something new.
- ✓ **Recycle** – Wherever possible!
- ✓ **Recover** – Take rubbish out of the environment by (safely) picking up litter.



Food:

- ✓ **Buy sustainably produced or caught food**—e.g. buy organic or environmentally friendly certified products.



Carbon footprint:

- ✓ **Reduce road miles**—Walk, cycle, use public transport or car share.
- ✓ **Reduce air miles**— cut down on the distance covered by you, your food, and products by plane, e.g. buy locally grown food rather than imported.



Gather Evidence:

- ✓ **Take part in citizen science projects** – Help conserve species by taking part in surveys. Click [here](#) to discover marine citizen science project you can get involved in.



Support good causes:

- ✓ **Get involved in community events**—e.g. beach cleans and tree planting.
- ✓ **Write to your local member of parliament** - show support for green policies.
- ✓ **Support environmental charities** - donate, volunteer, or help spread the word!



YOUNG ENVIRONMENTAL AMBASSADORS

In 2019/20, North Berwick Youth Project took part in an initiative to help their local environment.

Read on to find out more.

North Berwick Youth Project's vision is to work with young people to create an environment where they are given responsibility and the opportunity to make positive changes in their lives and their communities. Some of the exciting opportunities young people have led on have included partnership work with [YouthLink Scotland](#) which required local partners to work with the team to learn and inform their project.

The **On Our Wave Length** initiative saw teams of young people from around Scotland investigate environmental consequences on beaches and waters of their local coasts. After seeing the impact of litter on local wildlife, 6 members of North Berwick Youth Project chose to investigate plastic pollution.

Click on the box below to watch a video about the project and see what they discovered!



YOUNG ENVIRONMENTAL AMBASSADORS

Project member, Cain Ritchie, says:






"This project gave me an insight to what was really happening to the environment and eco system. I enjoyed working along side the other participants and sharing ideas with them in how we can change the ways we live with or without plastic. I also enjoyed learning about the different sea creatures and stats and what could happen to them if we don't change. Working with lots of organisations was a great experience too."

"This project gave the young people involved a great sense of achievement, they were able to fully take ownership of how the project was shaped, who they worked with and what they learned. The young people grew in confidence, knowledge and their passion to protect their coastal environment was ignited. The team had a sense of belonging in their community and were empowered to share their learning to tell a story of how we should all be taking responsibility to conserve and protect our beautiful coastline."

Project Leader, Lauren Cowie, says:



Follow the work of North Berwick Youth Project here:

NBYP
NORTH BERWICK YOUTH PROJECT



INVESTIGATION



GANNETS VS KITTIWAKES



INVESTIGATION: You're a seabird scientist that has noticed that Northern gannets are currently doing better than Black-legged kittiwakes. Why might this be?

Look at the table below comparing gannets and kittiwakes then answer the questions below. Answers on next page.

NORTHERN GANNET

BLACK-LEGGED KITTIWAKE

Prey	Medium-sized fish, (e.g. mackerel & herring)	Small-sized fish (especially <u>sand eels</u>). Occasionally marine invertebrates (e.g. shrimp and worms).
Feeding technique	Gannets fly up high and dive head-first into the school of fish, down to depths of 100 feet.	Kittiwakes pick food from the surface of the water whilst in flight or sitting on the water. They can also dive just below the surface.
Distance	The maximum foraging range found in one colony of gannets was 335 miles.	The maximum foraging range found in one colony of kittiwakes was 144 miles.
Adaptations	Muscular with good body fat reserves. Beak is streamlined to help it enter the water without injury. Air sacs close to the eyes act like air bags and cushion the force when hitting the water.	Long, narrow wings and a forked tail allow for swooping, graceful flight patterns and hovering above the surface of the water.
Threats	Over-fishing may reduce the amount of fish prey found closer to colonies. This is resulting in longer foraging trips and more time spent away from the nest. Conservation status: Amber (Numbers in moderate decline)	Warming seas affect when sand eels spawn and the availability of zooplankton their larvae feed on, leading to reductions in the number of sand eels. Sand eel fisheries in the North Sea also lead to reductions in the amount of sand eels available. Conservation status: Red (Globally threatened)

- Q1** Which species feeds at the surface of the sea?
- Q2** Which species has the longest foraging range?
- Q3** What adaptations enable seabirds to fly further and dive deeper?
- Q4** What issues may affect the availability of seabird food sources?

INVESTIGATION

GANNETS VS KITTIWAKES – ANSWERS



© Gareth Easton

NORTHERN GANNET – THE DIVE BOMBERS



© Susan Davies

BLACK-LEGGED KITTIWAKE – THE SURFACE FEEDERS

INVESTIGATION QUESTION:

You're a seabird scientist that has noticed that Northern gannets are currently doing better than black-legged kittiwakes. Why might this be?

ANSWERS

Q1. Which species feeds at the surface of the sea? *Kittiwake*

Q2. Which species has the longest foraging range? *Gannet*

Q3. What adaptations enable seabirds to fly further and dive deeper?

Strong muscles, body fat reserves and air sacs.

Q4. What issues may affect the availability of seabird food sources?

Climate change and over-fishing.



INVESTIGATION CONCLUSION:









Northern gannets have special physical adaptations such as strong muscles, body fat reserves and air sacs that cushion them when they dive into the water. This enables them to fly further and dive deeper to find their food. Kittiwakes however feed at the surface and don't fly as far for food. The sand eels they feed on are also fewer in number due to the effects of climate change and over-fishing. These differences make gannets more **resilient** (able to withstand or recover quickly) to the threats of climate change and over-fishing.

ACTIVITY



BIODIVERSITY BINGO

How many different types of plants and animals do you think live near you? If you go out and have a close look, you may be surprised by the variety of life all around you. Next time you are exploring the outdoors, take along this sheet with you and see how many of the bingo boxes you can tick off.

<input type="checkbox"/> A group of 4 or more birds	<input type="checkbox"/> 3 types of yellow flower	<input type="checkbox"/> An animal with 4 legs	<input type="checkbox"/> A leaf with wavy edges 
 A flying insect	<input type="checkbox"/> A bird's nest 	<input type="checkbox"/> A tree taller than you	<input type="checkbox"/> A worm 
<input type="checkbox"/> A tree with rough bark	 A bird on water	 A butterfly	<input type="checkbox"/> A flower with 2 or more colours
<input type="checkbox"/> A flower with 6 or more petals	<input type="checkbox"/> A ladybird 	<input type="checkbox"/> A shell or an animal that lives in a shell	<input type="checkbox"/> A bird making a sound 



Which of these was easiest to find? Why do you think that is? Which was the hardest item to find? What did you see that wasn't on this sheet? Did you have a favourite find?

PLEASE REMEMBER TO WASH YOUR HANDS AFTER YOUR EXPLORING SESSION

SPOTTER SHEET

COASTAL BUTTERFLIES

This is a guide to help you identify some of the butterflies you may spot in coastal habitats such as sand dunes and grasslands or woodland edges (some found in inland habitats too). Size, colour, markings and habitat type can all help you with identification. Butterfly records can be submitted through the [iRecord Butterfly App](#) which helps us to learn more about their distribution and status.

ORANGE TIP

Anthocharis cardamines



One of the earliest butterflies to appear in spring. The male is white with orange wing tips and a black spot. When the wings are closed it has a distinctive mottled green pattern. Look out for patches of wild garlic or cuckoo flower which its caterpillars feed on.

RED ADMIRAL

Vanessa atalanta



Distinctive large black butterfly with a red stripe across its forewings and red fringing on its hind wings. Emerging around July it flies until November. It is found in a wide range of habitats. The common nettle is the favourite foodplant of the larvae.

PEACOCK

Aglais io



Like peacock feathers it has striking big blue eyespots on its fore and hind wings which evolved to startle predators. It's one of our most common butterflies and is widespread. Its larvae feed on common nettles.

SMALL TORTOISEHELL

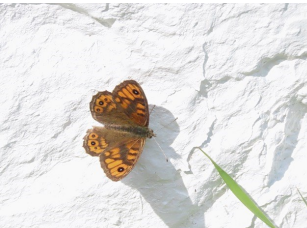
Phalacrocorax aristotelis



One of the first butterflies to emerge in spring. It is medium sized, reddish-orange in colour with a ribbon of blue and black markings bordering the fringes of its wings. Males are territorial and may be seen chasing each other around their habitats.

WALL BROWN

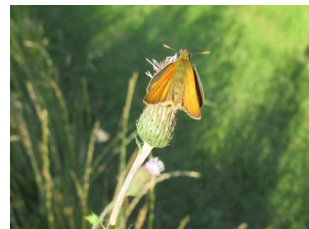
Lasiommata megera



On the wing between April to October this butterfly is found in sunny places such as open grassland, sand dunes and rocky foreshore. It basks in the reflected sun on walls, paths and bare patches of earth to heat itself up.

SMALL SKIPPER

Thymelicus sylvestris



You'll be lucky to find this small, orange winged butterfly. It can be found basking or flitting through rough grassland and sand dunes in the peak of summer, feeding on knapweeds and thistles. It has expanded into the southern parts of Scotland.

COMMON BLUE

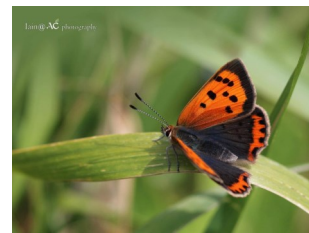
Polyommatus icarus



The male has bright blue wings with a white fringe, the female is browner and secretive. This species likes sheltered spots within coastal dunes and undercliffs. You may spot it feeding on plants such as clover and yellow bird's foot trefoil plant.

SMALL COPPER

Lycaena phlaeas



Beautiful copper coloured forewings with dark brown flecks and fringing. It flies from April to October and can be found feeding on ragwort and thistles. The males are territorial and will bask on bare ground or stones waiting on females to pass.

Images © Iain Cowe - orange tip, common blue, small copper and Susan Davies—red admiral, peacock, small tortoiseshell, wall brown and small skipper

DISCOVER

GLOSSARY

ADAPTED / ADAPTATIONS

How something is suitable for a place or task. For example, seabirds are adapted for catching fish in the sea because they have waterproof feathers and special hunting techniques.

BIODIVERSITY

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

CITIZEN SCIENCE

When the public help collect or analyse data for researchers. Anyone can get involved. Click [here](#) for a list of projects you can get involved in.

CLIMATE CHANGE

A change in the world's climate caused by changes to the atmosphere. Climate change is leading to more extreme temperatures and severe weather around the world. Click [here](#) for more information.

CONSERVE / CONSERVATION

Where people protect, preserve, or restore the environment.

ENDANGERED

A species that is very likely to become **extinct** in the future.

ENVIRONMENT

The surroundings or conditions in which species live.

EXTINCT

When a species has disappeared from the planet. There are no more alive.

ICE AGE

A long period of reduction in the temperature of the Earth's surface and atmosphere, resulting in the presence of ice sheets and glaciers.

OVERFISHING

The removal of a species of fish at a rate that the species cannot replenish.

SPECIES

A set of organisms that have similar characteristics to each other and can breed with each other.

SUSTAINABLE

Something that is able to continue at the same level for a long period of time. For example, fishing sustainably means fishing in a way that doesn't take all the fish away at once so there will be more in the future.

VULNERABLE

Something that is easily damaged.

ZOOPLANKTON

Tiny animals drifting in ocean. Food for lots of bigger marine species.



WE ARE CELEBRATING THE ACHIEVEMENTS OF YOUNG PEOPLE IN NATURE WITH OUR NEW CERTIFICATE SCHEME!

Are you a young person, or know a young person, who goes above and beyond to **educate** themselves, **inspire** others, or **take action** for the marine environment? Or maybe your class or family have done something together?

We'd love to hear what has been achieved, see photographs of accomplishments and reward them with a certificate! Please contact the team on marineengagement@seabird.org for more information or to apply.



© Phil Wilkinson

The Scottish Seabird Centre is an education and conservation charity based in North Berwick. Find out more about the charity [HERE](#) or make a donation [HERE](#).

