People · Ocean · Planet

FISHERIES AND CLIMATE CHANGE

This science pack has been created by the Marine Alliance for Science and Technology (MASTS). MASTS is an organisation that enhances the excellence of marine research in Scotland across 17 institutes and 700+ members. With such a large number of scientists working at the forefront of marine science, MASTS recognises the importance of communicating what we learn to the public.

People Ocean Planet (POP) is an initiative within MASTS, helping to drive positive changes across society for the ocean by making best use of our scientific knowledge.

To deliver this information we have worked with experts from MASTS Research forums. There are 12 of these forums in MASTS, creating a network of experts who meet to discuss, direct and support the research in their field. In this section of the pack you will hear from Ieuan Jones the representative of the Fisheries Science forum.

You can learn more about MASTS, People Ocean Planet and the Fisheries Science Forum in the QR links to the right.

MASTS

POP

Fisheries Science Forum

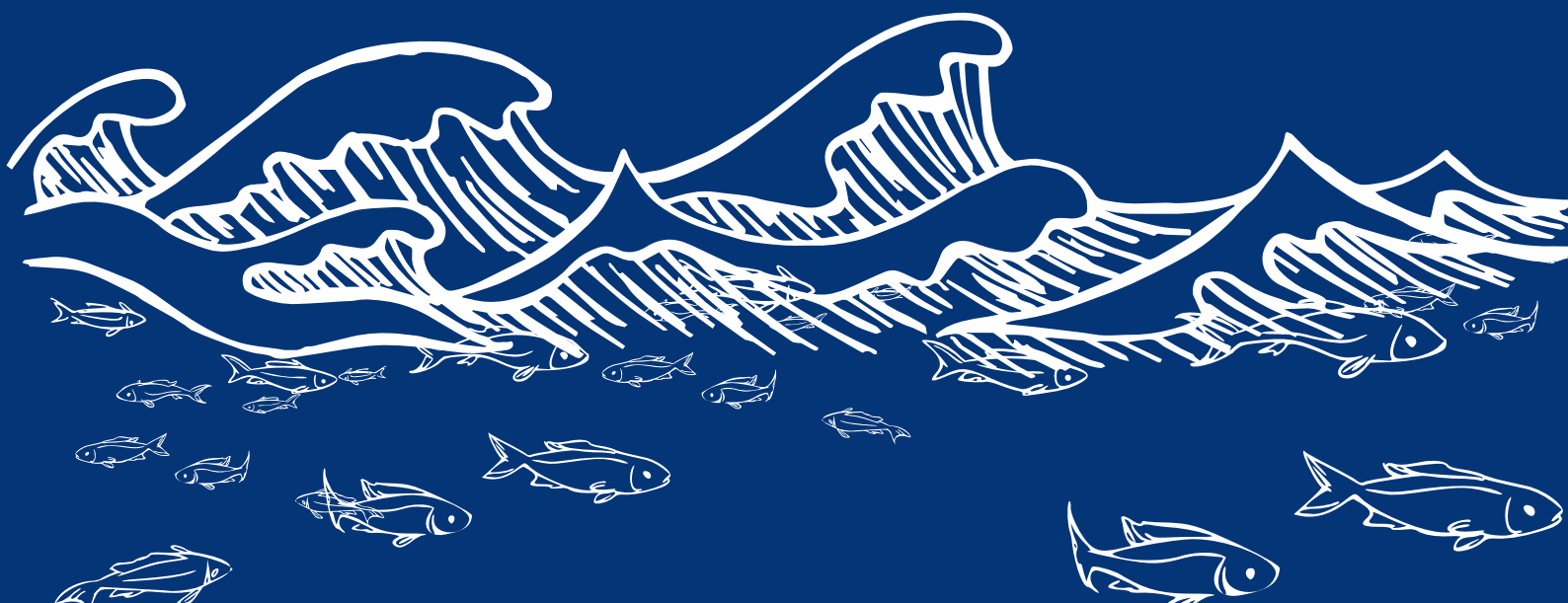
Curriculum Links
Age 11-14

Science - Relationships in an Ecosystem
- Genetics and Evolution
- Earth and Atmosphere

Geography - Human and Physical Geography

Mathematics - Using maths to make decisions

If this logo is in the bottom right hand of a page, there is a more printer-friendly version of this page available in the 'to print document' on our website.



Great Science Share for SCHOOLS

ABOUT IEUAN

HIS JOURNEY INTO STEM

I started with a love for the sea as a kid, growing up learning to surf and playing in the sea. When I was 16 I got the opportunity to volunteer on a leatherback turtle conservation project for a short time in Costa Rica, which really inspired me to pursue marine biology and conservation. Once at university, I became fascinated with fishing, and how we can manage fishing so that it is sustainable. I wanted to learn how we can protect people's livelihoods and food sources while also protecting our oceans. This lead me to study for my PhD.

HIS JOB

I am a PhD researcher looking at how the fish we find around the North Sea (of the East coast of the UK) have changed with increasing sea temperatures and reduced fishing. I'm also interested on ways we can help to avoid catching the fish species that we don't want (known as bycatch). Ieuan is working at the University of Aberdeen.

HIS HOBBIES

Paddleboarding, surfing, seabird watching and photography.

IEUAN JONES

PHD RESEARCHER

UNIVERSITY OF ABERDEEN

THE QUESTION IEUAN WANTS TO ANSWER IS...

How can we make fishing safe for the oceans and protect are seas and fish against the effects of climate change?

IEUAN INSPIRES YOU TO THINK ABOUT...

Many people around the world rely on fishing for their livelihoods and their main source of protein, so it is important that we protect our seas and fish for future generations.

ITS TIME TO EXPLORE OCEAN FISHERIES WITH IEUAN - LETS GO!

HOW ARE FISH INFLUENCED BY CLIMATE CHANGE?

There are many impacts that climate change and ocean warming can have on fish.

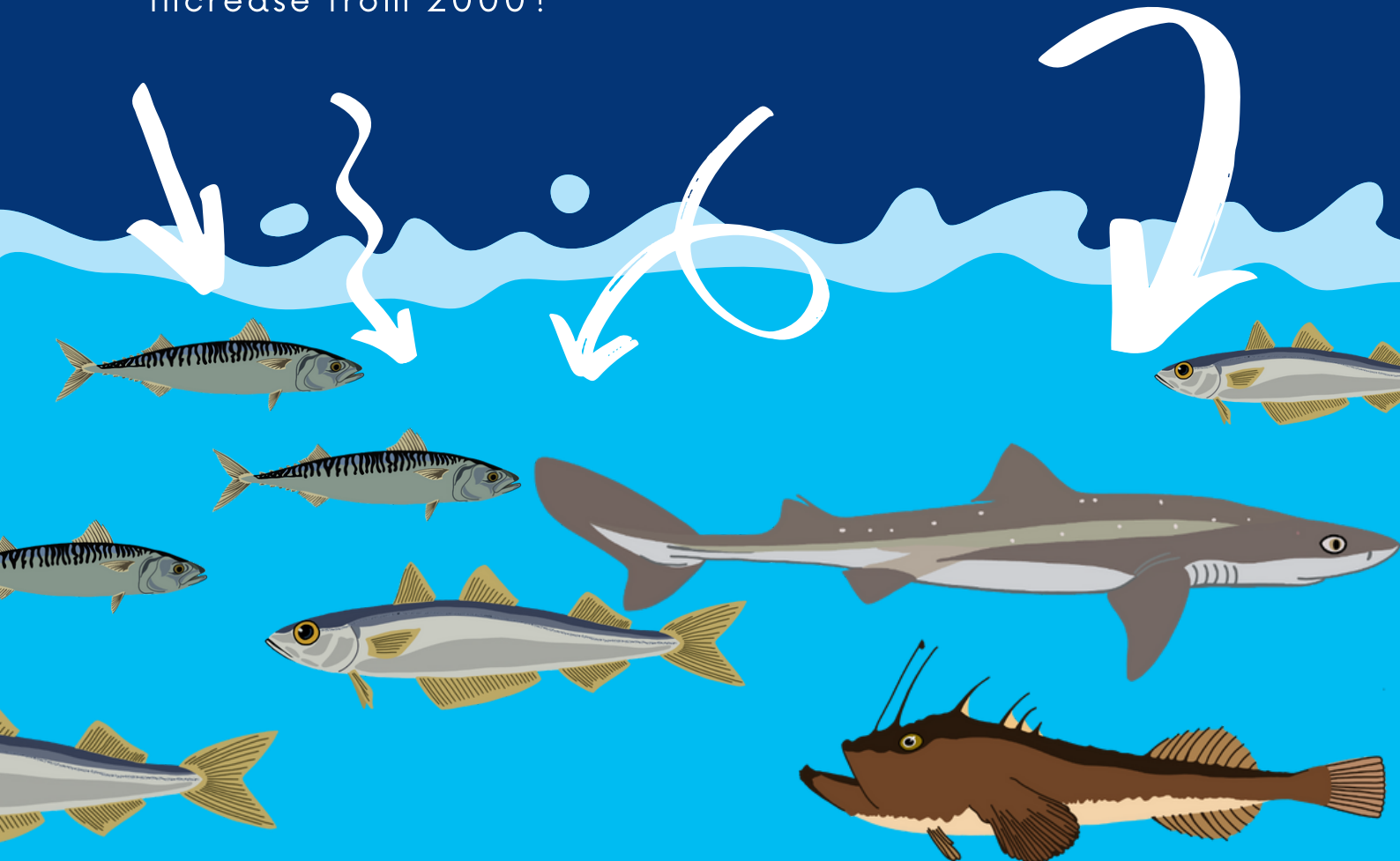
Firstly, fish may move to stay in waters which are the right temperature for them. Scientists call this 'tropicalization', which means that fish normally found in tropical waters (places nearer the equator) are moving into areas that were previously colder.

This can change the ecosystem and foodwebs that we see. Fish grow up to be smaller in areas where temperatures are higher compared with cooler areas. This means that if temperatures continues to increase, we can expect fish to generally get smaller.

Rising sea temperatures are now closely monitored and compared back in time. Here are links to resources which show the increase. Can you notice the particular increase from 2000?

moat.cefas.co.uk

European Environment Agency



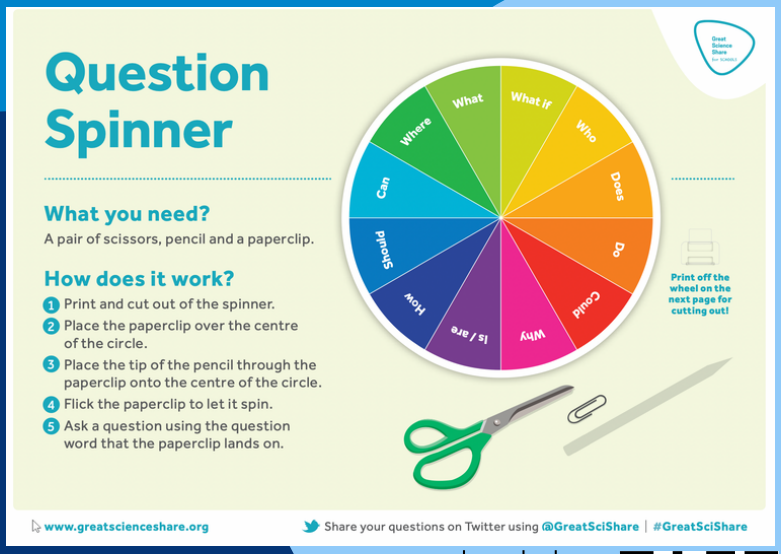
It is an important part of a scientist's job to ask questions. Asking questions is the first step to learn more about a topic. We can then go and find the answers by reading more information on the topic, or if there are no answers we can do our own experiments and research to find out.

ACTIVITY 1

After listening to the introduction video, write a list of questions you have about fisheries and climate change?

Link to introduction video

TIP: you can use a question spinner to help you think of all the different types of questions you could ask!



Download the question spinner and other question makers using this QR code!

Space to write your questions:

Now that we have our questions it is time to find some answers.
Our fisheries scientist Ieuan, has answered some questions below. Read these through carefully as they will help you with an upcoming activity.

WHAT?

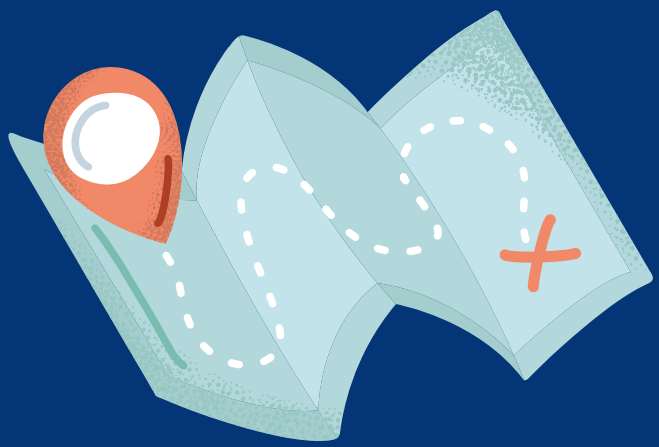
CLIMATE CHANGE IS CAUSING THE TEMPERATURE OF OUR SEAS TO RISE. WHAT DO YOU THINK WILL HAPPEN TO THE FISH WE NORMALLY FIND AROUND THE UK?

The UK is in the Northern Hemisphere. The sea temperature around the UK is colder the further North you are and warmer as you travel South. As sea temperatures rises due to Climate Change, the temperature found in a particular part of the sea changes. Fish, like other animals, are adapted to their environment, so when the sea temperature changes they will move to be in the area which is the temperature they have adapted to survive in. This means they will be found in different locations and move further North as temperatures increase.

WHY?

WHY DO YOU THINK FISH MOVING LOCATION MIGHT BE A PROBLEM FOR FISHERS IN THE UK?

This could be a problem for fishers as it might mean that they have to travel further away to catch fish that we are used to. Fish that we are used to eating in the UK, like cod and haddock, prefer cooler waters and so if these move due to climate change that will cause problems for fishers. They may even leave waters that our fishers are allowed to fish in, or be much less common.



HOW?

HOW DO WE FISH?

There are many methods that fishers use to catch the fish that we eat.

ACTIVITY 2

Match up the descriptions of the fishing methods to the photos below

Fish can be caught using traps called creels (often these are used for shellfish like crabs and lobsters).

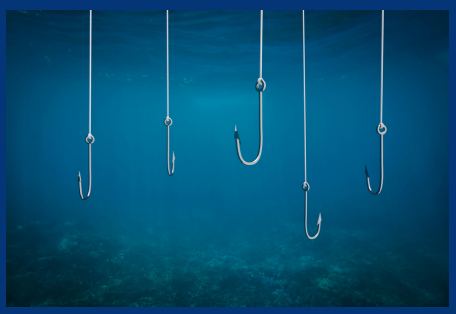
Some shellfish, like scallops, are caught by divers picking them by hand.

Some fish are caught by placing nets around them, called Seine-netting.

Some fish are caught using nets which are towed behind boats, either on their own or in pairs, which is called trawling.

Some shellfish are caught using gear towed by boats, which digs into the seabed to disturb the shellfish hiding in the mud or sand. This is called dredging.

Some fish are caught using lines of hooks which are set with bait and then picked up.



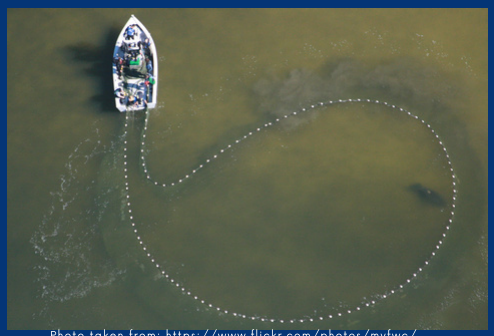
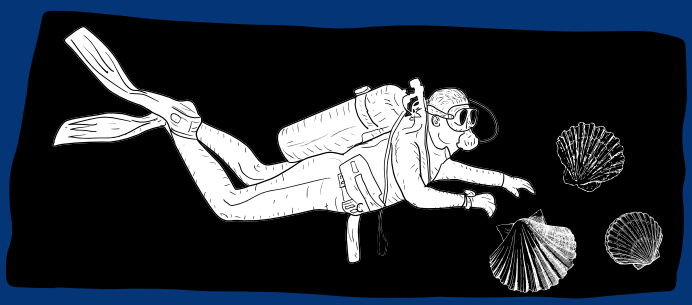
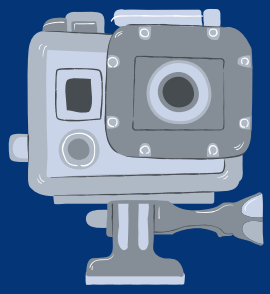


Photo taken from: https://www.flickr.com/photos/myfwc/



DO?

DO SCIENTISTS MONITOR WILD FISH POPULATIONS? HOW?

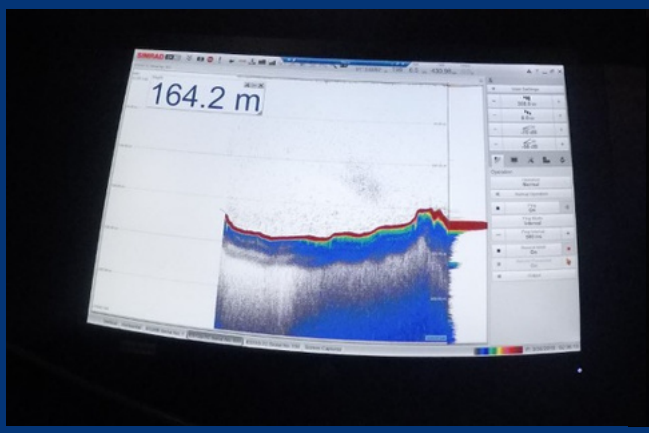


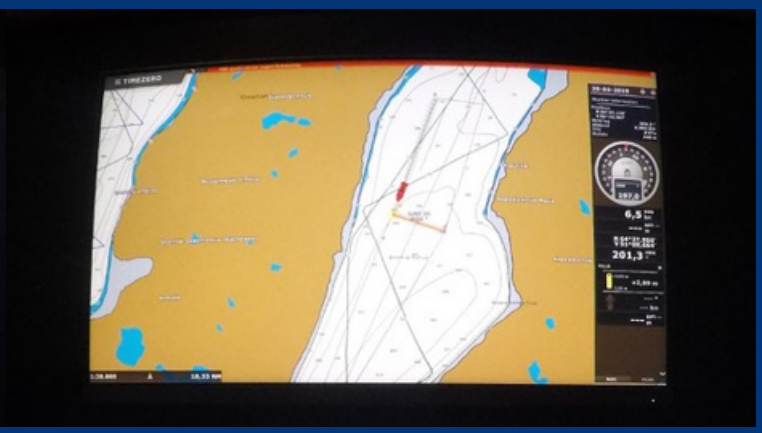
Twice a year scientists go out and catch fish in certain places in the sea so that we can count, measure, weigh and find the age of the different species.

Scientists can also go out with fishers so that they can measure what fishers are catching, and what fish are being caught accidentally.

Scientists can also go to the fish markets to sample the fish being brought in by fishers.

Sometimes scientist can use different methods like underwater cameras, or acoustic surveys where we use soundwaves to measure where fish are and how many there are.





WHAT?

WHAT DOES SUSTAINABLE FISHING MEAN?

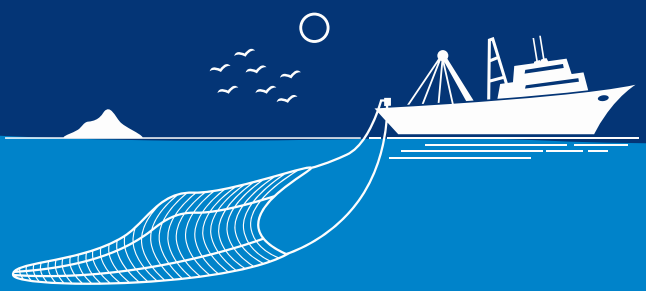
Sustainable, in fishing, means that we aren't catching more fish than are being replaced by young fish growing into adult fish. If we catch more than are being replaced, then we will have less fish next year. If we keep catching more, then eventually there may not be enough fish left for us to catch.

CAN?

CAN SUSTAINABLE FISHING HELP PROTECT FISH FROM CLIMATE CHANGE ?

Sustainable fishing can help protect fish from climate change by making sure that we're not causing extra problems for fish. Making sure that fish numbers are healthy can also give fish more chance to adapt to changes in their environment.

ACTIVITY 3



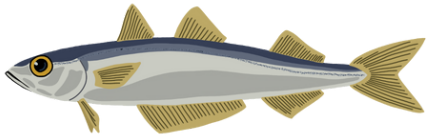
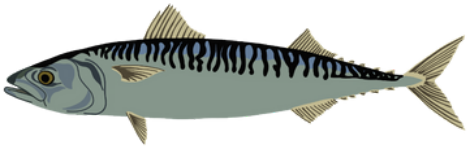
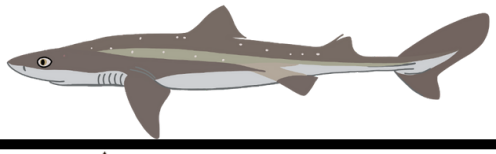
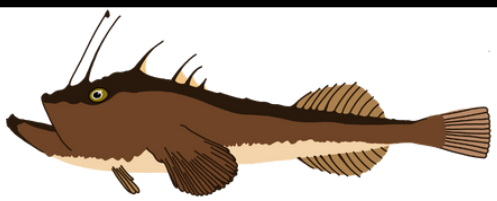
In this activity you are going to get the chance to become UK fishers!

You will be able to fish for 4 different species of fish that can be caught in the UK.
Each has a starting population number, this is the total number of fish of that species you can catch.
Every year, each species will have more fish added as young fish mature.

You can choose how many fish you catch and remove from the sea each year, which will earn you money points. You need to make at least 15 points a year.

It's up to you how much you catch each year, but you may start to notice if you take too many the fish population will go down. If they go down too much and you are left with no individuals of that species they cannot recover their population.

Use your cut outs of the fish to watch your fish population change and plot the number of fish you have on the graph to help you keep track! These can be found on the next pages.

Species	Starting Number	Number of Fish Added Each Year	Price
 Whiting	10	3	2
 Mackerel	10	5	2
 Spurdog	3	1	0
 Anglerfish	8	2	3

EXAMPLE OF HOW TO FILL IN THE TABLE

	A	B	C		D	
Year 1	Money points per fish	Population of species at the start	How many will we catch this year?	Total money points from my catch this year (A x C)	How many fish of each species are left (B - C)	Total number of fish at the end of the year D + newly mature fish
Whiting	4	10	2	4 x 2 = 8	10 - 2 = 8	8 + 3 = 11
Anglerfish	3	10	1	3 x 1 = 3	10 - 1 = 9	9 + 2 = 11
Mackerel	2	8	2	2 x 2 = 4	8 - 2 = 6	6+ 5 = 11
Spurdog	0	3	0	0 x 0 = 0	3 - 0 = 3	3 + 1 = 4

DID YOU MAKE ENOUGH MONEY?

BLANK TABLE

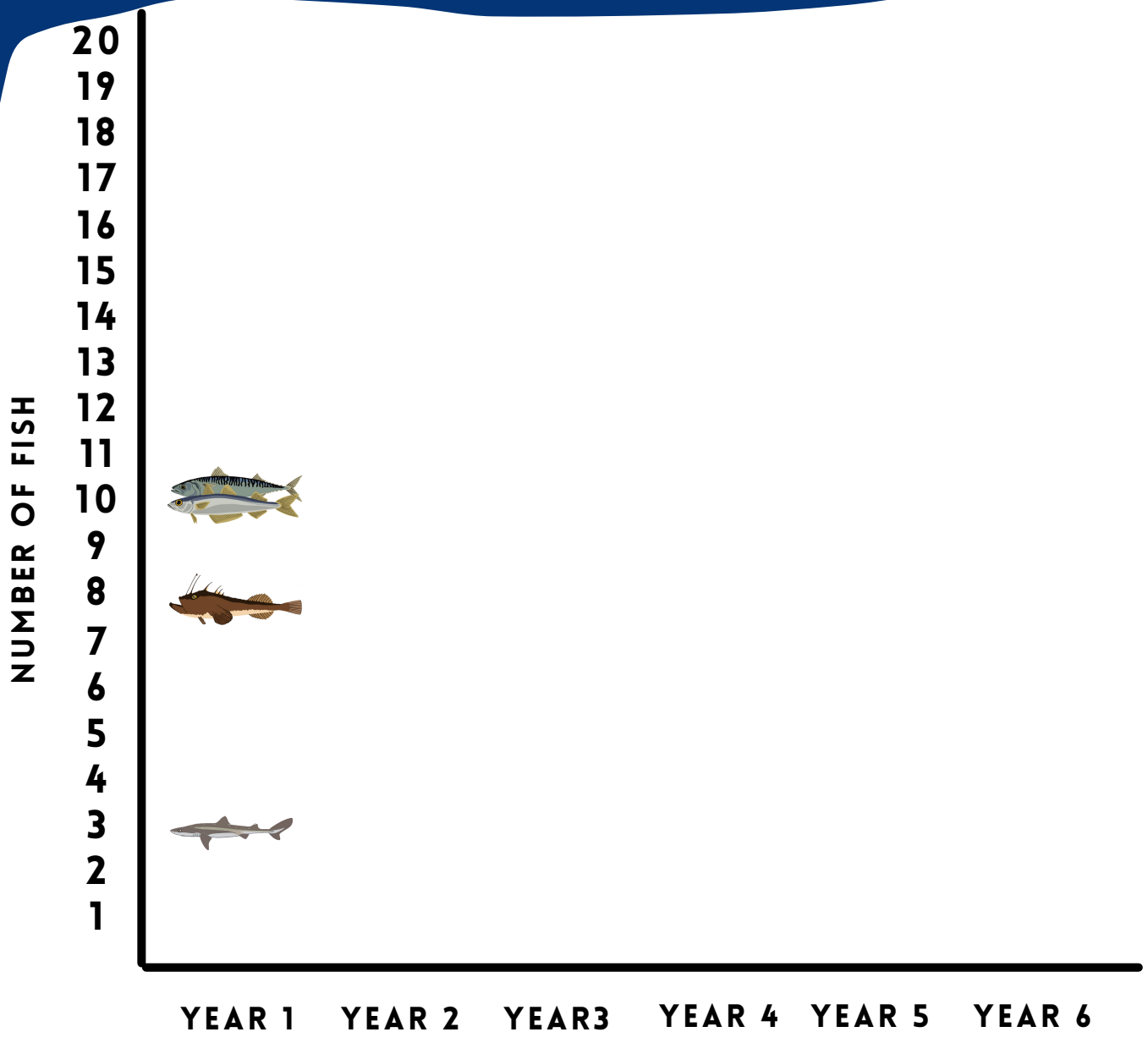
	A	B	C		D	
Year 1	Money points per fish	Population of species at the start	How many will we catch this year?	Total money points from my catch this year (A x C)	How many fish of each species are left (B - C)	Total number of fish at the end of the year D + newly mature fish
Whiting						
Anglerfish						
Mackerel						
Spurdog						

Ieuan would also like you to answer this questions:

HOW MANY INDIVIDUALS OF EACH SPECIES OF FISH CAN BE TAKEN FROM THE SEA AND THERE STILL BE MORE INDIVIDUALS AFTER YEAR 6 THAN YEAR 1?

WHY IS SPURDOG WORTH NO MONEY POINTS? SHOULD EVERY TYPE OF FISH IN THE SEA BE CAUGHT?

USE THIS GRAPH AND/OR THIS FISH CUT OUTS TO KEEP TRACK OF YOUR FISHING AND RECORD THE POPULATION EACH YEAR



#POPSCIKIT

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MARINE ALLIANCE FOR SCIENCE AND TECHNOLOGY FOR SCOTLAND

THE SPECIES I CHOSE TO FISH WAS ...

I CHOSE THESE SPECIES BECAUSE...

HOW DIFFICULT DID YOU FIND CHOOSING THE AMOUNT OF FISH TO CATCH?

DID YOU CHOOSE TO FISH SUSTAINABLY?

MY FAVOURITE FACT WAS..

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MARINE ALLIANCE FOR SCIENCE AND TECHNOLOGY FOR SCOTLAND

I CHOSE TO LEARN ABOUT HOW CLIMATE CHANGE IMPACTS...

I LEARNT THAT...

WHAT I WILL RESEARCH NEXT IS ...

I FEEL INSPIRED TO...

Share with us so we can learn with you!

www.greatscienceshare.org

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