



# UNSUSTAINABLE FISHING CHALLENGES



**Teacher Resources - Lesson Plan**

Image credit: Ian Schneider



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## Australian Curriculum Objectives



### Years 9 & 10 (Stage 5) - Science

- [AC9S9H02 / AC9S10H02](#)  
Investigate how advances in technologies enable advances in science, and how science has contributed to developments in technologies and engineering
- [AC9S9I01 / AC9S10I01](#)  
Develop investigable questions, reasoned predictions and hypotheses to test relationships and develop explanatory models
- [AC9S9I05 / AC9S10I05](#)  
Analyse and connect a variety of data and information to identify and explain patterns, trends, relationships and anomalies
- [AC9S9I07 / AC9S10I07](#)  
Construct arguments based on analysis of a variety of evidence to support conclusions or evaluate claims, and consider any ethical issues and cultural protocols associated with accessing, using or citing secondary data or information
- [AC9S9I06 / AC9S10I06](#)  
Assess the validity and reproducibility of methods and evaluate the validity of conclusions and claims, including by identifying assumptions, conflicting evidence and areas of uncertainty
- [AC9S9I08 / AC9S10I08](#)  
Write and create texts to communicate ideas, findings and arguments effectively for identified purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate
- [AC9S9H04 / AC9S10H04](#)  
Examine how the values and needs of society influence the focus of scientific research

### Extension Activities

- [AC9S9I02 / AC9S10I02](#)  
Plan and conduct valid, reproducible investigations to answer questions and test hypotheses, including identifying and controlling for possible sources of error and, as appropriate, developing and following risk assessments, considering ethical issues, and addressing key considerations regarding heritage sites and artefacts on Country/



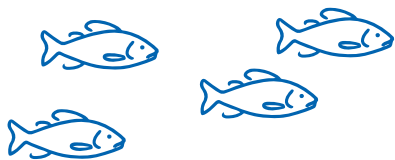
In this lesson for learners aged 14+ students consider learn about a number of unsustainable fishing challenges affecting our oceans today.

### Key terms

- Overfishing
- Unsustainable
- Bycatch
- Ghost gear
- Endangered marine habitat
- Shark finning
- Climate change
- Marine Stewardship Council

### You will need

- Access to the clip [Overfishing](#)
- Access to the [Unsustainable Fishing Game](#) (Kahoot) *or* - Printed copies of the Unsustainable Fishing cards (pages 3 to 16)
- Access to the clip [Born Free, Caught Wild](#)
- Access to the clip [What does the MSC label mean? 2. Marine habitats and species protected](#)
- Optional - Access to the clip [The Oceans and Us](#)



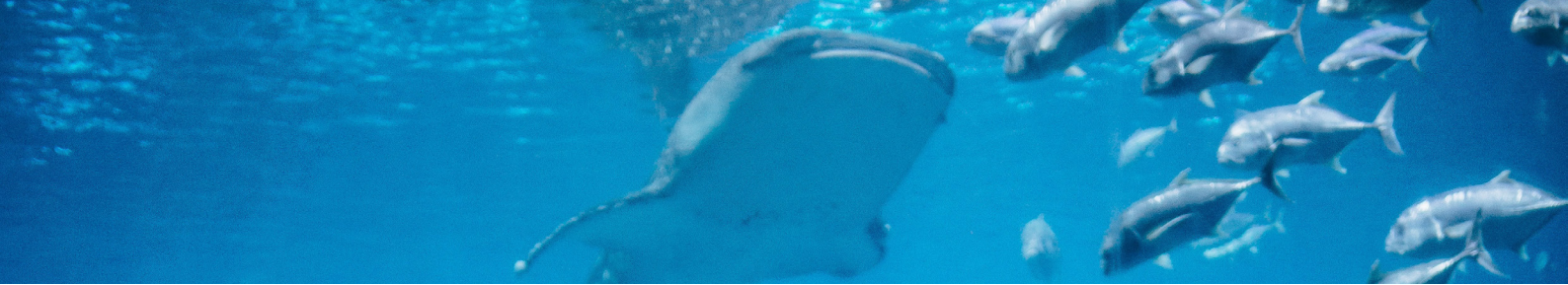
### Key Questions

- Why is the ocean essential to life on earth?
- What are some of the key unsustainable fishing challenges affecting our oceans today?
- How can science and technology be to prevent unsustainable fishing practices and support sustainable fishing?
- What can we all do to prevent overfishing and protect our oceans?

### Class Activities

- Learners revise what they learned in Science for Sustainable Oceans Part 1
- Learners play a card game on unsustainable fishing challenges
- Learners work in groups to conduct a research assignment on science technologies used for sustainable fishing
- Learners watch a video from a sustainable prawn fishery in Australia
- Learners discuss a range of solutions that can be used to support the health of our oceans and marine species





## Review (5-10 mins)

In Part One of ‘Science for Sustainable Oceans’ students looked at the problem of **Overfishing** and how the scientific model of **Maximum Sustainable Yield** can be used to address this unsustainable fishing challenge.

If the class have not completed Part One, begin this lesson by showing students the video clip [Overfishing](#) (2:55) from ‘My Dad the Fisherman’.

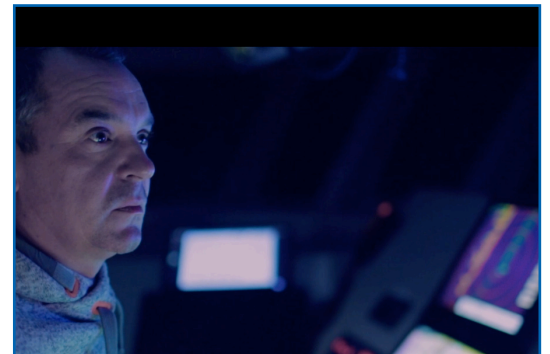
Discuss as a class:

- *How does these overfishing affect the entire ocean ecosystem?*
- *How might science knowledge be used to prevent overfishing?*

## Starter (5-10 mins)

Begin by asking students what they can recall from the Part One of the ‘Science for Sustainable Oceans’ lesson plan.

- *How is the ocean essential for life on earth?*
- *What is ‘Maximum Sustainable Yield’?*
- *How can science data be used for sustainable fishing practices?*



If you have not yet shown students this video clip from the BBC Earth, ‘[The Oceans and Us](#)’ (4:13) you could show them here.

## Main activity (30-40 mins)

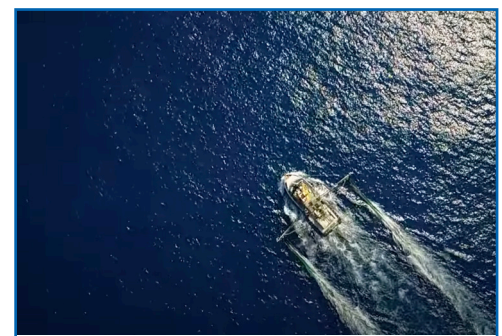
In this lesson, learners will explore some other key **unsustainable fishing** challenges, including bycatch, ghost fishing, endangered marine habitats, shark finning and climate change.

Ask learners to play the online [Unsustainable Fishing Game](#) (10-15 mins) or split learners into groups and use the printed Unsustainable Fishing cards below. To begin, ask learners to match questions with the correct answers.

Extend the activity by asking students to work in groups to research a **scientific technology** that can be used to address one of the unsustainable fishing challenges explored. To provide an example, first show students the video [Born Free, Caught Wild](#) (8:40) about bycatch reduction in Australia’s MSC-Certified Northern Prawn Fishery.

In their research students should address:

- *What is their chosen unsustainable fishing challenge from a science-based perspective?*
- *How might this challenge affect the entire ocean ecosystem?*
- *How do the values and needs of contemporary society influence the need for this science technology?*
- *How is technology used to prevent their chosen unsustainable fishing challenge?*
- *How can science knowledge be used to help fishers practice sustainable fishing in the future?*



Video Credit: Australian Council of Prawn Fisheries, FRDC and [Millstream Productions](#)

Students present their findings in the following class, in the format of a presentation or written assignment constructing evidence-based arguments and using appropriate scientific language.

## Discussion (5-10 mins)

Show learners the video [What does the MSC label mean? 2. Marine habitats and species protected](#) (2:36)



Discuss as a class:

- *How can a fishery minimise its impact on marine ecosystems?*
- *How can a fishery use science to achieve the Marine Stewardship Council certification?*
- *What can we all do to help to protect marine ecosystems?*

## Extension Activities

1. Plastic pollution caused by fishing 'ghost gear' is one of biggest challenges facing our oceans and marine life today. In this activity, students plan an investigation to analyse problem of fishing litter at a beach or river near them.

Using the Scientific Method, students should plan a visit to their chosen beach or river and audit any fishing-related litter that they find there. Using the Australian Marine Debris Initiative (AMD) [Data Collection Sheet](#) (Data Sheet v07-2013) as a guide, students note the different types of fishing litter that they may find, as well as other types of litter found at their site.

In planning their investigation, students should assess any risks and ethical issues associated with their field work and take measures to avoid them. For example, under no circumstances should students pick up hazardous or toxic waste materials such as a syringe. Students should also consider how to ensure that the data they collect is reliable.

Students then write a report on the results of their investigation. Students could also enter any findings they have into the [AMD Database](#).

2. Learners work in groups to play Go Fish, a game that explores how MSY works. Follow the instructions on the sheets to run the game. The game includes a sheet with an explanation of MSY.



# UNSUSTAINABLE FISHING CARDS - BYCATCH

## WHAT IS BYCATCH?

Bycatch are different types of fish or sea creatures that are caught unintentionally with the species that a fisher is targeting. It can include young or undersized fish.



## WHY IS BYCATCH A PROBLEM?

Bycatch can disrupt the food chain by taking fish that other species rely on for food. Bycatch is especially problematic when endangered and protected species like turtles and dolphins are accidentally caught, injured or killed.



## IS IT POSSIBLE TO FISH WITHOUT GETTING ANY BYCATCH?

It is difficult to solve the problem of bycatch entirely, because different marine creatures swim together under the sea. However we can use better fishing methods and equipment to prevent instances of bycatch.





## HOW CAN WE REDUCE BYCATCH

Fishers can reduce bycatch by using science and technology to improve our fishing methods and gear types such as Gillnets and Turtle Exclusion Devices.



## WHAT DO FISHERS DO WITH BYCATCH?

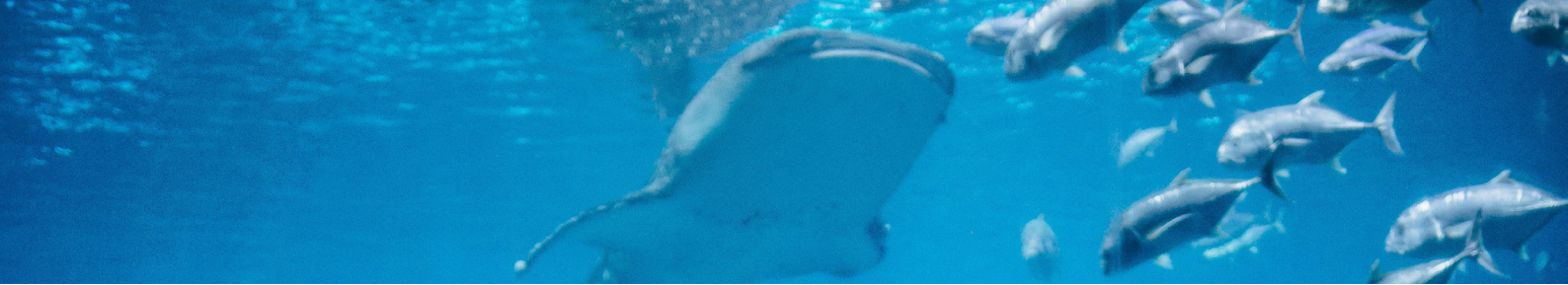
Fishers will often discard the fish and others marine creatures that they did not want to catch, cannot sell and are not allowed to keep.



## HOW IS THE MARINE STEWARDSHIP COUNCIL (MSC) HELPING TO PREVENT BYCATCH?

Fisheries that hold the MSC blue fish tick label must demonstrate that they have very few instances of bycatch, and that they have implemented measures to improve fishing methods and gear, and reduce bycatch.





# UNSUSTAINABLE FISHING CARDS - GHOST FISHING

**WHAT ARE  
GHOST NETS?**

Ghost nets are fishing nets that have been lost or thrown away at sea.



**DO GHOST NETS  
CONTINUE TO CATCH  
MARINE LIFE?**

Yes, ghost nets continue to catch fish beneath the ocean. They also get tangled with animals such as turtles, birds, sharks and seals. Hundreds of animals can be caught in just one net.



**HOW MANY GHOST  
NETS ARE THERE IN  
THE SEA?**

We do not know how many ghost nets are in the ocean today. It is estimated that at least 640,000 tonnes of fishing gear is lost each year. That's the equivalent of 90,000 double decker buses! (FAO)







**HOW MUCH OF THE PLASTIC IN THE OCEAN COMES FROM DISCARDED FISHING GEAR?**

It has been said that almost half (46%) of the plastic in the 'Great Pacific Garbage Patch' is from fishing nets.



**DOES THE MARINE STEWARDSHIP COUNCIL (MSC) CONSIDER GHOST GEAR ALLOWING A FISHERY TO USE THE BLUE LABEL?**

Yes. The effect of ghost gear is one of the factors that the MSC looks at when deciding if a fishery can use the blue fish tick label.



**WHAT HAPPENS TO GHOST NETS OVER TIME?**

Some lost or thrown away fishing lines and nets can stay in the ocean for a very long time. Others turn quickly into small pieces of plastic, which are seen wrongly as food by marine life.





# UNSUSTAINABLE FISHING CARDS - ENDANGERED HABITATS

**WHAT ARE  
'ENDANGERED' OR  
DELICATE MARINE  
HABITATS?**

Delicate marine habitats are places in the ocean that are breeding grounds for animals, or where endangered or slow growing creatures (like sea sponges) grow.



**HOW CAN THE SEA  
FLOOR BE AFFECTED BY  
FISHING?**

Fishing gear can affect delicate sea floor habitats. This can happen for example during bottom trawl fishing, which involves the towing of a large fishing net along the sea floor.



**CAN CORAL REEFS BE  
AFFECTED BY FISHING?**

When fishing traps are set close to a reef they cause damage to the coral, which takes a long time to recover. Coral reefs can also act as nurseries for young fish, so we must fish very carefully in these areas.





## HOW CAN OVERFISHING CAUSE HARM TO MARINE HABITATS?

Herbivorous (plant eating) fish play an important role in the marine ecosystem because they eat algae. If we catch too many herbivorous fish, large blooms of toxic algae can grow and cause harm to marine habitats.



## ARE ANY HABITATS PROTECTED FROM THE IMPACTS OF FISHING?

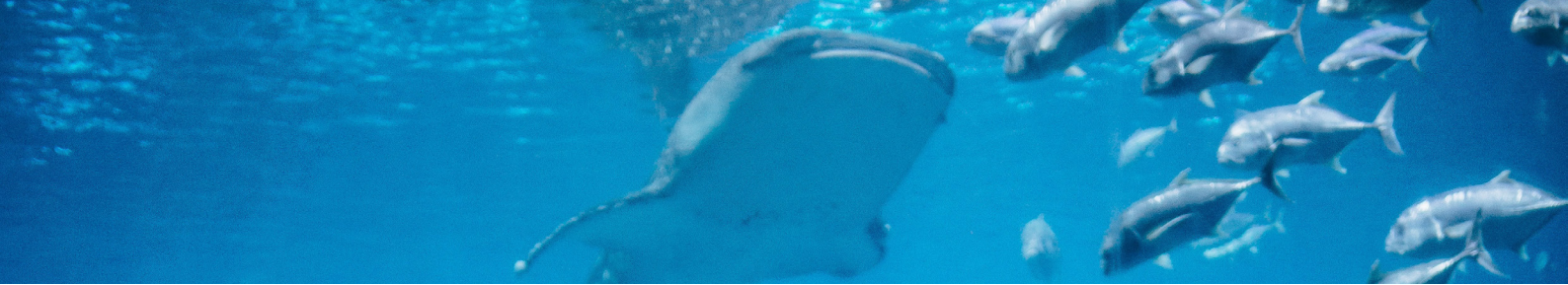
In Australia there are special areas (or zones) of the ocean where fishing is not permitted. In these areas, delicate habitats like the sea floor and coral reefs are protected. The Great Barrier Reef in Queensland is the largest protected area in Australia.



## HOW DOES THE MARINE STEWARDSHIP COUNCIL (MSC) MAKE SURE THAT CERTIFIED FISHERIES DON'T BADLY HARM THE AREAS THEY FISH IN?

In order to receive the MSC blue fish tick label, fisheries must show that they do little harm to the areas where they fish. Some very destructive fishing methods (such as the use of explosives) are banned from the MSC program.





# UNSUSTAINABLE FISHING CARDS - SHARK FINNING

HOW MANY SPECIES  
OF SHARK ARE THERE?

There are more than 1,000 types or species of shark and rays in the ocean today, with new species still being discovered every year.



WHAT IS SHARK  
FINNING?

Shark finning is the removal of any fins of a shark and discarding the rest of the shark (often still living) into the sea.



HOW HEALTHY ARE  
SHARK POPULATIONS?

More than 30% of all known shark and ray species are in danger of extinction. More than half of some groups of sharks have disappeared because of shark fishing, and it can take a long time for populations to recover.





**WHY ARE SHARKS  
SO SOUGHT AFTER?**

Sharks are worth a lot of money! Shark fin soup is considered to be a symbol of prosperity in some Asian traditions, and a single bowl can cost up to \$100.



**DOES THE OCEAN  
EVEN NEED SHARKS?**

Sharks play an important role in the ecosystem. As apex predators, they maintain the species below them and help to balance species diversity.



**HOW IS THE MARINE  
STEWARDSHIP COUNCIL  
(MSC) HELPING TO END  
SHARK FINNING?**

Any fishers engaged in shark finning are not allowed to get the Marine Stewardship Council blue fish tick label.





# UNSUSTAINABLE FISHING CARDS - CLIMATE CHANGE

## HOW DOES CLIMATE CHANGE AFFECT THE OCEAN?

Oceans play a major role in climate dynamics, absorbing 93% of heat that accumulates in the Earth's atmosphere, and a quarter of the carbon dioxide (CO<sub>2</sub>) released from fossil fuels. The impacts of climate change on our oceans include shifts in temperature, acidification, deoxygenation and changes in ocean currents.



## HOW MUCH DOES CLIMATE CHANGE AFFECT THE OCEAN?

In the past 30 years, marine heatwaves are estimated to have increased by more than 50%. Globally, ocean temperatures are predicted to increase by 1-4°C by 2100.




## HOW DOES CLIMATE CHANGE AFFECT MARINE LIFE?

Sudden rises in temperature and acidification can lead to the loss of marine habitats and species. Shifting ocean currents and warming waters are changing the distribution of fish stocks and altering the structure of ecosystems.






## DOES CLIMATE CHANGE AFFECT FISHING?

Climate change threatens fish stocks, but also creates new opportunities for fishing. Areas in the Tropics are predicted to see declines of up to 40% in potential seafood catch by 2050. In contrast, areas in higher latitudes such as the North Atlantic and North Pacific are seeing increases in the range of some fish species. 

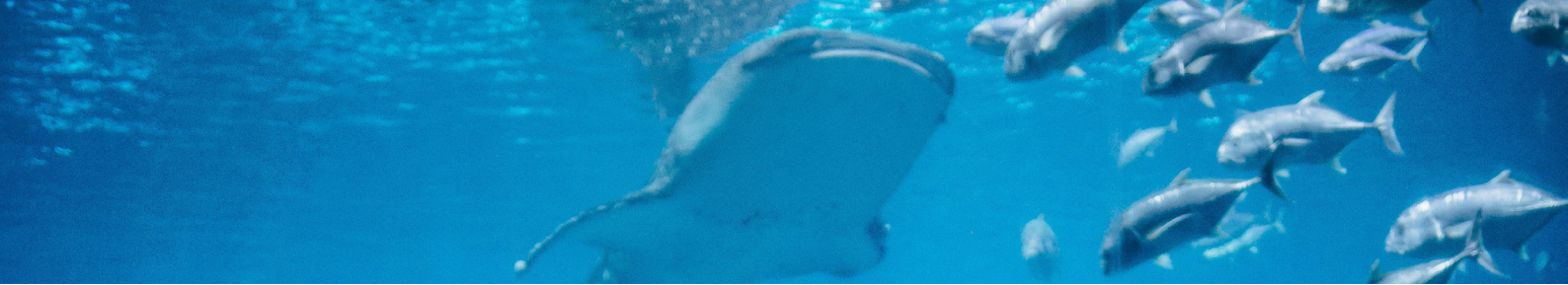
## DOES FISHING CONTRIBUTE TO CLIMATE CHANGE?

Fishing has less impact on climate than the harvesting of other proteins. A study of greenhouse gas emissions of wild fisheries found that each kg of fish caught produces between one and five kg of carbon. 

## HOW DO SUSTAINABLE FISHERIES COPE WITH CLIMATE CHANGE?

Sustainable fisheries that meet the MSC's standard for sustainable fishing are well-managed and more prepared for climate change. These fisheries have effective monitoring and management in place to reduce their impacts on the environment. Following advice from scientists, these fisheries have pre-agreed plans for responding to likely environmental changes. 





# UNSUSTAINABLE FISHING CARDS - OVERFISHING

## WHAT IS OVERFISHING?

When a certain species of fish, usually one people like to eat, is fished too much, the fish are unable to reproduce their numbers back to a healthy level and begin to decline. This is called 'overfishing'.



## IS OVERFISHING A BIG PROBLEM?

Yes. Today, almost one third of all global fish stocks are overfished. If nothing is done to prevent this decline, there is a risk that some species will be gone forever.



## WHY DON'T WE PUT RULES IN PLACE TO PREVENT OVERFISHING?

There are strict national and global rules in place to prevent overfishing, however illegal fishing remains a big problem. Illegal fishing can involve fishing without a license, catching species you aren't allowed to catch, taking fish from areas where you are not allowed to fish, or not reporting the amount of fish caught to fishing authorities.





## WHAT IS DESTRUCTIVE FISHING?

Destructive fishing practices include the use of cyanide poison or explosives to kill fish. These types of fishing can completely destroy the underwater environment and coral reefs.



## SHOULD WE STOP EATING FISH ALTOGETHER?

Billions of people all over the world rely on fish as an essential source of protein in their diets, or rely on fishing for their livelihood. As such, wanting the world to stop eating fish is not a practical solution to overfishing. A better solution is to support sustainable fishing.



## HOW IS THE MARINE STEWARDSHIP COUNCIL (MSC) HELPING TO END OVERFISHING?

The MSC was created to address the problem of overfishing. The MSC works with fishers all over the world to fish sustainably. Fisheries that demonstrate sustainable fishing practices by meeting the MSC Fisheries Standard can use the MSC blue fish tick on their seafood products.

