FOOD: DIFFERENT BY DESIGN

Teacher resources - Lesson plan

Recycle me

Australian Curriculum Objectives

Years 7 & 8 - Science

- AC9S7U02
  Use models, including food webs, to represent matter and energy flow in ecosystems and predict the impact of changing abiotic and biotic factors on populations
- AC9S7H01 / AC9S8H01
  Explain how new evidence or different perspectives can lead to changes in scientific knowledge
- AC9S7H03 / AC9S8H03
  Examine how proposed scientific responses to contemporary issues may impact on society and explore ethical, environmental, social and economic considerations
- AC9S7I01 / AC9S8I01
  Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge

Years 7 & 8 - Design & Technology

- AC9TDE8K01
  Analyse how people in design and technologies occupations consider ethical and sustainability factors to design and produce products, services and environments
- AC9TDE8K04
  Analyse how food and fibre are produced in managed environments and how these can become sustainable
- AC9TDE8K05
  Analyse how properties of foods determine preparation and presentation techniques when designing solutions for healthy eating

Years 7 & 8 - Geography

- AC9HG7K01
  Classification of environmental resources and the way that water connects and changes places as it moves through environments
- AC9HG7S01 / AC9HG8S01
  Develop questions for a geographical inquiry related to a phenomenon or challenge
- AC9HG7S05 / AC9HG8S05
  Identify a strategy for action in relation to environmental, economic, social or other factors, and explain potential impacts

Also suitable for

Years 5 & 6 - Design & Technology

- AC9TDE6K01
  Explain how people in design and technologies occupations consider competing factors including sustainability in the design of products, services and environments
- AC9TDE6K04
  Explain how the characteristics of foods influence selection and preparation for healthy eating
- AC9TDE6K05
  Explain how characteristics and properties of materials, systems, components, tools and equipment affect their use when producing designed solutions

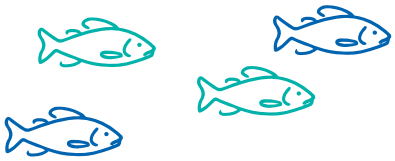
Years 5 & 6 (Stage 3) - Science

- AC9S5U01
  Examine how particular structural features and behaviours of living things enable their survival in specific habitats
- AC9S5H02 / AC9S6H02
  Investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions
- AC9S5I01 / AC9S6I01
  Pose investigable questions to identify patterns and test relationships and make reasoned predictions
- AC9S5I06 / AC9S6I06
  Write and create texts to communicate ideas and findings for specific purposes and audiences, including selection of language features, using digital tools as appropriate

This 40-60 minute lesson for ages 12+ will introduce learners to some of the ways that seafood production can be designed for a more sustainable future. Learners will discover some of the innovations being made in aquaculture and wild fishing to help reduce pollution and entanglements with marine wildlife.

Key terms

- Food system
- Environmental impact
- Seafood production
- Aquaculture
- Pollution
- Responsible
- Overfishing
- Bycatch reduction
- Sustainable



You will need

- Access to the following videos:

Introduction to Aquaculture

Overfishing

Prawn fishers in Hervey Bay

- Printed or projected versions of the activity sheets (pages 7-10)
- Optional - projection of the Ocean Connection cards (page 13)
- Optional extension activity sheets and videos

Key Questions

- How can we re-design our food systems for a sustainable future?
- What is responsible aquaculture?
- What is bycatch reduction in wild fishing?
- What are some of the innovations being made in the seafood industry to reduce environmental impacts?
- How else might we re-design our food systems for a sustainable future?

Class Activities

- Learners will discuss the complexity of feeding a growing global population
- Learners watch videos that introduce them to responsible aquaculture in Australia, with examples from Pacific Reef farm
- Learners understand the problem of bycatch and view a case study from the Northern Prawn Fishery
- Learners creatively tackle the environmental impacts of seafood production, by completing an activity on either pollution in aquaculture or bycatch in wild fishing

Starter (5-10 mins)

Introduce students to the theme of the lesson: **Designing food systems for Sustainable Oceans.**

To begin, brainstorm as a class a short list of foods that come from aquatic/marine environments. You can use the Ocean Connection cards (page 13) for inspiration.

- How many students eat fish or seafood in the class?
- What types of seafood do they like to eat?

Then discuss with students,
How many people are there on the planet today?
8 billion

In the past 50 years, the global population has more than doubled. What might this mean for for the farmers that grow our food?
Feeding a growing population puts pressure on farmers to increase production

So what might have happened to the amount of fish we consume in the past 50 years?
Seafood production has increased by 4 times!

How many of the 8 billion people in the world today might depend on fish as the primary source of animal protein in their diet?
1 in 5 people

In small island countries such as the Maldives, Kiribati and the Solomon Islands people are especially dependent on fish to meet their nutritional needs. We need fish and seafood because they contain many of the **essential vitamins and minerals** we need for good health including protein, zinc, iron, vitamin D and fatty acids.

So that's a lot of seafood being caught, farmed and sold. The fishing industry also employs millions of people worldwide who depend on **seafood for their livelihoods** (fishers, farmers, factory processors, transporters, vendors and more).

However as the world population grows and we consume more and more fish, what sort of environmental impacts might result?
Answers may include

- Overfishing
- Marine biodiversity loss
- Marine habitat destruction
- Water pollution
- Fish disease
- Bycatch
- Marine debris (discarded fishing gear in the ocean)

Main activity (40 mins)

So, how can we re-design our food systems for a sustainable future?
Introduce students to the concept of Fish Farming, also known as Aquaculture. Today over half of global fish we eat comes from aquaculture, and this is predicted to increase to 58% of the fish we eat by 2029.

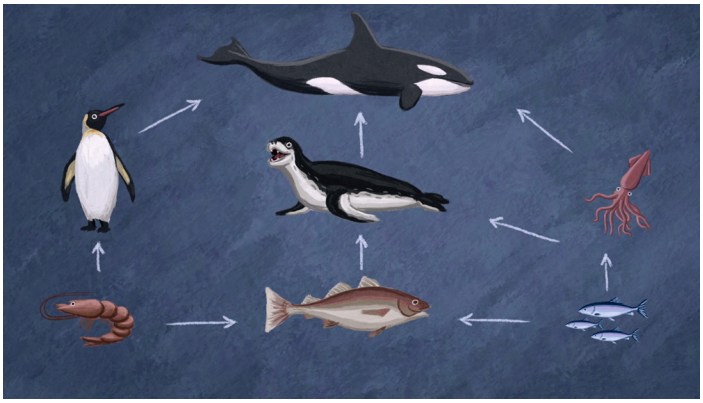
Show students the video Introduction to Aquaculture (3:17)

- The world's oldest known aquaculture site is located in Budjbim Victoria, the traditional country of the Gunditjmara people where Aboriginal Australians farmed eels
- Today we farm a number of different fish and shellfish species in Australia
- Aquaculture can cause environmental problems if not practiced responsibly, such as poor water quality from too much fish waste (poo)
- Ways to avoid water pollution can include location of the fish cages where there are water currents or filtration of farm pond water before it enters wetlands.

Next, watch a clip **(2:59 - 10:57)** from an ABC Catalyst episode 'Can Seaweed Save The World' about an ASC-certified Prawn and Kingfish farm using seaweed in innovative ways. show students what a prawn farm in Queensland is doing to make their production more responsible.

Discuss the images and scenes viewed in the video: weather, fish, scenery, ponds, jobs, technology used? Does it look like a typical farm that you may have seen before?

Secondly we look at a design solution in the wild fishing industry for Bycatch Reduction. Show students a short video clip Overfishing (2.55) to learn about some of the problems caused by overfishing.



So what is Bycatch?

Bycatch is when fishing boats accidentally catch fish and other animals that they don't really want or shouldn't take including sea birds, turtles, sharks and other marine creatures. Bycatch can also include young or undersized fish that are too small to eat and should be left in the sea to grow. If bycatch happens too often it can disrupt or affect the marine food web.

In Australia, our fisheries are trying to reduce bycatch to:

- Minimise harm and ensure the long-term survival of bycatch species
- Protect the wider marine ecosystem and food web
- Reduce work for fishers in sorting their catch
- Avoid waste or damage to fishers' catch

Show students a 5-minute video about bycatch reduction in Australia's Northern Prawn Fishery (NPF). (4:42)

Note: If you've already watched our Food: Different by Design Virtual Classroom show students this 7-minute video about the innovation of bycatch reduction devices (7:14) by NPF prawn fishers instead.

Activity

Now get students thinking about ways that they could improve on the designs of either an aquaculture or fishing system to make it more sustainable.
Split students into groups of 2-4 and give each group a copy of either the

- 'Poo-llution on a Fish Farm' worksheet (page 7), or
- Sea bird bycatch (page 9)

Students brainstorm ways that this fish farm could be more responsible and minimise damage on the environment.

Discussion (10 mins)

Students take turns presenting their ideas to the class, and then review all together against the answers sheet on pages 8 and 10

Discuss as a class,

- Do students think the example solutions for reducing pollution and bycatch in the seafood industry will be successful?
- How else might we re-design our food systems to make them more sustainable?
- How can we find out whether the seafood we buy is produced sustainably or not?

Did your class come up with some creative new ideas? Help us innovate the sustainable fishing and aquaculture industries by sharing them at alexis.farr@msc.org

Extension Activities

1. Play the Kahoot! Quiz Food: Different by Design

2. In 2011 the Western Australian Government implemented a new rule to help reduce bycatch in the Rock Lobster fishing industry. All rock lobster fishers are now required by law to use a 'Sea Lion Exclusion Device' (SLED) on their rock lobster pots.

Students read the Western Australian Department of Fisheries Guide on Sea Lion Exclusion Devices and answer the questions on page 11

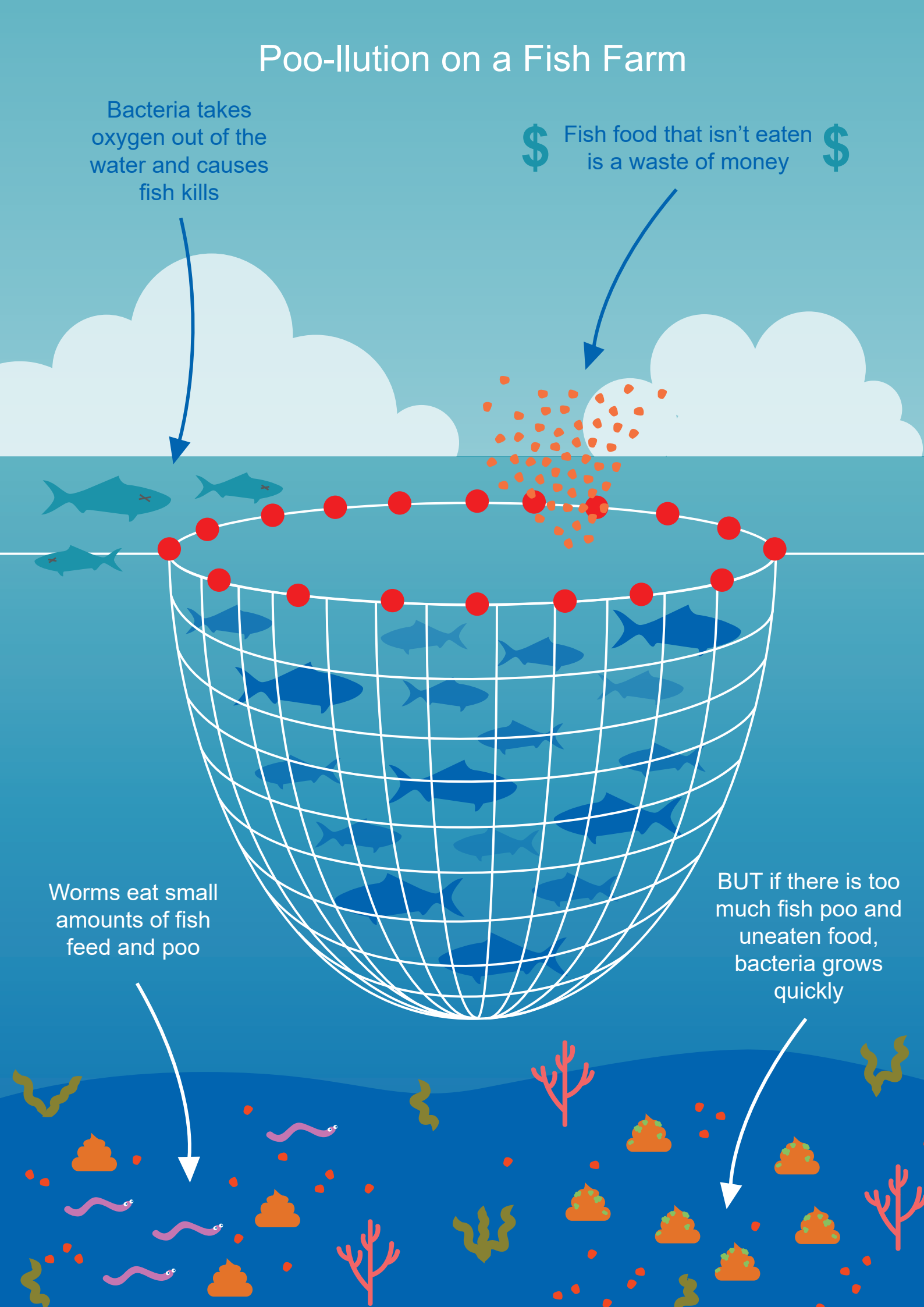
To learn more about the WA Rock Lobster see the Rock Lobster Factsheet in the Saltwater Schools activities

3. Show students a video of a simple sustainable seafood recipe for ceviche (11 mins) cooked by Chef Guy Turland and hosted by Science Journalist Rae Johnston.
Video marker from 23:36 - 34.21
Then make the recipe (p15) as a class!
No heat required

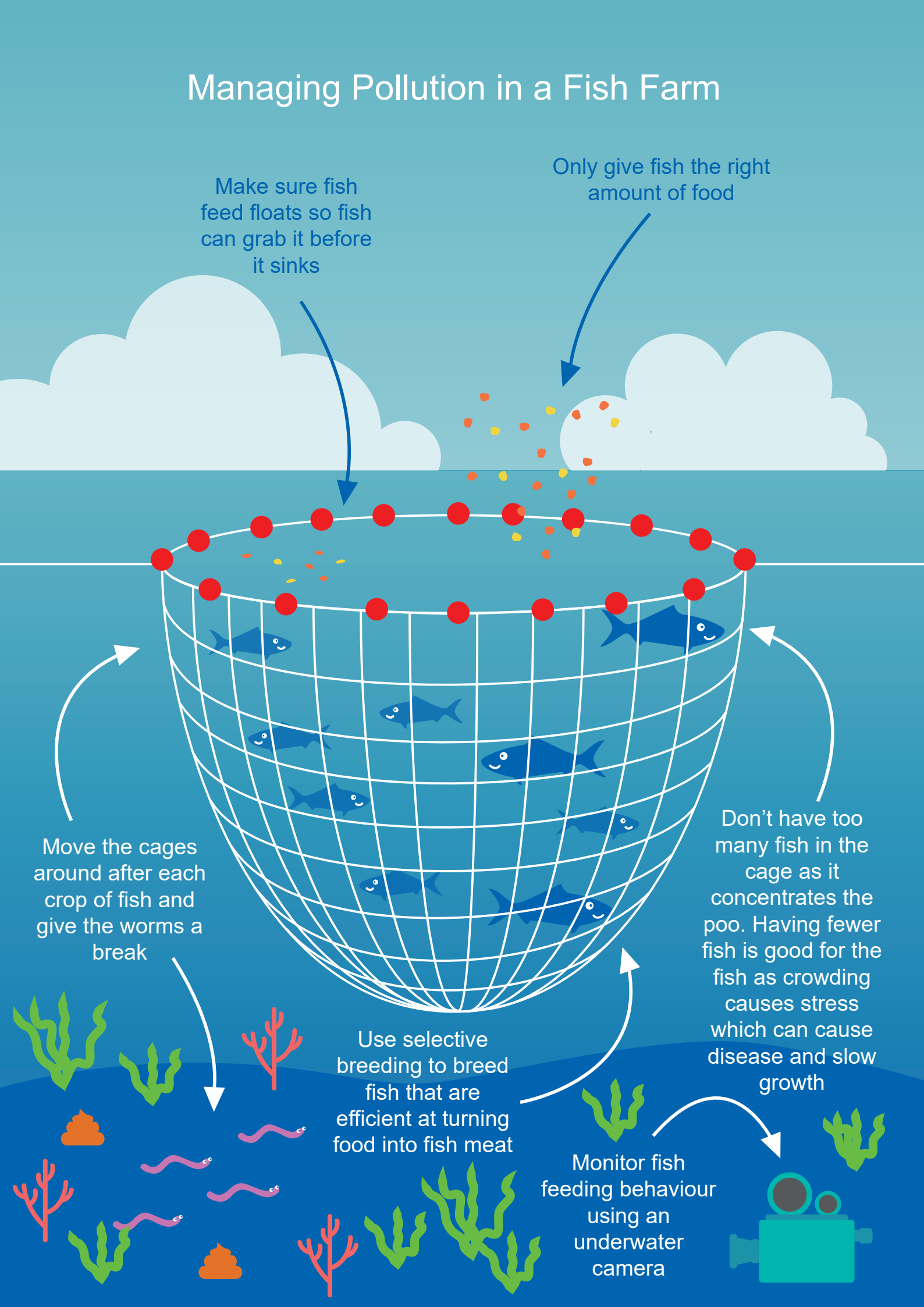
4. Play the Tricky Trawling game! In this game players must try to catch fish in the open ocean, while avoiding vulnerable seabed-dwelling creatures like octopus and skates

Continue learning about marine sustainability with more learning resources

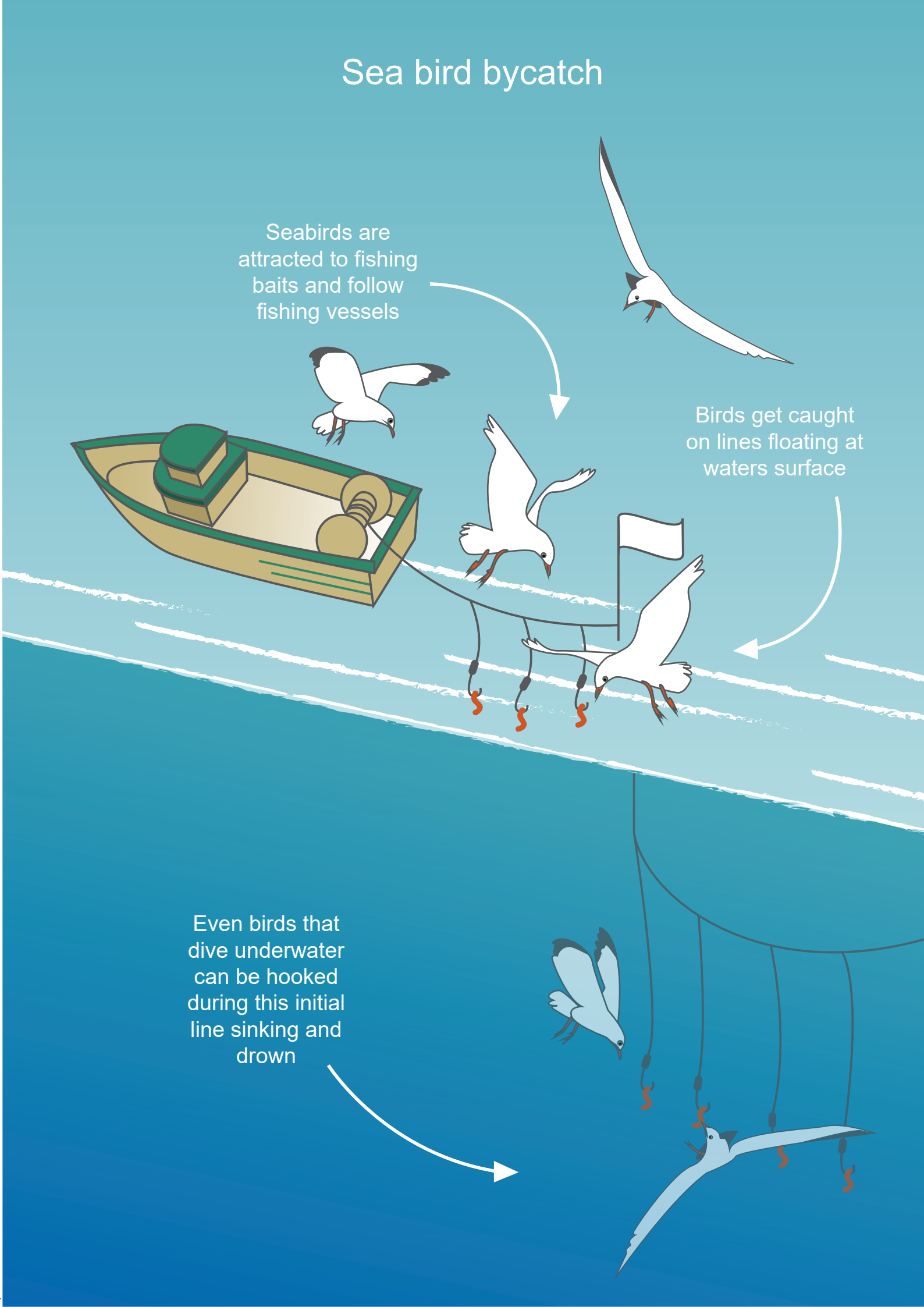
Poo-llution on a Fish Farm



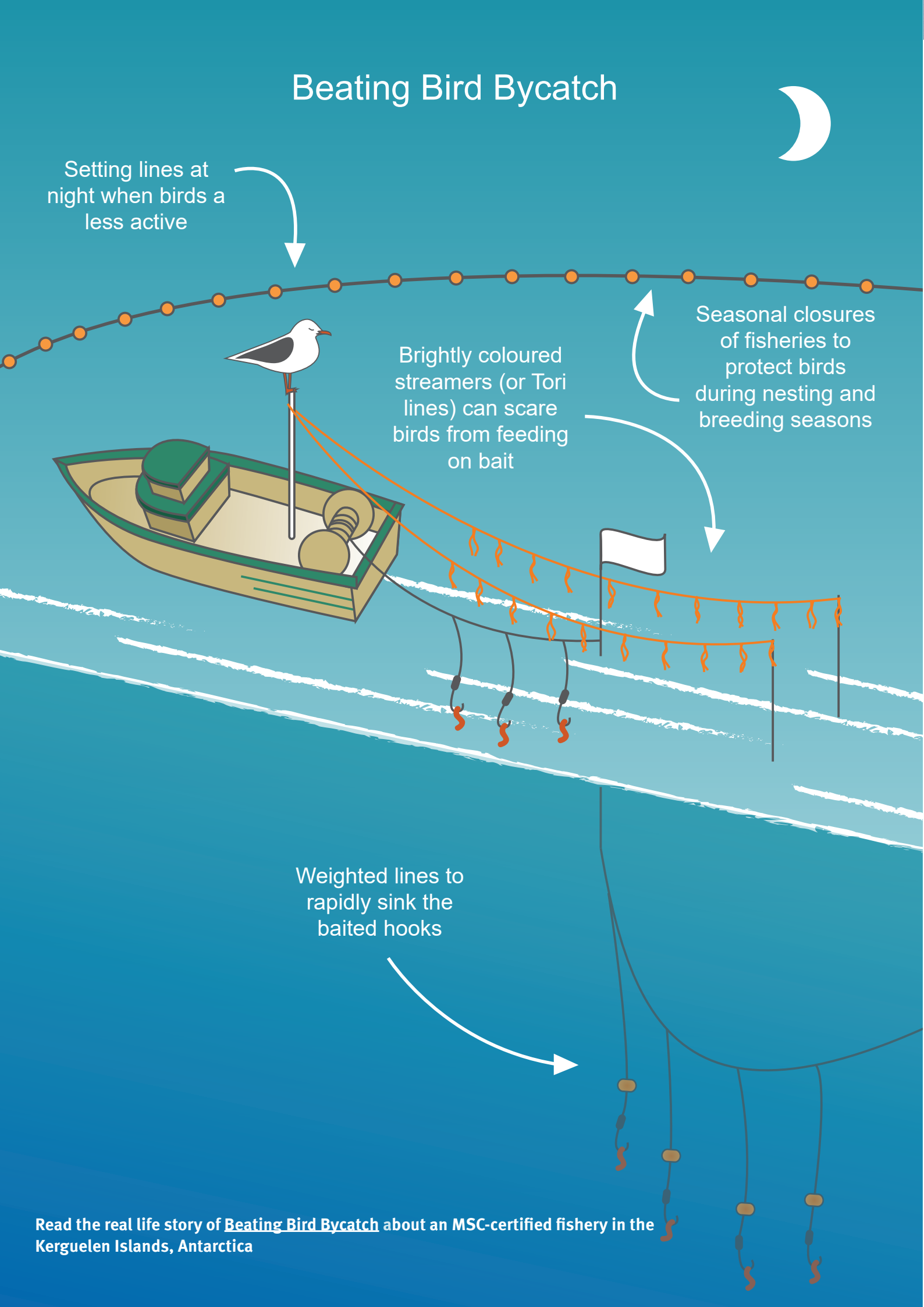
Managing Pollution in a Fish Farm



Sea bird bycatch



Beating Bird Bycatch



Read the real life story of Beating Bird Bycatch about an MSC-certified fishery in the Kerguelen Islands, Antarctica

SEA LION EXCLUSION DEVICE (SLED) QUIZ

How well did you read?

(1) What does a SLED do?
a. It makes a noise so that sea lions are scared away from lobster pots
b. It uses a light to show sea lions where the lobster pots are
c. It prevents a sea lion from entering rock lobster pots
d. It helps fishers to ride down a ski slope

(2) Why is there an obligation for Western Australian Rock Lobster fisheries to use SLEDs on their lobster pots?
a. To help fishers identify which pots are theirs underwater
b. To help fishers catch Sea lions which are considered a pest
c. Sea lions are listed as 'vulnerable' and 'specially protected' under Australian Conservation Acts
d. There is no obligation for fishers, but they use SLEDs voluntarily

(3) Where were **two** new SLED zones introduced in 2011/2012
a. The Abrolhos Islands
b. Coolimba
c. Jurien Bay
d. The Easter Group

(4) Where is a SLED fitted on a rock lobster pot?
a. Across the top of the neck
b. Vertically from the base of the pot
c. Inside the pot
d. Either across the top or vertically from the base

(5) What size gap must the SLED leave at the top of the pot?
a. 15 cm
b. 32 cm
c. 75 cm
d. 132 cm

(6) Why is it important that the SLED leaves a gap of this specific size at the top of the pot?
a. To help fishers get their hands into the pot
b. So that fish can come in and out of the pots
c. So that SLEDs do not reduce the catch of legal size rock lobster
d. The gap helps fishers to retrieve their pots with a rope

(7) What can fishers use to measure check the size and fit of their SLED?

_____

(8) Draw a picture of what might happen when a seal approaaches a lobster pot fitted with a SLED. Try to draw the SLED as accurately as possible, choosing either a rectangular or round neck type

Answers

(1) What does a SLED do?

a. It makes a noise so that sea lions are scared away from lobster pots
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d. Either across the top or vertically from the base

(5) What size gap must the SLED leave at the top of the pot?

a. 32 cm
b. 132 cm
c. 150 cm
d. 162 cm

(6) Why is it important that the SLED leaves a gap of this size at the top of the pot?

a. To help fishers get their hands into the pot
b. So that fish can come in and out of the pots
c. So that SLEDs do not reduce the catch of legal size rock lobster
d. The gap helps fishers to retrieve their pots with a rope

(7) What can fishers use to measure check the size and fit of their SLED?

____A SLED gauge_____

(8) No answer

OCEAN CONNECTIONS - SEAFOOD

Tuna Sandwich

Prawn salad

Fish and Chips

Kingfish taco

Fish Curry

Sushi

Seafood Pasta

Panfried Salmon

Oysters

KINGFISH & TIGER PRAWN CEVICHE

Ingredients

150g kingfish
150g Tiger prawns
2 lemons juice and rind
3 limes juice and rind
2 oranges, juice and rind
1 red chilli, seeds discarded, finely chopped
1 red onion, finely chopped
1 firm mango cheek
1 tablespoon finely grated fresh ginger
1 large handful coriander (cilantro) leaves coarsely chopped.

2 cups corn chips
2 avocados
2 limes juice
1 bunch coriander
1 chili, minced

Method

1. **Marinate.** To make the marinade, put the juices, chilli, onion, ginger, coconut cream and half the coriander in a medium bowl and mix to combine. Add the fish and toss to coat. Cover and refrigerate for 1 hour.
2. **Make Guacamole.** To make guacamole in a bowl smash, lime juice, coriander, chili salt and pepper.
3. **Serve.** Serve with smashed avo and corn chips .

Food: Different by Design was produced by the Aquaculture Stewardship Council (ASC) and Marine Stewardship Council (MSC) in Australia.

The Aquaculture Stewardship Council is an independent, international non-profit organisation that manages the world's leading certification and labelling programme for responsible aquaculture.

It works with aquaculture producers, seafood processors, retail and foodservice companies, scientists, conservation groups and consumers to transform aquaculture.

The Marine Stewardship Council (MSC) is an international non-profit that set standards for sustainable fishing and traceability within the seafood supply chain. The MSC brings together credible science-based evidence for a more sustainable way of life, fascinating stories about our oceans and the people who depend on them for survival. The MSC education program Saltwater Schools offers a simple way of introducing and reflecting on concepts around sustainability and connection - how we as consumers and citizens are connected to the world, along with a practical example of the change we can make in the world around us.

Explore our other teacher and parent resources at msc.org/saltwaterschools