What’s the Problem with Trawling?
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WWW.EARTECHO.ORG/EXPEDITIONS
Teacher Introduction

Commercial trawling has a devastating effect on biodiversity in areas where it has been used. Large commercial trawlers have been historically decimating both marine environments and significantly decreasing stock levels to a level at which they are unable to recover.

The impact on communities sitting on the seafloor, known as benthic communities is devastating, the primary culprit being drag trawlers with beams of up to 12 meters, and several beams often deployed at the same time.

This lesson looks at the effect of commercial bottom trawling on both fish stocks, and benthic community biodiversity.

Learning Objectives

- Students will understand what ocean biodiversity is and how it can be impacted by commercial bottom trawling.

Engineering Connection

Students will understand relative sizes and impacts of large-scale fishing operations, and devise a plan to reduce the impacts of trawling. Students perform percentage calculations, and analyze graphs.
Lesson

Starter:
Use the PowerPoint to introduce students are introduced to the idea of trawling and fish stocks. There are examples of large fishing vessels and the beam trawl equipment that is used. They see a video showing a small scale version of this method in practice from the Plymouth expedition.

They then analyze data on beam trawlers size, and complete calculations regarding the total percentage one beam trawler collects of the UK’s allocated fish stock.

Students are then shown the impact that this type of fishing method has had in the North Sea.

Activity 1: Students analyse the catch from a marine sample from 3 different areas
1. An area which has seen a heavy amount of commercial beam trawling
2. A natural reef in a protected marine area
3. An area where small sized fishing vessels have been used

Each area is represented by a video showing the types of organisms present in that location. Students complete a table analyzing the 3 different areas for their biodiversity and marine conditions.

Students review this data and answer a longer written question regarding the information that they have gathered. A mark scheme is supplied for self-assessment.

Activity 2: Students analyze graphs regarding effects of trawling on fish stocks and answer a series of questions describing and explaining supplied graphs (see student worksheets). There is one graph that looks at the decrease of fish stocks since 1895, to 2015. The other looks at the effect of management of stocks, in particular the rise in cod numbers since 2005.

Plenary: Students look at solutions to these issues, given information regarding the effects of various sustainable and unsustainable fishing methods, they create a 5 point plan for the UK to implement into its North Sea fishing industry to prevent the current decline in biodiversity and fish stocks.
1. Describe the trend in the landings of fish from 1950 to 2010 (2 marks)

2. Why was there a large decrease in fish landings twice before 1950? (1 mark)

3. Explain how the use of large commercial trawling vessels may have contributed to this trend? (3 marks)
1. Describe the trend in the stock size of North sea cod from 1970 to 2005 (2 marks)

2. What is meant by a quota? (1 mark)

3. Explain, using data from the graph, the effect that introduction of fish quotas and strict management has effected North Sea Cod stocks. (3 marks)
Next Generation Science Standards:

5-ESS3-1.
• Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.

MS-ESS3-3.
• Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

ESS3.C: Human Impacts on Earth Systems
• Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.

3-5: Use evidence to construct or support an explanation or design a solution to a problem.

3-5: Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

Australian Standards:

Technologies and Society –Investigate how people in design and technologies occupations address competing considerations, including sustainability, in the design of solutions for current and future use (VCDSTS033)
• Materials and technologies specialisations –Investigate characteristics and properties of a range of materials, systems, components, tools, and equipment and evaluate the impact of their use (VCDSTC037)
• Examine and prioritize competing factors including social, ethical, economic, and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures (VCDST5043)
• Investigate the ways in which designed solutions evolve locally, nationally, regionally, and globally through the creativity, innovation, and enterprise of individuals and groups (VCDSTS044)

Technologies Contexts: materials and technologies specialisations –Analyse ways to create designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools, and equipment (VCDSTC048)

Creating Designed Solutions: Investigating –Critique needs or opportunities for designing and investigate, analyse, and select from a range of materials, components, tools, equipment, and processes to develop design ideas (VCDSCD049)
• Generating: Generate, develop, and test design ideas, plans, and processes using appropriate technical terms and technologies including graphical representation techniques (VCDSCD050)
• Producing: Effectively and safely use a broad range of materials, components, tools, equipment, and techniques to produce designed solutions (VCDSCD051)
• Planning and Managing: Use project management processes to coordinate production of designed solutions (VCDSCD053)
UK Science Standards:
Planning different types of scientific enquiries to answer questions, including recognizing and controlling variables where necessary:

• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
• using test results to make predictions to set up further comparative and fair tests
• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
• identifying scientific evidence that has been used to support or refute ideas or arguments
• ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
• the use of conceptual models and theories to make sense of the observed diversity of natural phenomena
• the assumption that every effect has one or more cause

References
2. Britishseafishing.co.uk, https://britishseafishing.co.uk/cornelis-vrolijk/.
<table>
<thead>
<tr>
<th>Graphic</th>
<th>Impact</th>
<th>Fishonline criteria score</th>
</tr>
</thead>
<tbody>
<tr>
<td>😄</td>
<td>Very low impact/Well managed</td>
<td>0</td>
</tr>
<tr>
<td>😞</td>
<td>Low impact/Management requires some improvement</td>
<td>0.25</td>
</tr>
<tr>
<td>😞</td>
<td>Some impact/Management requires improvement</td>
<td>0.5</td>
</tr>
<tr>
<td>😞</td>
<td>Moderate impact/Poorly managed</td>
<td>0.75</td>
</tr>
<tr>
<td>😞</td>
<td>High impact/Unacceptable</td>
<td>1</td>
</tr>
</tbody>
</table>

**Key**

<table>
<thead>
<tr>
<th>Gear Type</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual e.g. Dive caught</td>
<td></td>
</tr>
<tr>
<td>Static e.g. Longlines</td>
<td></td>
</tr>
<tr>
<td>Encircling e.g. Purse Seine</td>
<td></td>
</tr>
<tr>
<td>Towed e.g. Dredging</td>
<td></td>
</tr>
<tr>
<td>Illegal/Highly damaging to environment e.g. Chemical</td>
<td></td>
</tr>
</tbody>
</table>

### Table reviewed and updated by Adam Townley, Bangor University, July 2013

<table>
<thead>
<tr>
<th>Fishing Method</th>
<th>Examples of Species Targeted by Method</th>
<th>Impact on habitat</th>
<th>Impact on target species</th>
<th>Impact on non-target species</th>
<th>Management</th>
<th>Mitigation or Conservation Measures Available (but not necessarily applied)</th>
<th>Rating (Overall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dive caught</td>
<td>Scallops (King)</td>
<td>😄</td>
<td>😄</td>
<td>😄</td>
<td>😞</td>
<td>Licensed diving only; closed areas; minimum landing size of 100 mm or 110 mm in some areas e.g. Isle of Man, Wales.</td>
<td>😄</td>
</tr>
<tr>
<td>Hand Gathering or rake</td>
<td>Molluscs e.g. Cockle</td>
<td>😄</td>
<td>😄</td>
<td>😄</td>
<td>😞</td>
<td>Byelaws on minimum landing size</td>
<td>😄</td>
</tr>
<tr>
<td>Handline</td>
<td>Mackeral</td>
<td>😄</td>
<td>😄</td>
<td>😄</td>
<td>😞</td>
<td>Licensing; minimum landing size of 20cm</td>
<td>😄</td>
</tr>
<tr>
<td>Jig</td>
<td>Squid</td>
<td>😄</td>
<td>😄</td>
<td>😄</td>
<td>N/A</td>
<td>Gear and licensing restrictions</td>
<td>😄</td>
</tr>
<tr>
<td>Pole and line</td>
<td>Tuna, Mahi mahi</td>
<td>😄</td>
<td>😄</td>
<td>😄</td>
<td>😞</td>
<td>Monitoring of bait fish used; Total Allowable Catch (TAC)</td>
<td>😄</td>
</tr>
<tr>
<td>Fishing Method</td>
<td>Species</td>
<td>Status</td>
<td>Status</td>
<td>Status</td>
<td>Notes</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Rod and line (Commercial)</td>
<td>Trout</td>
<td>😊</td>
<td>😊</td>
<td>😏</td>
<td>Licensing; closed seasons; gear restrictions; and minimum landing sizes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spear or harpoon</td>
<td>Tuna, grouper</td>
<td>😊</td>
<td>😊</td>
<td>N/A</td>
<td>Limit number of fishermen; report catch details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom longline</td>
<td>Cod, haddock, rays, ling and huss</td>
<td>😊</td>
<td>😍</td>
<td>😐</td>
<td>Restrictions on number of hooks, length of line, soak time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drift net (Coastal)</td>
<td>Herring, sardine</td>
<td>😊</td>
<td>😊</td>
<td>😐</td>
<td>Licensing; mesh size restrictions; effort controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed or gill net</td>
<td>hake, turbot, brill, sole</td>
<td>😊</td>
<td>😋</td>
<td>😐</td>
<td>Attachment of acoustic deterrent devices; dyes to make nets more visible; closed areas; effort Controls; exit panels; scaring devices e.g. pyrotechnics; white mesh – visible to seabirds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelagic longline</td>
<td>Toothfish, tuna, swordfish</td>
<td>😊</td>
<td>😏</td>
<td>😐</td>
<td>Various measures inc. circular-shaped hooks and bait type to reduce turtle by-catch; various measures to reduce seabird bycatch, e.g. scaring devices and deploying line deeper; magnets to reduce shark bycatch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pelagic longline (used in fisheries where measures to reduce bycatch are in use e.g. MSC Certified fishery)</td>
<td>Tuna, Patagonian toothfish (Chilean seabass), hake, swordfish</td>
<td>😊</td>
<td>😋</td>
<td>😐</td>
<td>Fishing at night; increasing weight on lines – ensures they are out of reach of seabirds; set lines underwater; offal disposed away from lines; dyed bait so it is less visible to seabirds; streamers used as a scaring device</td>
<td></td>
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</tr>
<tr>
<td>Pot or creel</td>
<td>Crab</td>
<td>😊</td>
<td>😋</td>
<td>😊</td>
<td>Limit on boat size; minimum landing size; escape gaps in pot; closed areas and seasons.</td>
<td></td>
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</tr>
<tr>
<td>Method</td>
<td>Target Species</td>
<td>Regulations and Practices</td>
<td></td>
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<tr>
<td>Pot or creel</td>
<td>Dublin Bay prawn</td>
<td>Minimum landing size; closed areas; limit pot numbers</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tangle Net</td>
<td>Spider crab, turbot, sole, angler or monkfish</td>
<td>Effort controls; restrictions on number and length of nets; mesh size</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Trap</td>
<td>Octopus, cuttlefish, prawns, turbot</td>
<td>Restrictions on the number of traps; escape gaps</td>
<td></td>
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<tr>
<td>FAD (Fish Aggregated Device)</td>
<td>Tuna</td>
<td>Control number and density of FADS; area closures; gear technology changes</td>
<td></td>
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</tr>
<tr>
<td>Purse-seine</td>
<td>Mackerel, tuna, herring, sardine</td>
<td>Dolphin friendly methods where applicable, e.g. medina panel and backdown principle; bycatch quotas</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Beam trawl (vessel &lt;24m, 220kW)</td>
<td>Flat fish e.g. plaice, sole, turbot, lemon sole. Also monkfish and cuttlefish</td>
<td>Square Mesh Panel (SMP) to reduce bycatch of benthos; mesh size; square mesh; closed areas; replacement of skids with wheels</td>
<td></td>
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</tr>
<tr>
<td>Beam trawl (vessel &gt;24m, &gt;220kW)</td>
<td>Flat fish e.g. plaice, sole</td>
<td>Electric tickers (experimental); Square Mesh Panel (SMP) to reduce bycatch of benthos; mesh size; square mesh; closed areas; replacement of skids with wheels</td>
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</tr>
<tr>
<td>Bottom trawl (shelf seas)</td>
<td>Demersal e.g. cod, haddock, monkfish</td>
<td>SMP; square mesh; mesh size; separator panels and grids etc.; closed areas; increasing dropper length</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Method</td>
<td>Species</td>
<td>Rating</td>
<td>Rating</td>
<td>Rating</td>
<td>Rating</td>
<td>Comments</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Dredge (National)</td>
<td>Scallop, oyster</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Closed areas; gear restrictions; effort controls; less damaging gear; seasonal closures; statutory closures to protect seabed features; VMS (vehicle Management System) to control access; gear rest; effort controls</td>
<td></td>
</tr>
<tr>
<td>Dredge (Coastal within 6 nm in Lyme and Cardigan Bay; Shetland (MSC Certified) only)</td>
<td>King scallop</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>No demersal tow gears where seabed is vulnerable/protected; number of dredges is limited; limitations on the number of dredges per bar; mesh size allows juveniles to escape; minimum landing sizes</td>
<td></td>
</tr>
<tr>
<td>Hydraulic or suction dredge</td>
<td>Molluscs e.g. cockle, clam</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Closed areas; gear restrictions; effort controls</td>
<td></td>
</tr>
<tr>
<td>Pelagic or mid-water trawl</td>
<td>herring, mackerel, hoki, horse mackerel, Pilchard</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Sorting grids, e.g. Nordmøre grid; minimum landing size; EU ban on mid-water pair trawling</td>
<td></td>
</tr>
<tr>
<td>Pelagic or mid-water trawl with known high bycatch</td>
<td>Seabass</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Sorting grids; EU ban on mid-water pair trawling; area closure; mesh size restrictions; TED (Turtle Excluder Devices)</td>
<td></td>
</tr>
<tr>
<td>Seine net</td>
<td>Demersal fish e.g. cod, sole, lemon sole, red mullet, squid, dab</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Effort controls; licensing; mesh size restrictions; selective panels</td>
<td></td>
</tr>
<tr>
<td>Troll</td>
<td>Tuna, swordfish</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>😞</td>
<td>Visible hooks; set lines below reach of seabirds</td>
<td></td>
</tr>
</tbody>
</table>
EarthEcho Expeditions: What’s the Catch?
What’s the problem with trawling?

WWW.EARTHECHO.ORG/EXPEDITIONS
What’s the Catch?

Our mission is to inspire young people worldwide to act now for a sustainable future. We are a nonprofit 501c3 organization founded in 2000 by siblings Philippe and Alexandra Cousteau in honor of their father Philippe Cousteau Sr., son of the legendary explorer Jacques Yves Cousteau. Our approach is simple; EarthEcho’s 21st century tools and interactive resources equip youth to identify and solve environmental challenges starting in their own communities.

WWW.EARTHECHO.ORG/EXPEDITIONS
What’s Trawling?

Commercial trawling has a devastating effect on biodiversity in areas where it has been used.

Trawling involves ships deploying large nets and gathering fish and other organisms as they travel. Some ships have nets up to 16m in diameter with some ships deploying multiple nets at the same time.

These can be dragged along the sea floor (beam trawling), or at other depths, depending on the type of fish that the ship is trying to catch.

In areas of heavy use, they have been shown to cause;

- Reduction of 20% in the density of species such as sponges,
- Reduction of 50% in the density of hydroids (jellyfish like organisms)
- Up to 80% damage and loss of corals

https://www.seafish.org/media/publications/SeafishGuidetoTowedGear_201310.pdf
WWW.EARTHECHO.ORG/EXPEDITIONS
What’s A Fish Stock?

A fish stock is the number of fish of a particular species that are present in a population. If the stock levels drop below a certain level, the population is no longer able to sustain itself.

Some stocks have dropped significantly with an increased demand for these fish to be exported to new markets, and with our rising world population size.

Mackerel, Tuna, and Bonitos stock sizes have decreased by 74% between 1970 and 2010.

Each country sets numbers (quotas) of fish that can be caught to maintain their fish stocks.


Over 30% of world fish stocks are now overfished
What’s A Fish Stock?

At the Breaking Point
The condition of the world’s fisheries has declined drastically because of overfishing.

In 1950:
15% of fish stocks were harvested to their maximum sustainable limits.
85% were sustainably fished.

In 2003:
32% of stocks had collapsed.
39% were overfished.
The remaining 25% were at the limit of sustainability.

Source: Sea Around Us Project (seaaroundus.org)

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What’s The Problem?

Large commercial trawlers, like the Cornelis Vrolijk which trawls from UK fish stocks, can account for huge proportions of a country’s stock allocation, and have been historically decimating both marine environments and significantly decreasing stock levels to a point at which they are unable to recuperate.

This particular trawler is 114m long, weighs over 5500 tonnes, and catches nearly a quarter of the UK’s entire fish stock allowance.

Small scale fishermen make up three quarters of the UK fishing fleet, but combined, they catch only a small proportion of the UK quota. Large commercial vessels allow overfishing to happen significantly more easily.
What’s The Scale?

Irish trawler, cost £50 m

1 month catch = annual catch of 7,000 artisanal local fishermen

Chinese Trawler fleet, Yangtze

Each of these ships carries a trawling net of this size

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What’s The Percentage?

To calculate the percentage of the fish stock each category is responsible for catching, you need to use the following equation:

\[
\text{Percentage of quota} = \left( \frac{\text{Number of tonnes caught}}{\text{Total number of tonnes in quota}} \right) \times 100
\]

1) Calculate the percentages for each category given opposite.

2) Explain why you think this causes problems with managing fish stocks.

Large vessels capable of catching such large amounts mean that it is much easier and quicker to overfish stock quotas.

<table>
<thead>
<tr>
<th>Category</th>
<th>Thousand Tonnes caught (est)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Large commercial vessels UK</td>
<td>653,393.28</td>
</tr>
<tr>
<td>b) Cornelis Vrolijk</td>
<td>156,542</td>
</tr>
<tr>
<td>b) Small traditional fishing vessels</td>
<td>27,224.72</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage of quota</th>
</tr>
</thead>
</table>
| a)                              | Percentage of quota = \((653393/680618) \times 100\)  
Percentage of quota = 0.96 x 100  
Percentage of quota = 96%        |
| b)                              | Percentage of quota = \((156542/680618) \times 100\)  
Percentage of quota = 0.23 x 100  
Percentage of quota = 23%        |
| c)                              | Percentage of quota = \((27224.72/680618) \times 100\)  
Percentage of quota = 0.04 x 100  
Percentage of quota = 4%          |
What’s The Effect?

The effect of trawling is far reaching, but has particularly negative effects on biodiversity. **Biodiversity is a measure of the different number of species living within a particular ecosystem.**

Beam trawling, as seen in the earlier video, has a distinct effect on the benthic communities (organisms living on the sea floor) found in those areas.

**Filter feeding organisms, such as corals, bivalves (shellfish), and sponges are particularly affected,** with heavy trawling reducing their numbers significantly, and shifting communities towards mobile animals.

This is likely to **significantly effect the entire coastal ecosystem** as organisms are removed and added to the food webs, as well as **effecting water quality and visibility.**

https://planktonpolicy.org/marine-policy/visions-for-the-north-sea/
What’s The Effect?

Subtidal mussel bed

S. North Sea now

Subtidal reef

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What Are Some Examples?

**Case study 1 – Protected marine area**

Papahānaumokuākea Marine National Monument – US

363,680 km² of ocean water

7,000 species of which one quarter are endemic (only found here)

**Case study 2 – Heavy commercial trawling**

North Sea – UK

750,000 km² of ocean water – approx 40% of which has heavy beam trawling

One of the most productive seas

**Case study 3 – Small fishing vessels only**

Port Phillip Bay – Australia

1,930 km² of shallow bay water

Ban of net fishing from 1st April 2018 with all commercial fishing to be phased out by 2022

[Map of Papahānaumokuākea Marine National Monument](https://nmsmarinesprotectedareas.blob.core.windows.net/marineprotectedareas-prod/media/archive/pdf/helpful-resources/factsheets/reserves-factsheet2014.pdf)

[Map of the North Sea](http://ices.dk/sites/pub/Publication%20Reports/Advice/2017/2017/Greater_North_Sea_Ecoregion_Fisheries_Overview.pdf)

## What Are They Like?

For each case study complete the table looking at biodiversity and other factors that we can see in each location.

<table>
<thead>
<tr>
<th>Case study 1 – Protected marine area</th>
<th>Case study 2 – Heavy commercial trawling</th>
<th>Case study 3 – Ban on commercial net fishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papahānaumokuākea Marine National Monument – US</td>
<td>North Sea – UK</td>
<td>Port Phillip Bay</td>
</tr>
</tbody>
</table>

https://sanctuaries.noaa.gov/papahanaumokuakea-expansion/  
https://www.plymouth.ac.uk/research/institutes/marine-institute/pluto  
https://www.instagram.com/jarro dboordimages/
<table>
<thead>
<tr>
<th>Type of area</th>
<th>Protected marine area</th>
<th>Heavy trawling</th>
<th>Ban on commercial net fishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different species seen (keep a tally)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rating for biodiversity (out of 10 with 10 as the highest)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarity of water?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endemic species?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other observations</td>
<td></td>
<td></td>
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</tr>
</tbody>
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WWW.EARTHECHO.ORG/EXPEDITIONS
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</tr>
</thead>
<tbody>
<tr>
<td>Number of different species seen (keep a tally)</td>
<td>100+</td>
<td>7+</td>
<td>80+</td>
</tr>
<tr>
<td>Rating for biodiversity (out of 10 with 10 as the highest)</td>
<td>10</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Clarity of water?</td>
<td>Clear</td>
<td>Cloudy</td>
<td>Clear</td>
</tr>
<tr>
<td>Endemic species?</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Any other observations</td>
<td>Large numbers of fish New species discovered Large numbers of plants/corals</td>
<td>Lots of rock without sea life Seaweed species present</td>
<td>Large numbers of plants/corals Medium numbers of fish</td>
</tr>
</tbody>
</table>
What Can I Say?

Exam style question:
Use the data gathered from the previous task.

What are the similarities and differences between an ecosystem found in an area of heavy trawling, and a protected marine area or an area with a ban on commercial net fishing?

(6 marks)
What Can I Say?

Self assess your answer:

**Level 3 (5-6 marks):**
A strong comparison with two or more similarities and differences is made

**Level 2 (3-4 marks):**
Two similarities and a difference are described or the converse

**Level 1 (1-2 marks):**
A small number of either similarities or differences are described

**Level 0**
No relevant content

**Indicative content**

**comparative points - similarities**
- both have fish living there
- both have a range of plants living on the sea floor
- both have a range of animals living on the sea floor

**comparative points – differences (allow converse points)**
- Heavy trawling area has large amounts of bare rock compared to other areas
- Heavy trawling area has significantly fewer fish species compared to other areas
- Heavy trawling area has cloudy water compared to the clear water of other areas
- Heavy trawling area has smaller range of plants living on sea floor compared to other areas
- Heavy trawling area has smaller range of animals living on sea floor compared to other areas
- Heavy trawling area has much lower biodiversity compared to other areas
What Is The Overall Effect?

Choose one of the graph worksheets and complete the questions.

**Chart 1: Landings of fish in Great Britain/UK by home fishing fleet (thousand tonnes), 1895-2015**

Consequence of Overfishing

---

North Sea Cod

Strict management and quotas introduced
What Is The Overall Effect?

1. The number of landings has decreased (1)
   - From ~1000 to ~450 thousand tonnes (1)

2. Both world wars decreased fish landings (1)

3. Large commercial trawling vessels can catch much larger amounts of fish (1)
   - This has reduced fish stocks to a level where they cannot replenish their numbers (allow unsustainable levels/overexploited) (1)
   - So there are now fewer fish to catch for all vessels (1)

Chart 1: Landings of fish in Great Britain/UK by home fishing fleet (thousand tonnes), 1895-2015

Chart showing the decrease in fish landings from 1895 to 2015.
What Is The Overall Effect?

1. • The number of landings has decreased (1)
   • From ~260 to ~50 thousand tonnes (1)

2. • The amount of a particular type of fish a country is allowed to catch within a year (1)

3. • North Sea cod stock size has increased (1)
   • From ~50 thousand tonnes to ~140 thousand tonnes (1)
   • This is a net increase of ~90 thousand tonnes (1)

North Sea Cod

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What’s The Plan?

Use the information sheet from the marine conservation society on sustainable types of fishing. Come up with a 5 point plan for North Sea fishing to ensure that fish stock levels can increase along with biodiversity.

Think about:
The type of fish that need to be caught
The impact of your methods on both the target and other species
The impact on the environment


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