Sustainable fisheries

4.7.5.3 · Ecology · revision notes

Fish stocks in the oceans are declining. You need to explain why stocks must be kept at a level where fish can still breed, and how controlling net size and fishing quotas help. This subtopic is in GCSE Biology only, not Combined Science.

Key facts

- Fish stocks in the oceans are declining (overfishing)
- Net size control: larger mesh lets young fish escape to grow and breed
- Fishing ban for a few years: the remaining fish breed and the stock recovers
- Stocks must be kept at a level where breeding continues
- Fishing quotas: limit the amount of each species caught in an area
- Aim: conserve fish stocks at a sustainable level

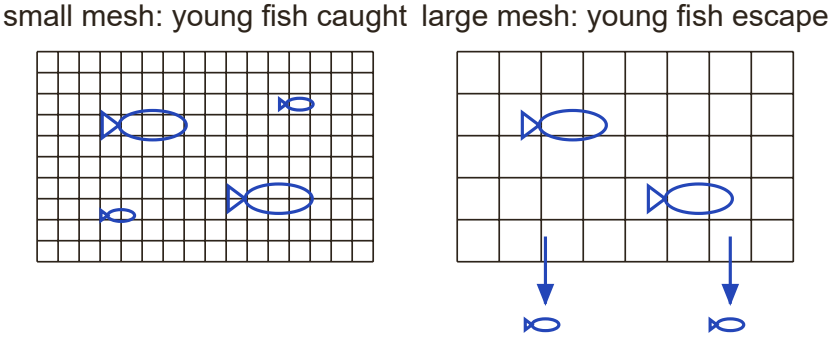
Notes

Why fish stocks matter

- Fish stocks in the oceans are declining because fish are being caught faster than they can reproduce (**overfishing**).
- Stocks must be kept high enough for the fish to keep **breeding**; otherwise some species could vanish completely from some areas.
- Fish are an important source of protein, so falling stocks threaten food security and fishing jobs.
- Losing a fish species also affects food webs: its predators lose food and its prey may increase.

Controlling net size

- Nets with a **larger mesh size** (bigger holes) let young, small fish escape.
- These fish survive, grow and reach breeding age, so they can reproduce and replace the fish that are caught.



A bigger mesh lets young fish escape, grow and breed.

- Fewer young fish are caught and thrown back dead.

Fishing quotas and bans

- **Fishing quotas** limit the amount of each species of fish that can be caught in an area.
- This leaves enough adult fish in the sea to breed, so the population can stay stable or recover.
- Quotas can be lowered when scientists' surveys show that a stock is falling.
- When a stock is very low, fishing for that species can be banned in an area for a few years, so the remaining fish breed and the stock recovers.

Problems

- Fishers may catch less and earn less money in the short term, and some may break the rules, so quotas have to be enforced.
- Fish caught above the quota, or of the wrong species, may be thrown back already dead.
- In the long term, sustainable fishing means there will still be fish to catch.

How to answer each type of question

Name methods of conserving fish stocks 2 marks **Grade 4**

1. The two methods in the specification are control of net size and fishing quotas.
2. Be precise: 'nets with a larger mesh size', not just 'bigger nets'.

Example. Give **two** methods used to conserve fish stocks at a sustainable level.

Model answer. Controlling net size, e.g. using nets with a larger mesh (1); fishing quotas, which limit the amount of fish caught (1)

Explain how a method helps maintain fish stocks 2 to 3 marks **Grade 5**

1. Say what the method does (young fish escape, or the catch is limited).
2. Say that more fish survive to breeding age or are left to breed.
3. Conclude that the population can be maintained or recover.

Example. Explain how increasing the mesh size of fishing nets helps to conserve cod. (3 marks)

Model answer. Young / small cod can escape through the larger holes (1). They survive and grow to breeding age (1). So they can reproduce and replace the cod that are caught, keeping the population stable (1).

Evaluate data on fish stocks

3 marks | Grade 7

1. Describe the trend with numbers and dates.
2. Link the changes to when quotas or net rules were introduced.
3. Remember that a correlation is not proof: other factors, such as water temperature, could matter.

Example. Fishing quotas for haddock were introduced in an area in 2008. The table shows the mass of adult haddock in the area.

Year	Mass of adult haddock in tonnes
2000	180 000
2008	60 000
2018	150 000

Evaluate whether the quotas were successful. (3 marks)

Model answer. Before the quotas, the stock fell by 120 000 tonnes, to a third of its 2000 mass (1). After the quotas, the stock increased by 90 000 tonnes, to 150 000 tonnes (1). This suggests the quotas helped, but other factors, such as water temperature or food supply, may also have changed, so the data does not prove the quotas caused the recovery (1).

Don’t lose marks

- Saying 'bigger nets' help. It is a larger mesh size (bigger holes) that lets young fish escape.
- Saying quotas stop fishing. They limit the amount of each species caught.
- Leaving out the key idea: fish must survive to breed.

More tips

Memory tricks

- Two tools: nets and numbers (net size and quotas).
- Big holes: baby fish swim free, grow up and breed.
- Sustainable = breeding keeps up with catching.

Exam technique

- Finish with breeding: 'so more fish reach breeding age and reproduce'.
- In data questions, give values from before and after the control was introduced.
- If asked for disadvantages, think about fishers' income and whether the rules are followed.
- Percentage decrease = (starting value − final value) ÷ starting value × 100. Read both graph values carefully and round only at the end.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3

State that fish stocks are declining

Fish are being caught faster than they can reproduce (overfishing), so numbers in the oceans are falling.

Grade 4

Name two methods to conserve fish stocks

Controlling net (mesh) size and introducing fishing quotas.

Grade 5

Explain why fish stocks must be maintained

If too few fish are left to breed, the species may disappear altogether in some areas.

Grade 5

Explain how larger mesh nets help

Young, small fish escape, so they can grow and reach breeding age.

Grade 5

Explain how fishing quotas help

Limiting the amount caught leaves enough adult fish to breed and replace those taken.

Grade 7

Evaluate conservation methods using data

Use stock or catch data to judge whether a method is working, and consider other factors.

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