



Built to be slow

Lesson plan: shark life history, population growth rates, and a simple model showing why sharks collapse under fishing pressure that fast-growing fish can withstand



Ages	14 to 18 (grades 9 to 12)
Time	60 minutes
Group	Pairs
Where	Any classroom. Calculators needed.
You need	The slides, calculators and one worksheet per student

What students learn

- How shark life history differs from most bony fish.
- What the intrinsic growth rate r means.
- How to run a simple population model with harvesting.
- Why a sustainable catch for one species can wipe out another.

Before the lesson

1. Print one **population model** worksheet per student.
2. Calculators, or a spreadsheet if available.

The lesson

- 1 Slow lane **10 minutes, slides 1 and 2.**
- 2 Two strategies and r **10 minutes, slides 3 and 4.**
- 3 Model it **25 minutes, slide 5.** Pairs complete five years for both species.
- 4 Results **10 minutes, slides 6 and 7.** Compare with the chart and discuss.

Answers and what to listen for

Answer key (rounded each year): shark at 10% fishing 1000, 900, 815, 743, 680, 625 (after 10 years: 430); fast fish at 10% 1000, 900, 864, 848, 841, 837 (levels off near 833); shark at 30% after 10 years: 49. In this model, the shark declines whenever the fishing rate exceeds r (6% a year), so the maximum survivable rate is just under 6%. Students' hand calculations may differ by a few animals because of rounding.

Making it easier or harder

- **Less confident groups:** model the shark only, for three years.

- **Older groups:** build the model in a spreadsheet and find the fishing rate that gives the biggest steady catch (maximum sustainable yield).

Curriculum links

- **Biology:** population dynamics, life history.
- **Maths:** modelling, iteration.
- **IB and GCSE:** populations and sustainability.

The teacher reading has the science behind every slide, with links to the sources.

Free to use and share for education. Made by Marine Conservation Philippines. More free lessons: marineconservationphilippines.org/resources/teachers-resources/ Photo by MCP. Updated September 2026.