

How the demise of the shark has led to our oceans becoming packed with sardines

By [David Derbyshire](#)

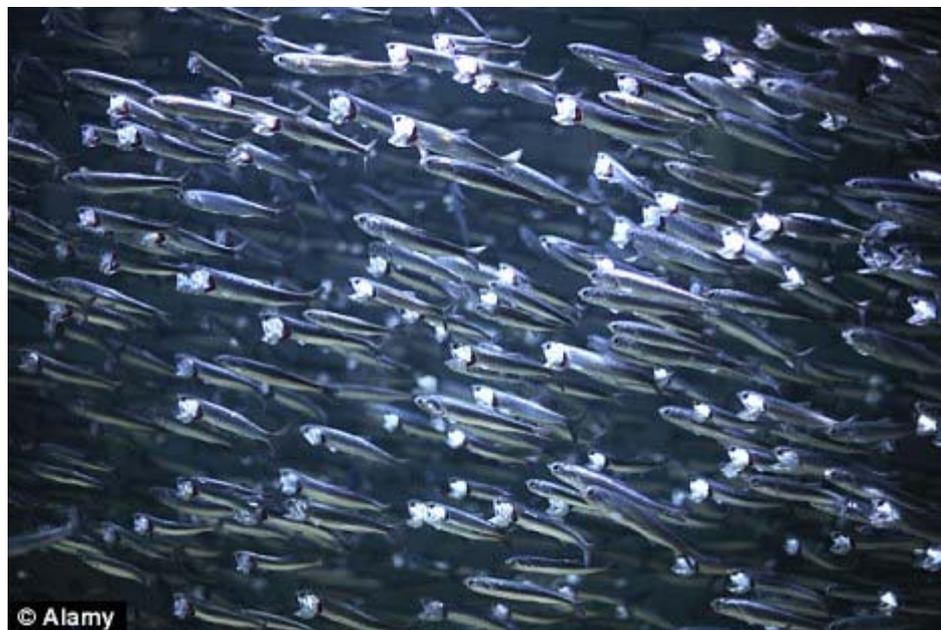
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The world's oceans are increasingly over-crowded with sardines, researchers say.

In the last 100 years, the number of small fish - such as pilchards, herrings, anchovies, sprats and sardines - has more than doubled, according to a study.

The rise is caused by a major decline in big 'predator fish' such as sharks, tuna and cod due to over-fishing.

Without the natural hunters to keep numbers under control, the population of smaller, plankton-feeding fish has boomed.



School of sardines: In the last 100 years, the number of small fish has more than doubled, according to a study

The scientists who made the discovery say the growing number of small 'forage fish' could have serious consequences further down the food chain - and may increase the risk of algae blooms, where populations of simple algae get out of control and choke the oceans.

There are growing concerns among scientists about the impacts of overfishing.

While there are signs that some fish - such as North Atlantic cod - are recovering from years of industrial fishing, some species - such as the giant bluefin tuna praised by Japanese chefs and served in fashionable London restaurants - are now just few years away from extinction.

The new study, carried out by a team of international scientists, is the first world-wide analysis of the impact of commercial fishing since Victorian times.

Using data on fishing going back to 1880, the researchers took more than 200 local snapshots of marine life from around the world and used computer models to estimate numbers.

The study confirmed that over-fishing has badly hit numbers of larger, predatory fish such as North Atlantic cod, salmon, swordfish and tuna.

In the last 120 years, populations have gone down by two thirds - with a 54 per cent decline taking place in the last 40 years alone, the researchers told the American Association for the Advancement of Science.



Water world: The increase in small fish is down to the steep decline of predators such as sharks

However, small 'forage fish', such as anchovy, sardine and capelin, which traditionally are hunted by the predators, have more than doubled over the same period.

Lead researcher Dr Villy Christensen, of the University of British Columbia, said: 'Overfishing has absolutely had a "when cats are away, the mice will play" effect on our oceans.

'By removing the large, predatory species from the ocean, small forage fish have been left to thrive.'

He added: 'If you take out the lions, then the number of antelope go up - and that's what's been happening in the oceans.'

Changing tastes in food have also helped the number of smaller fish soar. In the 1970s, herring in the North Sea were so badly overfished tough limits were placed on fisherman to protect the stocks.

Now the population has recovered - but the demand for herring has plummeted.

Most of the smaller species caught by fishermen are turned into meal and oil to use in fish and animal food. Only a small fraction are sold in fish markets.

The changes could be disastrous for the complex marine food chain.

Sardines and herring feed on animal plankton, or 'zooplankton' - floating organisms in the seas. In turn, zooplankton feed on plant plankton - the simple plant organisms that are at the bottom of the food chain.

As numbers of forage fish have gone up, the amount of zooplankton has gone down.

Without as much zooplankton, populations of plant plankton are at risk of getting out of control - creating vast 'blooms' of green algae.

'There are clear examples of this green soup - such as in the Black sea,' said Dr Christensen. 'We should be encouraging people to eat more sardines and herrings - and less predator fish.'

Around 32million tons of forage fish are removed from the oceans each year - more than a third of the weight of all fish caught. In Peru, fisherman catch nearly 11million tons of anchovies each year.

Around 80 per cent of forage fish are fed to animals.