

Sawfish spawn without sex

Researchers document first instances of 'virgin birth' in a wild vertebrate.

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Smalltooth sawfish are related to sharks.

For many species, reproduction is a duet between male and female. Now, for the first time, scientists report evidence of 'virgin birth' in a wild vertebrate that normally reproduces sexually.

The smalltooth sawfish (*Pristis pectinata*) normally requires contributions from both sexes to produce offspring. But the latest analysis estimates that nearly 4% of sawfish in a Florida estuary were born without any genetic contribution from a male, in a phenomenon known as facultative parthenogenesis.

This type of asexual reproduction is rare in vertebrates, and had previously been observed only in a handful of species in captivity, including [snakes](#) collected from the wild¹ and [Komodo dragons](#)². (Another type of asexual reproduction seen in wild vertebrates, obligate parthenogenesis, occurs in all-female species or populations.)

The latest findings appear in the 1 June issue of *Current Biology*³.

Smalltooth sawfish are one of five large ray species that have chainsaw-like appendages protruding from their faces, and are in the same subclass as sharks. The smalltooth sawfish was once abundant along the US eastern and southern coastlines from North Carolina to Texas, but overfishing and coastal development have drastically reduced its numbers. The critically endangered fish are now found only off the coast of southwest Florida.

Researchers discovered evidence of 'virgin births' among the sawfish while conducting a routine genetic analysis to determine whether they were inbreeding. Some of the 190 sawfish sampled in a Florida estuary showed unusually high levels of relatedness to other fish in the same population.

Relatedness is measured on a scale from zero to one, where zero indicates that there is no relation between an individual's parents, and 0.5 suggests that the parents were full siblings. Seven of the 190 fish had relatedness values close to one — indicating a 'virgin birth'.

Two to tango?

Andrew Fields, the study's first author and a fish geneticist at Stony Brook University in New York, says that his team initially doubted the findings. But a careful analysis ruled out explanations other than parthenogenesis. "I think maybe if there was one individual it wouldn't be a solid case, but the fact that we have so many in 190 samples, it's pretty convincing," he says.

The seven parthenogenic offspring came from multiple broods and were all normal-looking for their age, indicating that offspring produced this way can survive in the wild.

The study's authors are now encouraging other researchers to screen existing DNA databases from wild vertebrate populations using their methods to see if any parthenogens can be identified. In addition to mining existing data, Dulvy says that researchers should keep their eyes open for parthenogens in places around the world where small populations of sawfishes are found.

Nicholas Dulvy, a marine ecologist at Simon Fraser University in Burnaby, Canada, says that the findings add to evidence that sharks and rays have the greatest diversity of reproductive modes of any vertebrate group. "It's just one more just amazing reason that we should be concerned about these species," adds Dulvy, who is co-chair of the Shark Specialist Group at the International Union for Conservation of Nature.

But it is not yet clear how common parthenogenesis is in the wild across species. Fields's team suggests that parthenogenesis is a strategy that some species turn to if their population density is low, when females are likely to have difficulty finding a mate. If this is true, parthenogenesis might be most common in species that are on the verge of extinction.

Dulvy cautions that parthenogenesis will not be enough to save the smalltooth sawfish. "We still need good, strong management to ensure that populations have stabilized in Florida and that they indeed continue to recover," he says.

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References

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