

# Killing only a few animals won't do any harm -- or will it?

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Three Eurasian perch (*Perca fluviatilis*) of approximately equal age. The large individuals are "giant cannibals," the appearance of which can be induced by size-selective mortality. Credit: photograph by P. Byström

Using advanced mathematical modeling, researchers from Sweden and The Netherlands show in an article in the August issue of the *American Naturalist* that this statement is sometimes true.

Sometimes though, killing even a few individuals can have dramatic consequences, causing populations to fluctuate wildly. "The important question is: who gets killed? The effects of killing individuals crucially depend on the size of the victims," says Tobias van Kooten, assistant professor at Umeå University in Sweden.

The regulation of populations is usually determined by the properties of one specific size class of individuals. In some species, this "crucial stage" consists of small individuals that can monopolize the available food, denying it to all other individuals. Alternatively, especially in fish populations, large individuals can limit the abundance of smaller individuals through cannibalism. It is when such a crucial size class is

the target of mortality that unexpected things may happen.

Van Kooten and co-workers predict for example that in harvested cannibalistic fish populations, individuals may reach "giant" sizes, more than double the size of those in unharvested population. Indeed, such "giant cannibals" seem to occur frequently in heavily fished lakes. "Our results are directly applicable to conservation and management, since almost all human-induced mortality is size-selective," van Kooten states. "Fishermen select gear to catch large fish, while deer hunters prefer the tender meat of calves."

Unexpected effects of mortality have been reported before, but this systematic study, to be published in *The American Naturalist*, unravels the mechanisms behind the effects. Such "deep" understanding makes it possible to predict effects of size-dependent mortality for a wide range of species.

Citation: Tobias van Kooten, Lennart Persson, and André M. de Roos, "Size-dependent mortality induces life history changes mediated through population dynamical feedbacks" *The American Naturalist* (2007) 170:258–270. DOI: 10.1086/518947

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