Distressed damsels stress coral reefs

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Damselfish are killing head corals and adding stress to Caribbean coral reefs, which are already in desperately poor condition from global climate change, coral diseases, hurricanes, pollution, and overfishing. Restoring threatened staghorn coral, the damsels' favorite homestead, will take the pressure off the other corals, according to a new study published in the online journal *PLoS ONE*.

The small, belligerently territorial, threespot damselfish kill portions of coral colonies to grow gardens of algae, which they use as grounds for feeding and nests for breeding. Marine scientists thought that overfishing groupers and snappers in the Caribbean released the threespot damselfish from their predators, allowing them to swarm over the reefs in larger numbers, killing more coral than ever before.

That idea is wrong, says author Rich Aronson, a coral reef ecologist at the Florida Institute of Technology. "Our surveys of reefs around the Caribbean show that the number of predatory fish is not the key to how many damselfish live on a reef," says Aronson. "It's all about real estate—places to live."

Until the 1980s, threespot damselfish tended their gardens in staghorn coral, at the time the most common coral in the Caribbean. Staghorn coral, named for its long, thin branches, grew very fast and could keep ahead of the damselfish onslaught. The threespots preferred staghorn above all other corals for its tangle of branches, which provided ideal places to hide, feed, and nest. Although the threespots bit and killed portions of staghorn colonies, the living branches that remained

continued to thrive. But outbreaks of coral diseases, compounded by hurricanes and other environmental insults decimated populations of staghorn coral to the point that it is now listed as threatened under the U.S. Endangered Species Act.

Co-author Les Kaufman is a fish biologist with Boston University and Conservation International. He explains, "Once staghorn coral disappeared, the fierce little beasts switched to killing slow-growing coral heads." Coral heads are a lot less desirable from the damsels' point of view because they have fewer hiding places. Unlike staghorn coral, head-corals cannot recover quickly enough to keep pace with the death-bites of threespot damselfish, so the coral heads could take hundreds of years to recover.

"Threespot damselfish are limited primarily by habitat," says Kaufman. "They have not been released by fishing to overpopulate reefs, and if anything they are less abundant now." The fossil record shows that threespots commonly exploited staghorn coral on Caribbean reefs for at least the last 125,000 years—long before those reefs were fished. Aronson adds, "Caribbean reefs changed fundamentally when staghorn coral suddenly disappeared after dominating for hundreds of thousands of years. Threespot damselfish are now killing slow-growing coral heads, much more so than before and regardless of how many predators are around. We strongly advocate conserving fish stocks, but in this case restoring the staghorn populations will be far more effective in fixing the damage."

More information: Precht WF, Aronson RB, Moody RM, Kaufman L (2010) Changing Patterns of Microhabitat Utilization by the Threespot Damselfish, Stegastes planifrons, on Caribbean Reefs. PLoS ONE 5(5): e10835. doi:10.1371/journal.pone.0010835