Location isn't everything but timing is for certain spawning fish

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The timing of lane snapper spawning aggregations increases the survival of their larvae. Credit: David G. Smith/Smithsonian

The larvae of some species of reef fish appear to survive better depending on the timing of when they were spawned, according to new research from the National Institute for Mathematical and Biological Synthesis.

The findings, published this month in the journal *PLOS ONE*, advance earlier research that suggested only spawning location is critical and have important implications for fisheries management and conservation.

Each year, hundreds to thousands of fish aggregate at highly predictable times and locations to spawn, producing larvae that will spend at least a month in the plankton before settling to reef habitat.

Using a highly realistic biophysical model of ocean currents and larval behavior of snapper developed by co-author Claire Paris of the University of Miami, the researchers traced the movement of snapper larvae from spawning sites in Cuba. The work builds upon extensive studies of the ecology of snappers throughout Cuba as documented by Rodolfo Claro at the Oceanology Institute of Cuba.

The study found that larval success was sensitive to the timing of spawning - in particular, larval success was higher on days when spawning is observed to occur, compared to other days. But the location of the spawning was less critical - the researchers found little difference in larval success between actual spawning locations and other nearby locations simulated in the model.

Because large spawning groups are easy to predict, they are easy to overfish, and some large spawning groups have been fished to extinction. This study gives conservation managers even more reasons to protect spawning aggregations.

"Reef fishes form these large aggregations not just to find mates but because the specific time of the aggregation increases the survival of their larvae. Conserving spawning aggregations not only conserves the large reproductive individuals that sustain the population, but, according to our study, ensures the success of their larvae," said lead co-author Megan Donahue, an associate professor of marine biology at the University of Hawaii and member of the "Pretty Darn Good Control" Working Group at NIMBioS who helped produce the study.

More information: Donahue MJ, Karnauskas M, Toews C, Paris CB. 2015. Location isn't everything: Timing of spawning aggregations optimizes larval replenishment. *PLOS ONE*. Published online 23 June 2015. DOI: 10.1371/journal.pone.0130694

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