

# Species reemergence after collapse: Possible but different

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Species pairs that disappear through hybridization after human-induced changes to the environment can reemerge if the disturbance is removed, according to a new mathematical model that shows the conditions under which reemergence might happen.

The findings, published in the journal *Evolution*, are important for [conservationists](#) and ecosystem managers interested in preserving, or even restoring, systems that have been disturbed by human activity.

By simulating environmental disturbances that reduce the ability of individuals to identify and select mates from their own [species](#), the model explores the mechanisms that cause hybridization between closely-related species. Hybridization can lead to [population decline](#) and the loss of biodiversity. For instance, certain species of stickleback fish have collapsed into hybrid swarms as water clarity in their native lakes has changed, and certain species of tree frogs have collapsed as vegetation has been removed around their shared breeding ponds. Such hybrid swarms can replace the original species.

"What is happening isn't just speciation in reverse. The model shows that populations after collapse are likely to be different from the parental populations in ways that affect the future evolution of the system," said Tucker Gilman, postdoctoral fellow at the National Institute for Mathematical and [Biological Synthesis](#) and the paper's lead author.

According to the model, the reemergence of species pairs was more

likely when disturbances were strong than when they were weak, and most likely when disturbances were quickly corrected. However, even temporary bouts of hybridization often led to substantial homogenization of species pairs. This suggests that ecosystem managers may be able to refill ecological niches, but probably won't be able to resurrect lost species after species collapse.

"The encouraging news from an ecosystems service point of view is that, if we act quickly, we may be able to refill ecological niches emptied by species collapse. However, even if we can refill the niches, we probably won't be able to bring back the same species that we lost," Gilman said.

**More information:** Gilman RT, Behm JE. 2011. Hybridization, species collapse, and species reemergence after disturbance to premating mechanisms of reproductive isolation. *Evolution*. Article first published online: 29 APR 2011. [DOI: 10.1111/j.1558-5646.2011.01320.x](https://doi.org/10.1111/j.1558-5646.2011.01320.x)

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