Novel comparative approach enables mapping of fish 'countries'

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Using novel comparative riverscape genomics, biologists at the University of Arkansas surveyed 31 fish species from 75 locations in the White River Basin in Arkansas. Their study revealed a complex network of relations and adaptations that define aquatic communities in rivers and will help biologists plan conservation and ecosystem management.

The researchers' approach to genomic mapping, similar to that used by 23andMe for humans, revealed consistent genetic boundaries between populations of the various species in different sub-basins. The study was published as the cover article in *Molecular Ecology*.

"Just as our ancestors were more likely to have close relatives nearby, so also have fish, thus creating regionally distinct genetic 'countries,' shaped by unique environments," said Zach Zbinden, a post-doctoral research associate. Zbinden performed the research as part of his doctoral dissertation, guided by Marlis and Michael Douglas, professors of biological sciences.

The research will change how biologists plan conservation and ecosystem management, as humans typically have been unaware of such populations, given their invisible existence below water, Zbinden said. By identifying and understanding these genetic "countries" for many species, a blueprint for effective ecosystem conservation can emerge, a system that acknowledges and defines riverscape genetic diversity.

The study also demonstrates the importance of river network structure in predicting relationships among and within co-distributed species. It highlights the necessity of translating these hidden borders into local management strategies, for example, prioritizing the conservation of rivers that harbor unique populations across many species.

More information: Zachery D. Zbinden et al, Riverscape community genomics: A comparative analytical approach to identify common drivers of spatial structure, *Molecular Ecology* (2022). DOI: 10.1111/mec.16806

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