Fish ecologist's research indicates need to conserve iconic migratory snook in Mexico

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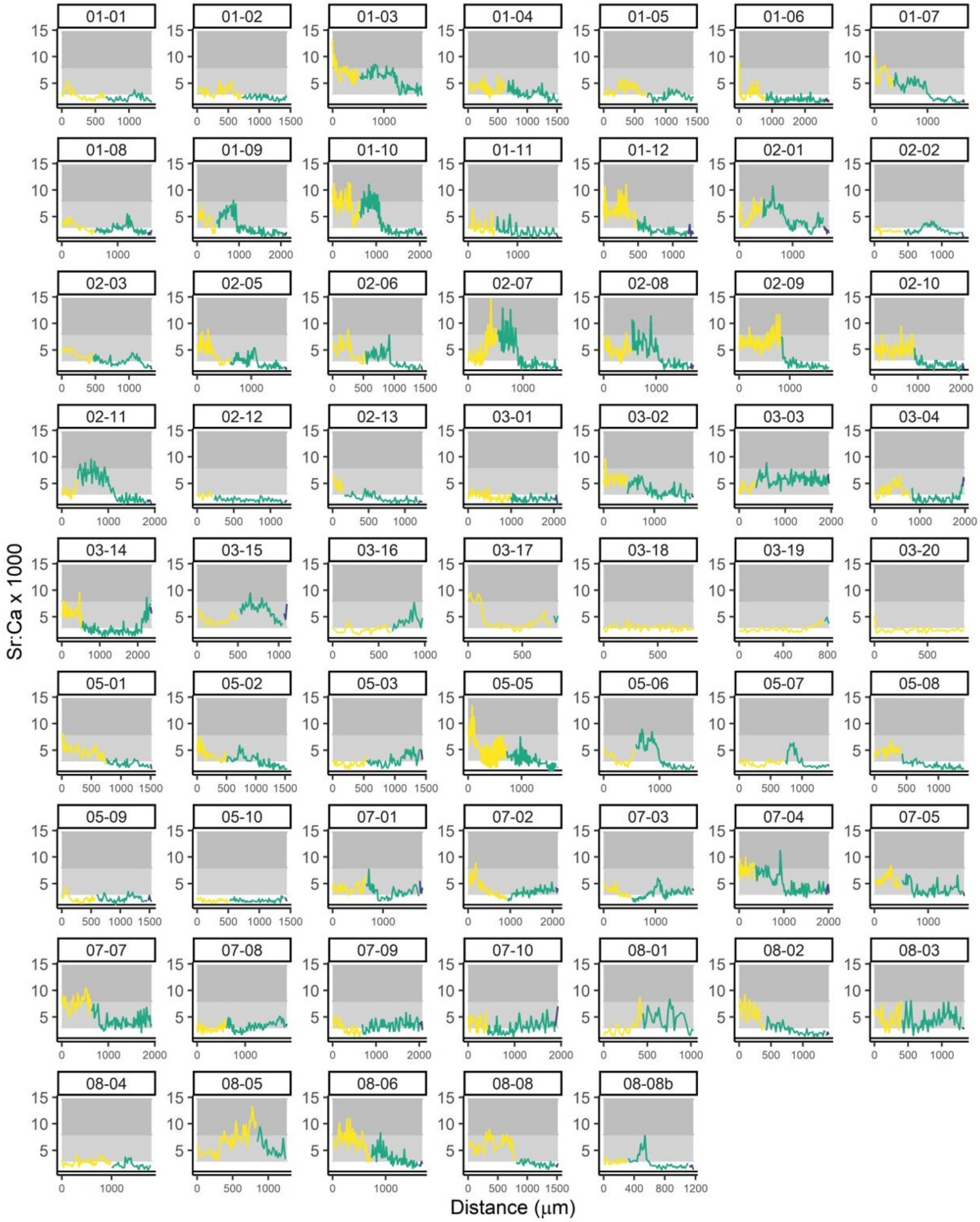

Lifetime plots of Sr:Ca for all common snook otoliths in our dataset, plotted from the otolith core (reflecting natal habitat conditions) to edge (reflecting habitat conditions near the time of capture). Strip text for each otolith indicates the site number “S”, then the fish number “F” (1 through number of fish collected) in the pattern, “SS-FF”. Lines are colored by otolith growth region, composed of “Core”, “Edge” (last observable growth band), and “Mid” (all growth bands between core and edge) regions. Note that the length of the transect in the otolith core does not indicate otolith core size: YOY otoliths 03-17 through 03-20 were sectioned on a different axis than adult otoliths allowing more core material to be sampled, and variation in transect line placement among remaining otoliths with respect to the otolith core origin resulted in variation in the amount of core material sampled and the overall length of the transect. The light gray area is the range of otolith Sr:Ca ratio values typically associated with estuarine water habitat use (0.003 0.008). Plots reflect four general patterns of migration among freshwater, estuarine, and marine habitats illustrated in Figure 4. Migratory pattern I (saltwater natal conditions, freshwater juvenile conditions, returning to saltwater at larger size) is illustrated in Figure 4A. Migratory pattern II (same as pattern I but with a protracted saltwater phase prior to juvenile migration to freshwater) is illustrated in Figure 4B. Migratory pattern III (freshwater natal conditions, then initial juvenile growth in saltwater followed by a migration to freshwater) is illustrated in Figure 4C. Migratory pattern IV (persistent freshwater- or estuarine-only signal) is illustrated in Figure 4D. Credit: *Aquatic Conservation: Marine and Freshwater Ecosystems* (2023). DOI: 10.1002/aqc.4003

Allison Pease grew up fascinated by river fish, spending countless summers in a mask beneath the surface of Texas creeks. Now a fish ecologist in the College of Agriculture, Food and Natural Resources at the University of Missouri, Pease studies the common snook—an iconic game fish that has filled a significant cultural, ecological, and economic niche in Mexico for centuries. Her latest study focuses on this species' migration patterns and the effects of proposed hydro dams on their population in southern Mexico.

For the study, Pease traveled to the states of Tabasco and Chiapas, where she investigated the snook's almost 400-mile migration up into the rainforest habitat of the Usumacinta River. She and colleagues have found that the snook, which connects aquatic food webs and supports fisheries, spawns and starts its life in coastal nursery habitats before moving into river habitats that offer an array of food resources.

Using otolith microchemistry—the measuring of the chemical composition of the layers of bone that grow in a fish's ear as it matures—Pease determined approximately where each snook had lived during its lifetime. This gave her insight into not only the snook's migration patterns but also whether the fish returned to the coast of the Gulf of Mexico to spawn or spent their adult lives in the river ecosystem.

"This is a fish that is important both culturally and economically, but it's in danger of facing a collapse due to overharvesting," Pease said. For instance, since the 1980s, there have been recurring proposals to construct hydropower dams in this river system, which would restrict the migratory domain these fish currently occupy when they go up to 400 miles into the rainforest from the Gulf of Mexico.

"The more we can understand what the fish needs and where it's moving, the more we can inform conservation efforts in terms of identifying places to restrict harvest during certain times of the year to keep this fishery going."

From Indigenous fisheries to commercial operations, snook has been celebrated as a high-quality river fish since the time of Mayan rule, making river fisheries in Mexico necessary for food, Pease said. She explained that diminishing environmental resources are spurring scientists to address the conservation of these historic fish to ensure their species' protection.

"I suspect that because people really love this fish, they might be open to accepting some more conservative regulation," Pease said. "The fisheries are mostly self-regulated with some places that have closures and limits on what kind of net you can use. We may need to strengthen some of those restrictions, if possible, to maintain the harvest of this fish."

In the future, Pease hopes this research will not only advance the science of understanding how the common snook function—their migration patterns, habitat preferences and spawning sites—but also serve a critical role in informing fisheries conservation. With continuing environmental change, species that depend on many different connected habitats are often the most at risk of becoming endangered.

"Otolith microchemistry highlights the importance of extensive connectivity for conservation of an iconic migratory fish in a large tropical river basin" was recently published in *Aquatic Conservation*.

More information: Allison A. Pease et al, Otolith microchemistry highlights the importance of extensive connectivity for conservation of an iconic migratory fish in a large tropical river basin, *Aquatic Conservation: Marine and Freshwater Ecosystems* (2023). DOI: 10.1002/aqc.4003

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