The Spotfin Shiner (*Cyprinella spiloptera*): A Fish that Spawns in Trees

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The spotfin shiner (*Cyprinella spiloptera*) has a widespread distribution in eastern and central North America and is found in streams ranging from small creeks to large rivers (Page and Burr, 1991). Observations in the field and in the laboratory have indicated that spotfin shiners spawn in crevices and cracks among rocks and tree roots or in bark or other woody debris (Hankinson, 1930; Pflieger 1965; Gale and Gale, 1976, 1977). Males defend territories around suitable crevices. Other members of the genus *Cyprinella* have also been described as crevice spawners (e.g., Mayden, 1989; Baker et al., 1994; Goldstein, 1997; Johnston and Shute, 1997; Rakes et al., 1999), although Vives (1993) cautioned that at least some species are able to spawn on a variety of substrates.

I have long been aware of the crevice spawning behavior of the spotfin shiner. On June 16, 1982, I helped to seine some spotfins in spawning condition from the Wisconsin River just downstream from Sauk City, Wisconsin, and they spawned in a crevice between two pieces of slate in my office tank. However, I never gave crevice spawning much thought, perhaps because most of my initial experience with spotfin shiners occurred in small streams where a variety of woody debris, rocks, and cobbles seem to provide an abundance of potential spawning crevices. It wasn't until relatively recently when I encountered spotfin shiners in a different context that I came to realize the potential importance of a particular type of spawning substrate for this species in at least some systems.

It was the summer of 1997, and I was assisting John Lyons of the Wisconsin Department of Natural Resources with his surveys of fishes in large rivers. We spent July 14 on the Chippewa River in Eau Claire and Pepin counties (water temperature: 22.5-23°C) and July 15 on the St. Croix River in Polk and St. Croix counties (water temperature: 23-24.5°C). We were electrofishing with a "mini-boom" shocker (not as large as a standard electrofishing boat), and it was my privilege to belt myself into the swivel seat mounted in the bow, put the pedal to the metal, and net all the stunned fish I could handle. From my vantage point, I could often observe just where individual fish were positioned when they were first shocked.

After two days of sampling river shorelines, I came to associate male spotfin shiners with silver maples and other trees that had toppled into the water. Even before they were captured, the male spotfins were easily distinguishable by their yellow fins and relatively deep bodies from other minnows. (The latter were often found in dead trees but also occurred at least sometimes out in the open.) Inspection of the male spotfins revealed that they sported breeding tubercles in addition to spawning colors. It took a while, but finally I saw the connection between the crevice spawning behavior of the spotfin shiner and the concentration of suitable substrate provided by the bark of trees. In what were otherwise largely barren habitats of sand and silt, spotfin shiners were apparently relying on the trunks and branches of downed trees to supply microhabitat critical for successful reproduction.

Although my observations suggest the importance of downed trees to spotfin shiners in large midwestern rivers, I was not in a position to prove that they were spawning on the trees where we collected them. Our sampling regime did not permit underwater examination for eggs. Moreover, it is possible that spotfin shiners were attracted to downed trees for reasons other than, or in addition to, spawning. For example, trees may provide cover from predators or shelter from the current. It is interesting, therefore, that recent studies on the upper Mississippi River, where spotfin shiners are known to occur (e.g., Johnson and Jennings, 1998), failed to associate

spotfin shiners with woody snags (Lehtinen et al., 1997; Madejczyk et al., 1998). That these studies were conducted in the fall may provide indirect support for the spawning hypothesis. If spotfin shiners associate with trees primarily to avoid predators or current, then they might be expected to remain attracted to trees in the fall. But if spotfin shiners associate with trees primarily for reproductive purposes, then there is no reason to expect the association to continue beyond the spawning season.

If downed trees are important to spotfin shiners for spawning, then recently fallen trees should be more attractive than old snags that have lost most of their bark. (Some of the toppled trees where I observed spotfins were still growing leaves from branches that were not submerged.) It might be possible to test this hypothesis by surveying naturally produced snags that vary according to the characteristics quantified by Lehtinen et al. (1997). It might also be possible to test it experimentally by constructing snags that vary in a quantifiable way and anchoring them in appropriate river shoreline habitat.

The spotfin shiner is generally common throughout its range (Page and Burr, 1991), but some other crevice spawners in the genus *Cyprinella* are imperiled (Johnston, 1999). Further studies of trees as reproductive habitat for spotfin shiners would be of interest for their own sake, but they might also provide insight applicable to the management of the spotfin's threatened and endangered relatives.

Acknowledgment

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Corrections to Summer 2000 *American Currents*

p. 13, right column, 3rd line from top: citation should read "FWS, 2000a" not "FWS, 2000b"

p. 17, right column, last paragraph: correct name for Morrison Creek lamprey is *Lampetra richardsoni* var. *marifuga*

p. 36, left column, last line: "Fishisheries" should be