

The Spotfin Killifish, *Fundulus luciae*, is More Common Than You Thought

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The spotfin killifish (*Fundulus luciae*, Fig. 1) may be the most habitat-specific species in its generally adaptable genus. Its distribution is much of the U.S. Atlantic coast, from Massachusetts to as far south as Georgia. But spotfins are specialists adapted to living on the upper edge of tidal salt marshes, and typically spend their entire life history on the upper marsh. The mummichog (*F. heteroclitus*) is more numerically dominant in these salt marshes and is also much more flexible in habitat choice.

Spotfins are poorly known and infrequently reported because their preferred habitat on the upper marsh is not easily visited by humans. This is an area of treacherous mud requiring hip waders and careful walking. Both juvenile and adult spotfins are typically found in 20 cm or less of water, depending on the tide, and often they can be netted out of relatively liquid mud, so they're usually only found by people who have set out to look for them. This obscurity to humans leaves many unanswered questions about spotfins, especially about their exact geographic distribution. It seems that their northern limit is the Palmer River in Massachusetts, a tributary of Narragansett Bay (Stallsmith, 1999). The southern limit is somewhere to the south of Sapelo Island on the Georgia coast, maybe as far as Florida. The most comprehensive studies of the spotfin's ecology have been in marshes in North Carolina (Kneib, 1978 and 1984), Virginia (Byrne, 1978) and New Jersey (Able et al., 1983).

The exact conservation status of *F. luciae* across its range is also hazy, with some reports that it may have disappeared from parts of Chesapeake Bay and the Delmarva Peninsula (NatureServe, 2003). The Global Heritage Status Rank for the spotfin is G4, apparently secure, although for New York the State Rank is S1, critically imperiled (NatureServe,

2003). These fears of diminishing populations may be an artifact of the difficulty of sampling this fish. Or, the fish may suffer from destruction of its salt marsh environment.

Herein is a review three recent field surveys for spotfins, one in southern Massachusetts (Stallsmith, 1999), one in the lower Hudson River estuary in New York (Yozzo and Ottman, 2003), and the third a marsh utilization study in Connecticut (Osgood et al., 2003). The species has been known from Long Island, New York, but there were no reports from the Hudson estuary. Similarly, until recently there have been no collection reports from Connecticut (Osgood et al., 2003) or Rhode Island, and one reported collection in Massachusetts dating back to 1983 (Hartel et al., 2002).

I spent the summer of 1999 looking for spotfins along the southern Massachusetts coast, Cape Cod, Cuttyhunk Island and Nantucket (Stallsmith, 1999). This project was supported through a small grant by The Nature Conservancy (TNC) acting on behalf of the Massachusetts Natural Heritage & Endangered Species Program. Karsten Hartel, Associate Curator of Ichthyology at Harvard's Museum of Comparative Zoology, had mentioned to me that in 1983 he unexpectedly had found spotfins while leading a class in seining on a high tide salt marsh along the Palmer River in Swansea, MA, close to the Rhode Island border. This struck me as interesting because I hadn't heard of any collections of spotfins closer to Massachusetts than Long Island. AC editor Chris Scharpf forwarded an announcement from TNC looking for conservation survey proposals in Massachusetts. And, happily, TNC agreed to fund my proposal to try to find spotfin populations in other Massachusetts locations.

Because of the spotfin's predominantly southern distribution, I limited my search to the southern coastline of

Fig. 1.
Spotfin killifish, *Fundulus luciae*.
Photo by Fritz Rohde.



Massachusetts because this is relatively warm water under the influence of the Gulf Stream. North of Cape Cod the water is boreal, strongly affected by the Labrador Current flowing south along the coast from Canada. As well as returning to Hartel's original site in Swansea, in the Narragansett Bay drainage, I mapped out other salt marshes to visit: the mouth of the Westport River in Westport, MA; the Converse Road area in Marion, MA; marshes in Woods Hole and Falmouth, MA, on Cape Cod; Cuttyhunk Island, the tip of the Elizabeth Islands chain running south from Woods Hole; and Folgers Marsh on Nantucket, which is owned by the University of Massachusetts Boston field station.

In short, I didn't find spotfins at any of these places except for the Palmer River, and the nearby Barrington River in Seekonk, MA, also tributary to Narragansett Bay to the south. (I also found them on the Rhode Island side of the Barrington River, which defines the state line between MA and RI at that point.) All of the places I visited had what appeared to be perfect spotfin habitat, with extensive upper marsh areas. For whatever reason *F. luciae* doesn't seem to inhabit areas to the north and east of Narragansett Bay. To my knowledge there's no sharp climatic break; it could be that spotfins are slow dispersers and are still expanding their range northwards after the most recent glaciation. Or maybe the areas in which I didn't find them really are colder, or lacking in some significant food resource. It's a question yet to be answered.

Two recent publications have confirmed the presence of *F. luciae* in the lower Hudson River estuary of New York

(Yozzo and Ottman, 2003) and the lower Housatonic River estuary in southwestern Connecticut (Osgood et al., 2003). Spotfins have been known to be locally common in New Jersey (Able et al., 1983), and they seemed to have at least a localized population around Narragansett Bay, so it would seem likely that their distribution was continuous in available habitat along the northern shore of Long Island Sound as far as Narragansett Bay. And this does seem to be the case after all.

The Hudson River study sampled four widely scattered sites around the Hudson estuary for spotfins. Two of these sites produced spotfins: Piermont Marsh in Rockland County, NY, (surprisingly far up the river) and Ralph Creek, off of Jamaica Bay, Brooklyn. The study's authors attribute the presence of spotfins in these areas to surviving intact marshes providing quality habitat. The sites that failed to produce spotfins in this study were in badly degraded marshes in New Jersey. The authors also summarize and confirm other recent distribution records for spotfins in the northeast: Larchmont Harbor, Larchmont, NY; Sybil Creek, Bramford, CT; and the Housatonic River in Milford, CT. The latter site is from Osgood et al. (2003) which had as its main focus how different marsh vegetation can influence the utilization of a salt marsh by nekton (animals that are large enough to propel themselves against currents and tides).

These three studies from the last five years confirm that the spotfin killifish has a more northerly distribution than was once thought and is common in the right salt marsh habitats

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Spotfin killifish, cont. from p. 10

from New York as far north as the Narragansett Bay drainage in Massachusetts and Rhode Island. One of the vexing questions in ecology and conservation biology can be exactly how to define rarity. Because spotfin killifish are so habitat specific, they've been considered rare even though the correct habitat for them (upper salt marshes) extends from Massachusetts to Georgia. The details of the spotfin's distribution at the southern end of its range in South Carolina, Georgia and maybe Florida await clarification. But it appears that the Global Heritage Status Rank of G4, apparently secure, is accurate.

Literature Cited

- Able, K. W., C. W. Talbot, and J. K. Shisler. 1983. The spotfin killifish, *Fundulus luciae*, is common in New Jersey salt marshes. *Bulletin of the New Jersey Academy of Science* 28 (1): 7-11.
- Byrne, D. M. 1978. Life history of the spotfin killifish, *Fundulus luciae* (Pisces: Cyprinodontidae), in Fox Creek Marsh, Virginia. *Estuaries* 1: 211-227.
- Hartel, K. E., D. B. Halliwell, and A. E. Launer. 2002. *Inland fishes of Massachusetts*. Lincoln, Ma.: Massachusetts Audubon Society.
- Kneib, R.T. 1978. Habitat, diet, reproduction and growth of the spotfin killifish, *Fundulus luciae*, from a North Carolina salt marsh. *Copeia* 1978: 164-168.
- . 1984. Patterns in the utilization of the intertidal salt marsh by larvae and juveniles of *Fundulus heteroclitus* (Linnaeus) and *Fundulus luciae* (Baird). *Journal of Experimental Marine Biology and Ecology* 31: 121-140.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life. Version 1.8. Arlington, Va. Retrieved 28 Feb. 2004 (<http://www.natureserve.org/explorer>).
- Osgood, D. T., D. J. Yozzo, R. M. Chambers, D. Jacobson, T. Hoffman, and J. Wnek. 2003. Tidal hydrology and habitat utilization by resident nekton in *Phragmites* and non-*Phragmites* marshes. *Estuaries* 26: 522-533.
- Stallsmith, B. 1999. A report to determine the range of spotfin killifish, *Fundulus luciae*, in the coastal marshes of Bristol County, Cape Cod, Nantucket, the Elizabethe Island and Martha's Vineyard. The Nature Conservancy and Massachusetts Natural Heritage and Endangered Species Program. 6 pp.
- Yozzo, D., and F. Ottman. 2003. New distribution records for the spotfin killifish, *Fundulus luciae* (Baird), in the lower Hudson River estuary and adjacent waters. *Northeastern Naturalist* 10: 399-408. ←