

Cepria, 1991(5), pp. 695-702

Hall, et al. 1991

## Movements and Habitats of Shortnose Sturgeon, *Acipenser brevirostrum* in the Savannah River

J. WAYNE HALL, THEODORE I. J. SMITH, AND SCOTT D. LAMPRECHT

Telemetry studies were conducted to determine seasonal movements and habitat areas of adult and juvenile shortnose sturgeon (*Acipenser brevirostrum*) in the Savannah River. Thirty-two adults (19 prespaw and 13 postspaw) and six cultured juveniles were equipped with transmitters between April 1985 and March 1987. Upriver spawning migrations occurred from mid-February to mid-March when river temperatures ranged from 9 C to 12 C. Downstream migrations began in mid-March with all adult shortnosed sturgeon leaving the freshwater reaches by early May. Migration rates were as high as 33 km per day. Based on our observations, two probable spawning sites were identified: rkm 179-190 and rkm 275-278. These areas were characterized by submerged timber, scoured sand, and a clay and gravel substrate. Depths ranged from 6-9 m and bottom velocities averaged 82 cm/sec. The freshwater/saltwater boundary region of the river was utilized by adult and juvenile sturgeon during both fall and winter, and preliminary data suggest that this area may serve as an important feeding ground for sturgeon. A probable nursery area for juvenile shortnose and Atlantic sturgeon was identified, approximately 2-5 km downriver of the freshwater/saltwater boundary region. This area was characterized by sandy-mud and clay-mud bottom at a depth of 10-14 m.

ALTHOUGH formerly commercially harvested, the shortnose sturgeon, *Acipenser brevirostrum*, is listed currently as an endangered species in the United States (Miller, 1972) and is considered rare and possibly endangered in Canada (Gorham and McAllister, 1974). This species occurs along the east coast of North America from the Saint John River in New Brunswick, Canada to the St. Johns River in Florida (Vladykov and Greeley, 1963).

Little information exists on the biology and exploitation of this species which was part of the reason for listing the shortnose sturgeon as an endangered species in 1967. In recent years, however, research has been focused on this species, especially in the northeastern United States. Reproducing populations have been identified and characterized in the Delaware River, New Jersey (O'Herron and Able, New Jersey Division Fish, Game, and Wildlife, unpubl.), the Connecticut River, Massachusetts (Taubert, 1980; Buckley and Kynard, 1985), the Saint Johns River, New Brunswick, Canada (Dadswell, 1979), the Kennebec River, Maine (Squiers et al., Maine Department of Marine Resources, unpubl.), and Montsweag Bay, Maine (McCleave et al., 1977). Shortnose sturgeon have been documented in southern rivers: the Altamaha and Ogeechee rivers, Georgia (Heidt

and Gilbert, 1979); the Savannah River, Georgia (Smith, unpubl.); the Winyah Bay System and the Pee Dee and Edisto rivers, South Carolina (Dadswell et al., NOAA, unpubl.; Smith and Dingley, 1984); in North Carolina (Seehorn, 1975); and Florida (Kilby et al., 1959); but little is known of its life history and ecology in southern rivers.

During April 1985 to March 1987, the South Carolina Wildlife and Marine Resources Division conducted studies focused on shortnose sturgeon in the Savannah River. Specific objectives were to characterize movements and habitats.

### STUDY AREA

The Savannah River basin drains an area of over 27 million km<sup>2</sup>. Its headwaters originate in the Blue Ridge Mountains of North Carolina, South Carolina, and Georgia. The Seneca and Tugaloo rivers join near Hartwell, Georgia, to form the Savannah River. From here, the river flows approximately 500 km in a southeasterly direction to the Atlantic Ocean (Fig. 1). The Savannah River serves as a boundary between South Carolina and Georgia.

The river is used for a variety of purposes ranging from cooling water disposal to com-

Copyrighted Material

River. Detailed ecological analyses of the areas inhabited by sturgeon could provide additional information about the habitat requirements of both Atlantic and shortnose sturgeon. Rigorous examination of the freshwater/saltwater region and the characteristics of the King's Island Turning Basin could identify the importance of these areas in the life cycle of the Atlantic and shortnose sturgeon inhabiting the Savannah River.

Our data indicate that Savannah River sturgeon utilize much of the river during spawning migrations and make extensive use of the upper estuary. Careful consideration of possible impacts to the sturgeon population should be made before physically modifying the river channel or the water quality standards in the Savannah River.

#### ACKNOWLEDGMENTS

We greatly appreciate the valuable assistance provided by M. H. Green in the conduct of field activities and data collection. C. J. Ray, Jr. and P. Hubbard collected the wild fish used in this study. T. Dingley and R. Lindsey of the Orangeburg National Fish Hatchery provided facilities and assistance. L. Greene typed the manuscript, and K. Swanson prepared the figures. Support for the research project (SC-AFS-15) was provided by the United States Fish and Wildlife Service and the state of South Carolina.

#### LITERATURE CITED

- BUCKLEY, J., AND B. KYNARD. 1985. Yearly movements of shortnose sturgeon in the Connecticut River. *Trans. Amer. Fish. Soc.* 114:813-820.
- DADSWELL, M. J. 1976. Biology of the Shortnose Sturgeon, *Acipenser brevirostrum*, in the Saint John River Estuary, New Brunswick, Canada. Huntsman Marine Laboratory, St. Andrews, New Brunswick, Canada.
- . 1979. Biology and population characteristics of the shortnose sturgeon *Acipenser brevirostrum* LeSueur 1818 (Osteichthyes: Acipenseridae) in the Saint John Estuary, New Brunswick, Canada. *Can. J. Zool.* 57:2186-2210.
- DOVEL, W. L., AND T. J. BERGGREN. 1983. Atlantic Sturgeon of the Hudson Estuary, New York. *New York Fish and Game Journal* 3(2):140-172.
- GORHAM, S. W., AND D. E. McALLISTER. 1974. The shortnose sturgeon, *Acipenser brevirostrum*, in the Saint John River, New Brunswick, Canada, a rare and possibly endangered species. *Syllogeus* No. 5, National Museums of Canada, Ottawa, Ontario, Canada.
- GREELY, J. R. 1936. II. Fishes of the area with annotated list, p. 45-103. In: *A biological survey of the lower Hudson watershed*. Rep. New York State Conserv. Dept., Suppl. 26 (11).
- HEIDT, A. R., AND R. J. GILBERT. 1979. Movements of Shortnose Sturgeon, *Acipenser brevirostrum*, in the Altamaha River, Georgia. *ABS Bull.* 26.
- KILBY, J. D., E. CRITTENDAN, AND L. E. WILLIAMS. 1959. Several fishes new to Florida freshwater. *Copeia* 1959:77-78.
- MCCLEAVE, J. D., S. M. FRIED, AND A. K. TOWT. 1977. Daily movements of shortnose sturgeon, *Acipenser brevirostrum*, in a Maine estuary. *Copeia* 1977:149-157.
- MILLER, R. R. 1972. Threatened freshwater fishes of the United States. *Trans. Amer. Fish. Soc.* 101:239-252.
- SEEHORN, M. E. 1975. Fishes of the southeastern national forest. *Proc. Southeastern Assoc. Game Fish Comm.* 29:10-27.
- SMITH, T. I. J., AND E. K. DINGLEY. 1984. Review of biology and culture of Atlantic (*Acipenser oxyrinchus*) and shortnose sturgeon (*Acipenser brevirostrum*). *J. World Mariculture Society* 15:210-218.
- SMITH, T. I. J., S. D. LAMPRECHT, AND J. W. HALL. 1990. Evaluation of tagging techniques for shortnose sturgeon, *Acipenser brevirostrum*, and Atlantic Sturgeon, *A. oxyrinchus*. *American Fisheries Society Symposium* 7:134-141.
- TAUBERT, B. D. 1980. Reproduction of shortnose sturgeon, *Acipenser brevirostrum*, in the Holyoke Pool, Connecticut River, Massachusetts. *Copeia* 1980:114-117.
- VLADYKOV, V. D., AND J. R. GREELY. 1963. Order Acipenseroidae, p. 24-60. In: *Fishes of the Western North Atlantic, Part III*. V. H. Olsen (ed.). *Memoirs of the Sears Foundation for Marine Research*, New Haven, Connecticut.

(JWH, TIJS) SOUTH CAROLINA WILDLIFE AND MARINE RESOURCES DEPARTMENT, PO BOX 12559, CHARLESTON, SOUTH CAROLINA 29412, AND (SDL) SOUTH CAROLINA WILDLIFE AND MARINE RESOURCES DEPARTMENT, WILDLIFE AND FRESHWATER FISHERIES DIVISION, PO BOX 190, BONNEAU, SOUTH CAROLINA 29431. Accepted 18 July 1990.