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# Status of Paddlefish in the Alabama Waters of the Tennessee River

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*Abstract.*—The Alabama waters of the Tennessee River have historically contained abundant populations of paddlefish *Polyodon spathula*. During the later half of this century, overexploitation has reduced the number of paddlefish in the Tennessee River. We attempted to determine whether paddlefish populations in the Tennessee River within Alabama had recovered from this overexploitation since the implementation of a statewide moratorium in 1988. We failed to collect paddlefish after an effort of 346 gill-net-hours and 20 h of electrofishing pedal time from November 1993 through June 1994. Low abundance of paddlefish in the Tennessee River is likely the result of a combination of continuing commercial harvest in bordering states, loss of habitat, and slow recruitment due to a relatively old age at maturity. Recovery may require additional time, stocking, or both.

Paddlefish *Polyodon spathula* were once abundant in all Mississippi River drainages, including the Tennessee River. Alabama has historically had abundant paddlefish populations in both the Mobile River and Tennessee River drainages, supporting both sport and commercial fisheries (Carlson and Bonislawsky 1981; Gengerke 1986). The commercial fishery for paddlefish on the Tennessee River within Alabama was small until World War II, when a market for domestic sturgeon *Acipenser* spp. developed. During 1942, the commercial harvest of paddlefish from Wilson and Wheeler reservoirs was nearly 324,000 kg (Bryan 1942). However, by 1945, overexploitation reduced harvest to just over 53,000 kg at Pickwick, Wheeler, Wilson, and Guntersville reservoirs (Pasch and Alexander 1986). Overexploitation of paddlefish stocks was recognized in the 1940s, but it was not considered a long-term problem because the demand was expected to decline after the war (Bryan 1945). After the war, commercial harvest remained low through the mid-1950s (Pasch and Alexander 1986). Demand for paddlefish increased again in the late 1970s and early 1980s due to an increased price for roe. Paddlefish harvest in the Tennessee River increased again in 1980, reaching over 150,000 kg (Gengerke 1986). This high level of exploitation, combined with subsequent complaints of declining catches from commercial anglers, prompted the Alabama Department of Conservation and Natural Resources to implement a moratorium on harvest and possession of paddlefish in Alabama in November 1988 (Wood 1989).

By 1993, 5 years had passed since implementation of the moratorium. We conducted this study to evaluate the current status of paddlefish in the Tennessee River in Alabama. Our objective was to index relative abundance of paddlefish in the Tennessee River.

## Methods

We sampled paddlefish with gillnetting and by electrofishing in Guntersville, Wheeler, and Wilson reservoirs (Figure 1). We electrofished in November 1993 and April 1994 and gillnetted biweekly from 22 January through 12 June 1994. Electrofishing was conducted during both day and night with a boom-mounted electrofishing boat that used pulsed DC at 4–6 A. Gill nets consisted of 45.7 × 3 m floating monofilament nets with 127-mm-bar mesh. Three or four nets were fished at a time. Of the 14 sampling days for gill nets, 8 were at night. Gill nets were checked every 2 h to minimize fish mortality. Also, we consulted and sampled with commercial fishers who had historically fished for paddlefish in the study waters. During this sampling, we used commercial gear, consisting of 183 × 12-m floating multifilament nets with 152-mm-bar mesh and fished where commercial fishers had historically collected paddlefish.

Sampling locations were selected on the basis of temporal and physical characteristics that would make them more likely to contain paddlefish and information provided by regional fisheries biologists and conservation officers responsible for managing and policing areas within the Tennessee River system and by commercial fishers who had historically collected paddlefish in these areas. We

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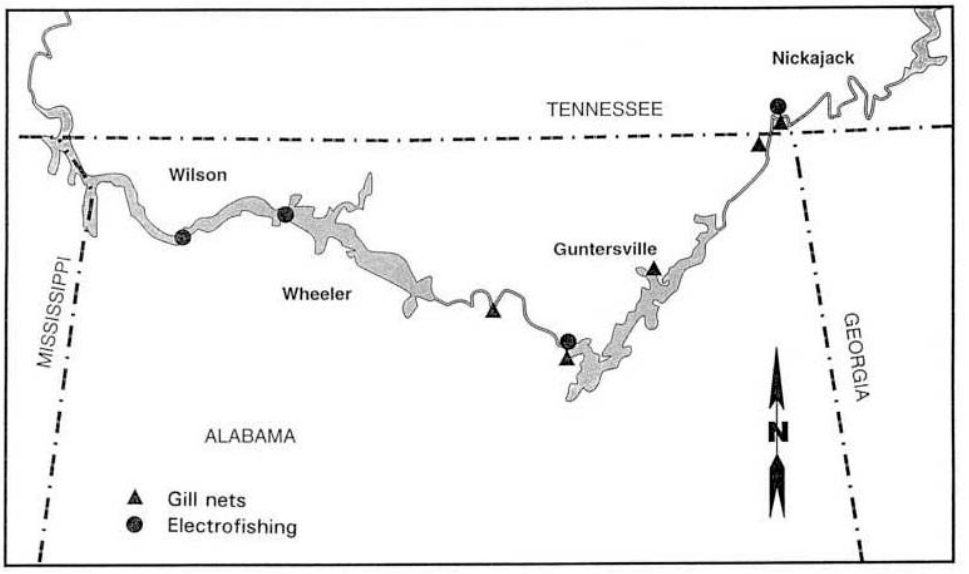


FIGURE 1.—Map of the Tennessee River in Alabama, indicating sampling areas and the location of Wilson, Wheeler, Guntersville, and Nickajack reservoirs.

targeted tailrace areas with gravel substrates because paddlefish are known to congregate in these areas during the spawning season (Southall and Hubert 1984; Moen et al. 1992) and backwater areas and deep holes in the main river channel where fish seek refuge during high flow. Other areas sampled included tributary creeks and slower moving water downstream from islands.

## Results and Discussion

We collected no paddlefish after a total effort of 346 gill-net-hours (including 64 net-hours with the larger commercial gill nets) and 20 h of electrofishing pedal time. Although we recognize that this amount of effort was relatively low, we suggest that our purposive approach to selecting sampling locations would have yielded higher catch rates if paddlefish were more abundant. Our site-selection approach and sampling methods have been effective in previous paddlefish collections in other locations in Alabama. For example, electrofishing in areas of the Alabama River that were similar to those in the Tennessee River produced 3.87 paddlefish/h, whereas gillnetting produced 0.13 paddlefish/h (Hoxmeier 1996). Similarly, our methods yielded 5.2 paddlefish/h electrofishing and 2.3 paddlefish/h gillnetting on the Tallapoosa River, Alabama (an upper tributary of the Alabama River; Lein 1994).

Although few hard data exist concerning commercial harvest of paddlefish from the Tennessee River because the Tennessee Valley Authority stopped recording commercial harvest in the mid-1950s, an informal survey of commercial fishers and fish market owners revealed that paddlefish were scarce. Additional suggestive evidence of declining paddlefish populations can be found in the records of arrests made by conservation officers in this region for paddlefish-related violations. For example, below Nickajack Dam, paddlefish-related violations decreased from 15 during 1982 to zero in 1985; the last reported violation occurred in 1990 (M. Bailey, Tennessee Wildlife Resources Agency, personal communication). Commercial fishing, law enforcement data, and our sampling results strongly suggest that the Tennessee River paddlefish population in Alabama is at low levels and may not have recovered from earlier overexploitation.

Factors affecting paddlefish abundance in the Tennessee River in Alabama may include continuing commercial harvest of the species in Tennessee, low recruitment due to habitat loss and alteration, and the relatively old age at maturity of paddlefish. Paddlefish migrate long distances and can cross several state lines. Many paddlefish that inhabited the Yellowstone and Missouri rivers in Montana spent the summer months in Lake Sakakawea, North Dakota (Robinson 1966; Rehwinkel 1978). Likewise, the Tennessee River flows

through portions of Tennessee, Alabama, Mississippi, and Kentucky, and each state has its own management plan for paddlefish. In the Tennessee River system, the protection afforded to paddlefish in Alabama is not offered in Mississippi or Tennessee. Tennessee currently allows an unlimited catch of paddlefish by commercial anglers during 16 April–15 February, although some reservoirs and spawning areas are protected (Bailey, personal communication). It is likely that paddlefish routinely migrate up to Nickajack Dam in Tennessee from Guntersville Reservoir in Alabama in the spring and become available to the Tennessee fishery. Paddlefish populations in the Tennessee River may need to be managed as an interjurisdictional fishery.

Before dam construction, paddlefish populations on the Tennessee River may have been able to recover more quickly from overexploitation. Although dam construction has not limited migration, it has inundated spawning areas. Dams also prompt large numbers of paddlefish to concentrate in tailraces, increasing their vulnerability to exploitation (Pasch and Alexander 1986). Overexploitation, combined with low recruitment due to dam construction, may be the primary reason for the slow recovery of paddlefish in the Tennessee River.

Paddlefish do not reach sexual maturity until a relatively old age compared with other fishes. Females did not reach sexual maturity until they were 8 years old in Lake Cumberland, Kentucky (Hageman et al. 1988), and Kentucky Lake, Kentucky–Tennessee (Hoffnagle and Timmons 1989). Given that only 5 years have passed since the moratorium was established, there may not yet have been sufficient time for recovery.

If recovery does not occur because there are too few paddlefish to sustain the population, stocking should be considered. Paddlefish stocking has been successful in Tennessee and Missouri and may provide recovery in Alabama. Cherokee Reservoir, Tennessee, was stocked with approximately 20,500 paddlefish during 1986–1992, leading to increased mean size and catch per effort (Peck 1993). Successful introduction of paddlefish in Table Rock Lake, Missouri, was accomplished by stocking paddlefish that were 25–30 cm in total length (Graham 1986). Stocking paddlefish in the Tennessee River would not need to be done annually, given that some areas with suitable spawning habitat exist and could be used by stocked fish once they reached sexual maturity.

Due to their vulnerability to capture and relatively old age at maturity, paddlefish stocks can be easily depleted without proper management. Our results indicate that paddlefish in the Tennessee River within Alabama are sparse. We suggest that paddlefish in the Tennessee River be monitored regularly through an interstate management program among Alabama, Tennessee, and Mississippi. If continued monitoring reveals that paddlefish populations do not increase, then supplemental stocking of fingerling paddlefish may need to be considered.

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