

## Capturing and Tagging Wild Age-0 and Age-1 Paddlefish in a Great Plains Reservoir

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**Abstract.**—Over the period 2–15 August 1996, age-0 and age-1 paddlefish *Polyodon spathula* were captured with long-handled dip nets in Lake Sakakawea, a Missouri River mainstem reservoir in North Dakota. Catch rates varied from about 20 fish/boat-hour (a boat-hour is defined as a 1-h effort by a boat driver and two netters) at the beginning and end of the sampling period to 50 fish/boat-hour during the middle of the sampling period. Previously untagged age-0 fish (2,346) were marked with binary coded wire tags implanted in their rostrums. This capture and tagging procedure has promise in Lake Sakakawea and elsewhere as a stock assessment tool for wild paddlefish.

Assessment of reproductive success and recruitment of paddlefish *Polyodon spathula* stocks necessitates effective sampling of age-0 and age-1 fish. Although successful sampling of wild adult paddlefish has been conducted with several gears, including gill nets (Rosen et al. 1982; Alexander et al. 1987; Hageman et al. 1988), trammel nets (Pasch et al. 1980), electrofishing (Berg 1981), and snag fishing (Moen et al. 1992; Scarnecchia et al. 1996), sampling of age-0 and age-1 fish has been much less successful. Ruelle and Hudson (1977) successfully used a bottom trawl to capture age-0 paddlefish of 15–212 mm body length (BL; front of eye to fork of caudal fin) in Lewis and Clark Lake, a Missouri River mainstem reservoir. Pasch et al. (1980) reported limited success in sampling larvae with an epibenthic sled and age-0 fish with small-mesh gill nets in Old Hickory Reservoir, Tennessee. Wallus (1986) collected larvae in the Cumberland and Tennessee river systems by towing several different types of fine-meshed nets. We describe a procedure to capture and tag (with binary coded wire tags) age-0 and age-1 paddlefish

in Lake Sakakawea, a 156,000-ha Missouri River mainstem reservoir in western North Dakota.

Investigations in Lake Sakakawea (Fredericks 1994; Scarnecchia et al. 1995) indicated that age-0 paddlefish (100–300 mm fork length, FL) and age-1 paddlefish (350–550 mm FL) could be observed in large numbers near the surface at the upper end of the reservoir in July and August. The method of observation was to travel slowly by boat (8–9.5 km/h; Fredericks 1994) and observe fish off the bow and sides. Fish startled by the boat swam to the surface, where they could be counted (Fredericks 1994). Counts of age-0 fish in some years were sufficiently high (e.g., 1,756 fish in 1993; Fredericks 1994) to indicate that it would be possible to capture (with dip nets) and tag large numbers of fish in years with high reproductive success. Age-1 paddlefish also could be observed in the same manner but numbers of fish observed were much lower (less than 50 in 1992 and 1993; Fredericks 1994).

On 1 August 1996, a visual survey of 43 km of the reservoir (river kilometers, RKM, 2,433–2,476) indicated the presence of numerous age-0 and age-1 paddlefish, especially in the section from RKM 2,447 to RKM 2,457 where our sampling occurred. Over the period 2–15 August, 2,360 age-0 fish and 61 age-1 paddlefish were captured with long-handled 0.64-cm-mesh dip nets. Secchi depths in the area sampled were 33–38 cm on 1 August but increased to 86–89 cm by 17 August. Catch rates, estimated as catch/boat-hour (a boat crew defined as a driver and two netters) ranged from a low of 20–23 fish/h at the beginning and end of the sampling period to a high of 50 fish/h during the middle of the sampling period (Table

TABLE 1.—Catch and catch per unit effort for age-0 and age-1 paddlefish in Lake Sakakawea, 2–15 August 1996. Total catches by day include recaptured fish (number recaptured are also shown in parentheses). Recaptured age-0 fish had been tagged earlier in the sampling period. Recaptured age-1 fish were hatchery-reared fish that had been tagged and released in 1995.

Date	Total capture of:		Effort:	
	Age-0 fish:	Age-1 fish:	Boat-hour	Catch/boat-hour
Aug 2	104	9	5.0	23
Aug 5	199 (1)	2	9.0	22
Aug 8	133	1	3.5	38
Aug 9	148	1	3.0	50
Aug 12	564 (2)	15 (1)	21.0	27
Aug 13	616 (4)	6 (1)	19.0	33
Aug 14	329 (3)	15	16.0	22
Aug 15	267 (4)	12	14.0	20

1). The water surface varied by location and time of day from calm to wave heights of up to 1 m. Fish were captured in both calm and rough water. We estimated that, overall, about 33% of the age-0 fish and 10% of the age-1 fish observed were captured. Larger age-0 fish were stronger swimmers than smaller age-0 fish and were better able to avoid capture, and yearlings were even better at avoiding capture.

Untagged age-0 fish (2,346 individuals) were tagged in the rostrum with a Northwest Marine Technology hand-held tagger using batch, double-length, binary coded wire tags. Tags were implanted at least 1 cm from the tip of the rostrum amid the median rostral bones that support the flatter, stellate bones (Grande and Bemis 1991). Tags were injected at a 45° angle from the rostrum tip axis along the edge of the rostrum. About three age-0 fish could be processed per minute. When fish were weighed as well as tagged, the process speed was 2.5 age-0 fish/min.

The relative size of age-0 fish sampled increased during the 2-week netting and tagging period. Mean length of age-0 fish increased from 206 mm on 2 August to 241 mm on 15 August. Yearlings ranged in length from 370 to 520 mm FL; too few were captured during the period to assess trends in length over time.

We intend to continue this procedure in future years, to mark and recapture tagged fish in order to assess age, growth, harvest rates, and other aspects of paddlefish ecology necessary for their effective management. The capture method described here also was used successfully in Fort Peck Reservoir, Montana, in 1995 (W. Wiedenheft,

Montana Department of Fish, Wildlife and Parks, personal communication). It is hoped that this procedure will have application for paddlefish research and management in other parts of the species' range.

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