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Caution On The Use Of Electrofishing For Paddlefish

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Numerous concerns have been expressed in recent years about possible negative effects of electrofishing on target species (Snyder 1995). Electrofishing is an important fish sampling method (Reynolds 1996), so concerns about its effects can have far-reaching implications. For threatened and endangered species, or for physiologically fragile fishes, a safe sampling method is necessary to permit the release and subsequent survival of each fish.

No formal studies have adequately addressed the effects of electrofishing on paddlefish (*Polyodon spathula*). Although it has long been known that electrofishing can be used for sampling paddlefish, no one has evaluated delayed mortality. Available information is observational or anecdotal. D. Helms, Iowa Conservation Commission biologist, in a letter dated 22 September 1966, reported electrofishing for paddlefish below Lock and Dam 12 of the Upper Mississippi River at Bellevue, Iowa. Helms reported shocking for a total of two hours and 10 minutes on 15-16 September 1966, and seeing paddlefish (mean weight 13.6 kg) surface at a rate of 1.2-1.5 fish per minute. Dead paddlefish were found below the dam on September 19 by anglers. Helms investigated on 21 September 1966 and counted 68 dead paddlefish in the area. He did not prove that electrofishing was the cause but concluded that "all evidence points in this direction."

Helms reported in a May 1997 telephone conversation with the senior author that he had used alternating current with 3-4 electrodes in front of the boat, extending downward 1 meter into the water. Helms made no attempt to switch the current on and off, but left it on for periods of several minutes. Fish were observed jumping out of the water.

Van Eeckhout (1980) reported mortality of paddlefish, probably from electrofishing, in the Yellowstone River, North Dakota in 1977 and 1978. The results were presented at the Great Plains Fisheries Workers Association Meeting in Billings, Montana in 1979. Fish were sampled within 2 km of the Fairview Bridge with a commercially-produced pulse-DC unit with a 3500-watt generator. The most successful results were obtained at 6 A, 60 pulses per second (pulse width 3-4 msec) and

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voltages of 420 V or 560 V. The field was generated between six stainless steel anodes (46 cm long and 1.3 cm in diameter) and the boat, which acted as the cathode. Sampling occurred in depths of 0.3-2.5 m. Of 24 fish captured by electrofishing and tagged in 1977, one was found dead later the same day and a second dead fish was recovered three days later. In addition, four injured, untagged specimens were collected nearby within a three-week period after the initial electrofishing events. One dead fish was recovered with similar damage in 1978, following electrofishing. A post-mortem of this fish revealed blood in the musculature above the notochord, a rupture in the notochord sheath (Figure 1a), sequential hematomas along the notochord and ruptures in the notochord itself (Figure 1b). Although linkage among electrofishing, notochord damage, and dead or moribund fish was not established conclusively under controlled and replicated conditions, Van Eeckhout (1980) attributed the effects to electrofishing. He concluded that "It has been surmised that the physical damage to paddlefish notochords is probably a function of electrofisher design, construction, efficiency and electrical conductivity of the water."

Numerous paddlefish were shocked in the Missouri River below Fort Peck Dam and Yellowstone River below the Intake Diversion Canal (River Kilometer 114.4) in the 1980s and were observed to be substantially stressed (P. Stewart, Personal Observation). Fish were often weak after being released and barely righted themselves, although none were known to have been killed outright. Internal damage, although suspected, was not confirmed. Because of concerns about the effects of electrofishing, multi-filament gillnets, drifted and checked immediately upon contact with a fish, are used for sampling paddlefish in Montana and North Dakota.

Snagging and netting were the only methods listed in the protocol in Louisiana's paddlefish management plan (Reed 1991). Electrofishing was excluded as a sampling technique for three reasons: 1) paddlefish were rarely collected by electrofishing and when they were seen they were moving rapidly away from the boat, 2) chase boats with extra large nets would be required to catch them, and 3) health of the fish would be questionable for tagging and release.

Contacts with representatives of the 22 states involved in a Mississippi Interstate Cooperative Resource Agreement (MICRA) provided information regarding their use of electrofishing for sampling paddlefish. Three states, Illinois, Indiana, and Kentucky, reported using electrofishing for sampling paddlefish, and then only in places too swift to use gill nets or trammel nets.

If electrofishing will allow paddlefish to be sampled in places where other gears such as multi-filament gillnets are ineffective, then the effects of electrofishing on paddlefish should be assessed in a well-designed research study addressing both short-term and long-term effects. Such a study has not yet been conducted. Delayed mortality is the primary concern based on the findings of Helms and Van Eeckhout (1980). The issue of delayed mortality must be addressed before accepting the viability of electrofishing as a safe research tool for sampling paddlefish. A study might involve shocking and capturing fish using different types of current (AC, DC, pulse DC) and holding fish in large ponds for periods of at least two weeks. Comparisons with gillnetting should also be made.

Until definitive studies are conducted, we recommend the use of multi-filament gillnets for sampling paddlefish. It is an effective gear in

a.

b.

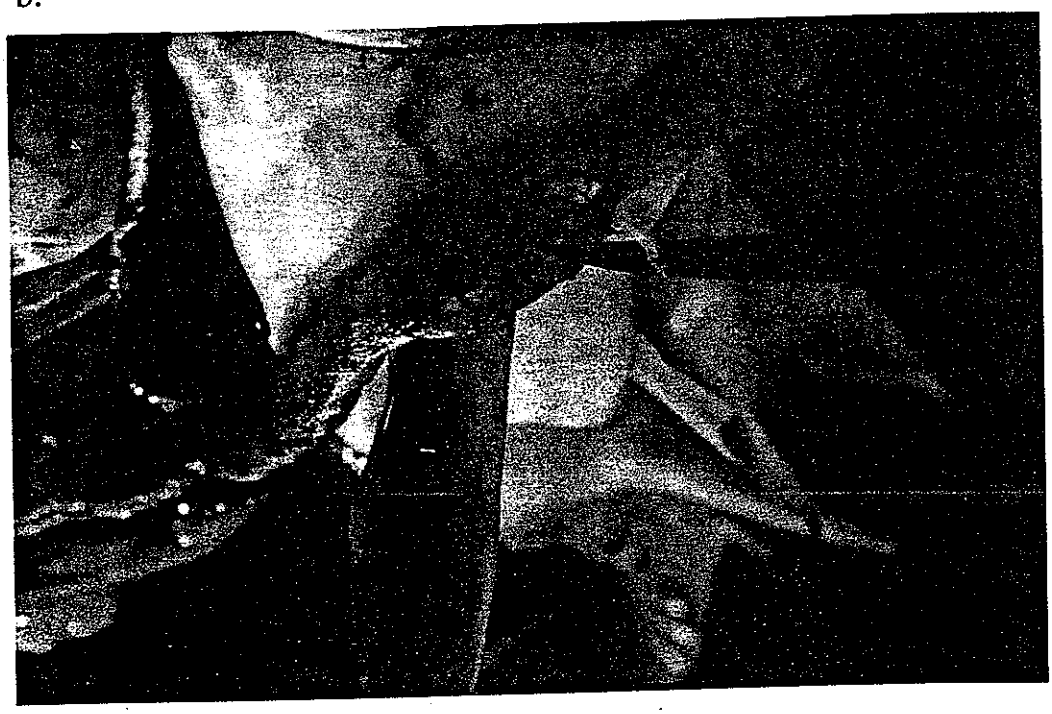

Figure 1. *Photographs of paddlefish musculature and notochord following electrofishing in 1978 showing a) a 5.0-7.5 cm rupture in notochord sheath and b) a rupture in notochord. Photographs by G. Van Eeckhout, North Dakota Game and Fish Department.*

most river situations. In sampling in the Yellowstone and Missouri Rivers, North Dakota over the period 1993-1998, by F. Ryckman and D. Scarnecchia, a total of 3,624 fish was sampled. Nets were checked immediately upon contact with a fish, and each fish was released immediately after jaw tagging. No immediate (pre-tagging) or short-term (post-tagging) mortalities were observed. Observations downriver in subsequent days did not reveal any delayed mortality, but fish were not held in ponds for observation.

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