

NOTES ON THE SPAWNING OF BLUE AND CHANNEL CATFISH IN BRACKISH WATER PONDS

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DETERMINATIONS OF SALINITY TOLERANCE in blue (*Ictalurus furcatus*) and channel (*I. punctatus*) catfish is of interest since commercial production of these fish in brackish or saline waters is increasing. In coastal Louisiana alone there are reports of 11 catfish farmers producing fish in approximately 373 acres subjected to varying amounts of salinities (Dr. James Fowler, personal communication). If this trend is to continue, there is a need to more fully understand the effect of salinities on the life cycle of these fish.

Eight years ago, the Louisiana Wild Life and Fisheries Commission in cooperation with the Louisiana State University Agricultural Experiment Station, began exploring the possibilities of producing freshwater catfish in brackish coastal waters. These early studies revealed that blue catfish and channel catfish were present in coastal waters with salinities ranging up to 11.4 parts per thousand (ppt) along the gulf coast [4]. Brackish water pond studies later demonstrated that these species and the white catfish (*I. catus*) will grow in salinities ranging from 2 to 11 ppt [5]. Top production has ranged from 2,300 to 2,684 pounds per acre per year.

These data were later supported by Allen and Avault [1] in controlled laboratory experiments using sea water as the culture medium. They reported that 3-day-old or older channel catfish eggs tolerated up to 16 ppt salinity. Upon hatching the tolerance dropped to 8.0 ppt and increased to 9 or 10 ppt after yolk sac absorption. Five-month-old fingerlings had another increase in tolerance of 11-12 ppt and there was no further increase in tolerance beyond 6 months. Blue catfish, 1-year-old, were found to be slightly more tolerant to salinity than similar age channel catfish [2].

Other reports in the literature indicate that hybrid blue-channel catfish tolerate salinities between 14 and 15 ppt for periods of 96 hours [6]. It is also reported that salinity tolerance of these hybrids is equal to that demonstrated by nonhybrid channel catfish fingerlings in artificial sea water. Jaspers [3] reported upon the effects of 0, 2, 5, and 8 ppt salinity on channel catfish sperm motility. Her data indicated that of those tested 5 ppt was optimal. Spermatological motility was maintained for at least 360 minutes at this salinity. However, at 0 ppt salinity motility was completely depressed within 5 minutes.

As demonstrated, the actual missing link to these studies has been the effects of salinity on spawning of blue and channel catfish. About the only suggestive data available was obtained from fish population records collected in connection with field studies over a period of years. This indicated that wild channel and blue catfish evidently spawned in salinities up to 2 ppt. These field studies were not designed to determine salinity at spawning; therefore, spawns may have occurred at slightly higher or lower salinities. Additional information concerning effects of salinity on channel catfish spawning was obtained from a northeast Louisiana catfish farmer (Pete Haring, personal communication). Mr. Haring reported successful spawning in ponds receiving saline well waters ranging from 1.4 to 1.6 ppt salinity.

For the past 4 years, blue and channel brood fish were hormonized and placed in spawning ponds and tanks in which water salinities were staggered from 5 to 9 ppt. No successful spawns were recorded though spawning techniques common to freshwater farmers were used.

Data for this report was accidentally obtained during the spring and summer of 1972 as the spawning ponds were being renovated. Blue and channel catfish brooders were separated and crowded in small 0.1-acre holding ponds (table 1). No attempt was made to spawn the fish as no spawning containers were placed in the ponds. Routine feeding and maintenance of the fish revealed that spawns had occurred during the summer of 1972. Channel catfish spawned in two of the small ponds and blue catfish in another. The fingerling blue catfish were found August 16, 1972. At this time they were fairly uniform and measured 97–117 millimeters in total length. The two ponds of channel catfish fingerlings were found October 29, 1972. These were not as uniform, and ranged from 75 to 130 mm. This possibly indicates that more than one spawn occurred. The ponds were harvested on February 15, 1973. One hundred and fifteen pounds of 130–160 mm blue fingerlings (approximately 2,440), 40 pounds of 75–140 mm channel fingerlings (approximately 2,500) and 15 pounds of 50–77 mm channel fingerlings (approximately 2,800) were obtained from the ponds.

Water chemistry data indicated that the ponds in which spawns were found had salinities of 2 ppt or below throughout the summer (table 2). The other ponds containing blue and channel catfish recorded slightly higher salinities and no spawns were found.

The effects of sea water on the reproduction and survival of catfish, thus far, tends to follow the same pattern as that reported for largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*) [7]. Laboratory

Table 1.—Stocking numbers and weights per 0.1 acre pond of brood blue and channel catfish, Rockefeller Wildlife Refuge, November 1971

	Pond number					
	B-18	B-19	B-23	B-24	B-25	B-43
Species -----	Blue	Blue	Channel	Blue	Channel	Channel
Number -----	33	42	148	33	200	53
Size range (pounds) ---	2-35	2-35	1-3	2-6	1-3	1-3

tests demonstrated that approximately 10 to 12 percent sea water (3.6–4.3 ppt) was the maximum concentration at which these fish could successfully reproduce. Fingerlings survived concentrations of 29 to 38 percent sea water (10.3–13.4 ppt).

In summary, studies have indicated that freshwater catfish may be successfully grown in coastal waters. Indicative as it is, the salinity data in this report are too inconclusive to give definite tolerance limits for blue and channel catfish reproduction. It simply documents that both species originally obtained from freshwater hatcheries spawned in brackish water ponds in salinities of approximately 2 ppt.

ACKNOWLEDGMENTS

I wish to express sincere appreciation to Brandon Carter, Biologist Aid, Louisiana Wild Life and Fisheries Commission and to Steve Funderberk, Rodney Roadifer, and Richard LeBlanc, students at Louisiana Tech University for their assistance throughout the spawning season. Also I am indebted to Dr. James W. Avault, Louisiana State University for his review of this paper.

Table 2.—Periodic salinity (ppt) and temperature (°C) data collected from catfish brood ponds, Rockefeller Wildlife Refuge, 1972

Pond number	12-21-71		2-23-72		4-10-72		7-19-72		9-15-72		10-2-72		Average salinity
	Salinity	Temp	Salinity	Temp	Salinity	Temp	Salinity	Temp	Salinity	Temp	Salinity	Temp	
B-18 -----	2.0	17.3	1.8	19.0	1.9	20.6	2.8	28.9	2.7	28.4	2.3	21.4	2.25
B-19 -----	2.1	17.2	1.8	17.9	1.9	20.6	2.9	28.9	2.3	28.6	1.8	21.5	2.27
B-23 * -----	2.0	17.1	1.7	17.4	1.8	19.8	1.9	28.6	2.0	28.5	1.7	21.5	1.85
B-24 * -----	1.9	17.4	1.6	18.1	1.8	20.2	1.9	28.5	2.0	28.3	1.5	21.4	1.78
B-25 * -----	1.8	17.9	1.6	17.5	1.8	20.2	2.0	28.7	1.9	28.3	1.6	21.3	1.78
B-43 -----	2.2	17.6	1.7	18.8	2.2	22.1	2.3	29.1	2.3	28.4	1.6	21.7	2.05

* Spawns found in these ponds.

