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INITIAL AND DELAYED MORTALITIES OF LARGEMOUTH BASS CAPTURED IN THE 1973 NATIONAL KEOWEE B.A.S.S. TOURNAMENT[1]

by

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ABSTRACT

Tournament-caught largemouth bass were compared with hatchery bass to determine survival rates of bass injected or uninjected with oxytetracycline. Significant mortality rates occurred only in injected tournament-caught bass held in plastic pools. Hatchery controls, uninjected tournament bass and injected tournament bass held in hatchery ponds exhibited mortality rates similar to each other. Survival was best in hatchery ponds, but not significantly better than in pools except for injected tournament-caught bass.

INTRODUCTION

Angling tournaments are not new on the sport fishing scene but they have increased recently in magnitude and number with several contests now organized on a professional level by a national organization. This trend may continue until a significant number of these tournaments will occur on every major lake and reservoir in the country.

These contests are usually directed at a particular species, the largemouth bass, *Micropterus salmoides* (Lacepede), which is a terminal predator and an important constituent of a well-balanced fish population. These tournaments tend to intensify angling pressures on this highly-preferred species by a group of fishermen who may be more proficient anglers than the general fishing public. For this reason the continued proliferation of these contests could have adverse effects on fish populations in our public waters.

In an attempt to reduce the impact of tournaments on bass populations and to allay public concern, a recent innovation by many tournament sponsors has been a "return-your-catch" policy, whereby qualifying fish are retained in live wells and returned to the lake of origin at the end of the contest day. Success of the release approach depends upon a relatively high survival rate for captured fish, which is directly related to the care taken by the individual angler and the refinement of holding and handling procedures.

Probably the most extensive and best planned handling procedures have been developed by the Bass Anglers Sportsman's Society (B.A.S.S.) in its national

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tournaments where bonus points are awarded for each live bass and considerable effort is made to promote the survival of tournament-caught largemouth bass. B.A.S.S. has taken the initiative in improving handling methods and in using prophylactics to reduce mortalities associated with their tournaments. Several researchers have been involved in developing these procedures and assessing initial and delayed mortalities. Initial mortalities have been reduced to 10-15% in recent tournaments (Wellborn and Barkley in press, May in press) while estimates of delayed mortalities have ranged from 3 to 15%. Wellborn and Barkley reported a significant reduction in latent mortalities of test fish injected intraperitoneally (IP) with oxytetracycline. However, Plumb et al. (in preparation), working with tournament fish in Georgia, have found somewhat higher mortality rates in bass injected IP with this bactericide than in untreated fish. This experiment was directed toward the substantiation and possible expansion of these earlier works.

METHODS

A national B.A.S.S. tournament was conducted in 728,424-are (18,000-acre) Lake Keowee in western South Carolina From 30 May through 1 June 1973. Weather conditions were unseasonably cool during this time and lake water temperatures remained at approximately 24°C. Angling periods were for 10 h the first 2 days and 8 h the third. Only artificial lures were permitted, with plastic worm baits apparently predominating. All boats were equipped with aerated live wells and most fishermen did not attempt to disgorge deeply hooked lures.

At the conclusion of each contest day, anglers checked in the catches at a central location. During weigh-in, the fish were removed from live wells and placed in perforated plastic bags, which were submerged in large plastic garbage cans filled with water containing 3-ppm acriflavin, until weighing. Once counted and weighed, the bass were placed in a 2271-l (600-gal) holding tank filled with lake water. Since the total catch was rather small, all fish alive at the weigh-in were utilized in this survival study. The fish were netted from the holding tank and alternate specimens were marked with a caudal or dorsal fin clip and injected IP with Terramycin® at a rate of 18 mg/g estimated total weight. Uninjected bass were not marked but placed directly into a 1135-l (300-gal) distribution unit equipped with aerators and oxygen.

At the completion of the weigh-in and treatment process, these fish were transported to Clemson University (20-min trip), where a portion was transferred to vinyl-lined pools and the remainder was hauled to Styx State Fish Hatchery in Columbia, South Carolina. Maximum loading for these trips to Columbia was approximately 63.5 kg (140 lb) and traveling time was 3 h. A number of largemouth bass was obtained from the Cheraw National Fish Hatchery to serve as controls. These bass were taken from a holding pond on the initial day of the tournament, transported about 4 h to Clemson, and placed in selected ponds coincident with the tournament fish. Nine of the control bass were also transferred to the Styx Hatchery. Half of the controls were marked and injected in the same manner as were the tournament bass. At the hatchery the controls and tournament bass were placed in separate 4.0-are (0.1-acre) ponds. Tournament catches on subsequent days were handled similarly except insufficient numbers were available for transport to the Styx Hatchery from the second day's catch.

A total of 140 tournament and 30 hatchery controls were retained 14 days in 21 pools at Clemson University. These pools had a mean capacity of 4,822 l (1,274 gal). Eight of these pools had soil bottoms from a previous experiment. Pools were filled 1 day prior to stocking with municipal water which had chlorine levels of 0.04 ppm. Pool chlorine levels ranged from 0 to 0.01 ppm during the experiment. Tap water temperatures were 21°C; oxygen levels, 9 ppm; and total hardness, 10-ppm $CaCO^3$. Pool temperatures were monitored by two Taylor maximum-minimum thermometers, one in a soil-bottom pool and the other in a clean pool. Temperatures in soil-bottom pools ranged from 21 to 28°C with a mean maximum-minimum range of 23 to 27°C. Clean-pool temperatures ranged from 20 to 28°C with means of 22 and 27°C. A fine spray was

directed over the pools for aeration and water exchange, providing a 30-h mean exchange rate with a maximum 56-h rate of exchange for one pool. Seven to eight bass were placed in each pool on a 50:50 ratio of injected and uninjected fish with an effort made not to exceed 9.1 kg (20 lb) total weight of fish per pool.

Three 4.0-are ponds were utilized at the Styx Fish Hatchery where the 1st and 3rd days' catches were held separately as were the hatchery controls. Water temperature of one pond was monitored with a Taylor maximum-minimum thermometer. Mean maximum-minimum temperatures for this pond were 29 and 22°C. No other water quality parameters were measured in ponds.

Both pools and ponds were checked at approximately 0800 hours and 1800 for mortalities, and a log was kept of deaths occurring during the previous 12 h. If a fish was near death and no longer capable of maintaining equilibrium, it was removed and recorded as a death for the 12-h period.

At the conclusion of the 14-day retention period, the ponds and pools were drained and all surviving fish recovered.

Unaccountable losses were excluded from the final statistics as were four fish that jumped out of the pools.

RESULTS AND DISCUSSION

A total of 261 largemouth bass weighing 344.7 kg (760 lb) was caught during the 3-day tournament. Of these fish 42 were dead at the weigh-in (Table 1). This number included several fish that were unable to attain a normal swimming position and were judged beyond recovery and two bass that died in transit to Clemson and were included as initial mortalities. Four of the 60 tournament bass and one of the nine controls transferred to the hatchery ponds died in transit and were excluded from the statistics, because these deaths were probably the result of prolonged confinement.

Table 1. Catch Statistics and Mortalities of Largemouth Bass Caught in 1973 B.A.S.S. Tournament at Lake Keowee, South Carolina 30 May - 1 June 1973.

Date	Total Catch	Initial Mortalities	% Initial Mortality	% Delayed Mortalities
30 May	83	10	12.0	1.0
31 May	86	15	17.4	1.3
1 June	92	17	18.6	1.0
Total	261	42	16.1	3.3

Water quality in the pools declined somewhat during the experiment with water temperatures increasing progressively and oxygen levels being depressed at predawn, though at no time did they become critical. Oxygen levels were depressed initially by about 2 ppm with the introduction of approximately 9.1 kg (20 lb) of bass to each pool. Early morning levels ranged from 5.2 to 7.2 ppm with a mean of 6.5 ppm for all pools during the experiment. During the later part of the experiment, oxygen fluctuations were amplified by the development of heavy plankton blooms, which produced slightly supersaturated oxygen levels in some pools in the afternoons and lower concentrations during predawn hours. Carbon dioxide was monitored regularly but at no time did it diverge measurably from normal. Water exchange rates varied considerably among pools but there was no correlation between individual pool mortalities and pool exchange rates. The dirt-bottom pools were the most susceptible to algal blooms but chi-square tests of the slightly differing survival rates were judged insignificant.

Significant mortalities occurred only in the Terramycin-injected tournament bass held in pools (Tables 2-5). All the hatchery controls, uninjected tournament bass, and injected tournament bass held in hatchery ponds exhibited similar mortality rates by chi-square analysis (Tables 2-5). Survival was best in hatchery ponds but not significantly better than in the pools except for injected tournament-caught bass. Mortalities for uninjected tournament-caught bass were significantly greater than zero.

Table 2. Mortalities of Largemouth Bass Caught in 1973 Keowee B.A.S.S. Tournament and Hatchery Controls Retained in Pools and Hatchery Ponds for 14 Days.

Classification	Number of Fish in Test	Death	Losses*	% Mortality
Tournament-caught Largemouth Bass in plastic pools				
Injected	68	25	2	37.9
Uninjected	72	3	6	4.5
TOTAL	140	28	8	20.0
Controls in plastic pools				
Injected	16	2	0	12.5
Uninjected	14	0	0	0.0
TOTAL	30	2	0	6.7
Tournament-caught Largemouth Bass in hatchery ponds				
Injected	30	3	2	10.7
Uninjected	30	2	2	7.1
TOTAL	60	5	4	8.3
Controls in hatchery ponds				
Injected	4	0	0	0.0
Uninjected	5	0	1	0.0
TOTAL	9	0	1	0.0

*Bass that were lost to the experiment through accident or could not be accounted for at the conclusion of the experiment.

Table 3. Chi-square Tests of Mortalities for Different Treatments of Largemouth Bass Held in plastic pools.

	Chi-square test
Controls	
Injected/uninjected	.94ns1
Tourney bass	
Injected/uninjected	21.94**
Controls/Tourney	
Injected	4.08*
Uninjected	.62ns1
Dirt bottom/Clean pools	.86ns

* - Significant to the 95% level of confidence.
** - Significant to the 99% level of confidence.
1 - Expected values too small for valid chi-square analysis.
ns - Tested non-significant difference at 95% level of confidence.

A number of the bass held in pools exhibited dermal and/or mucus film disruptions evidenced by discolored areas on their fins and body. These generally did not heal and after 3 to 4 days developed fungal growths. Mortalities began to occur on the fourth day and peaked on the fifth. Then a 2-day recession of deaths followed with a resumption of mortalities on the 8th day which continued for the duration of the experiment (Table 4). Examination of a heavily infected fish near the termination of the experiment showed advanced *Aeromonas liquifaciens* infection with a heavy secondary infection of *Saprolegnia* sp.

Since these infections and mortalities were concentrated in the injected tournament bass, apparently they were associated with the handling and injection process, and the pool facilities somehow inhibited recovery from these initial injuries while the hatchery ponds provided conditions more conducive to recovery.

According to these results Terramycin administered IP is of questionable value in the promotion of post-tournament survival of largemouth bass. Short-term delayed mortalities were less than 5% of the total catch. Apparently, a "return-your-catch" procedure is a valid approach at least to decreasing the consumptive effects of angling tournaments on a lake fishery. Though handling procedures and prophylactic measures can certainly be refined and improved, the most productive area for reducing catch mortalities associated with these tournaments is in the area of fish retention and handling, and a system which provides for the immediate return of these fish to the water may serve best to minimize angling mortalities.

Table 4. Chi-square Tests of Mortalities for Differences Between Largemouth Bass in Pools and Hatchery Ponds.

	Chi-square Test
Controls	
Hatchery Pond/Pools	.71ns1
Tourney (Injected)	
Hatchery Ponds/Pools	6.85**
Tourney (Uninjected)	
Hatchery Ponds/Pools	.25ns1

* - Significant to the 95% level of confidence.
** - Significant to the 99% level of confidence.
1 - Expected values too small for valid chi-square analysis.
ns - Tested non-significant difference at 95% level of confidence.

Table 5. Chi-square Tests of Mortalities for Different Treatment of Largemouth Bass Held in Hatchery Ponds.

	Chi-square Test
Controls	Identical
Tourney	
Injected/Uninjected	.22ns1
Control/tourney	.88ns1

1 - Expected values too small for valid chi-square analysis.
ns - Tested non-significant difference at 95% level of confidence.

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Table 6. Chronicle of Mortalities of Largemouth Bass Caught in Keowee B.A.S.S. Tournament and Hatchery Controls Retained in Pools and Hatchery Ponds 30 May-14 June 1973.

Day	Pools		Hatchery Ponds	
	Controls	Tourney	Controls	Tourney
1		3		1
2				
3				1
4		3		1
5	1	6		1
6				
7				
8		5		
9	1	2		
10		2		
11		4		
12				
13		3		
14		2		1
TOTAL	2	30	0	5

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TEXAS BASS CLUBS[1]

by

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ABSTRACT

A 1972 survey was taken of Texas bass clubs to determine the number and location of organizations, their membership, club objectives, tournament regulations, fishing success and estimated harvest of bass from Texas reservoirs. Questionnaires were sent to 206 clubs, and reports were received from 170 of the groups during this study. The 170 reporting organizations collectively held 1,755 tournaments in 1972. Harvest records revealed an average catch per unit effort of 0.17 bass and/or 0.28 lb. per man-hour. Harvest from tournament lakes was, in most cases, less than 0.50 lb. per acre and was not considered harmful to bass populations at this time.

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