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## **TOURNAMENT CATCH OF LARGEMOUTH BASS FROM ST. JOHNS RIVER, FLORIDA**

by

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### ABSTRACT

A three-day fishing tournament on the St. Johns River, Florida, in which 200 fishermen competed, yielded 1165 largemouth bass over 12 inches, and 1254 bass smaller than 12 inches. The over-all catch rate was 0.50 bass per hour. The catch per acre of water fished was 0.03 bass. Over-all mortality estimates ranged from 22.3 to 43.8 percent; they were due primarily to epidermal bacterial and fungal infections, contracted by handling. The 31-day tag retention rate for largemouth bass tagged with the Floy® FD-68-B anchor tag was found to be 51.1 percent for fish held in a hatchery pond.

### INTRODUCTION

A three-day Florida invitational tournament of the Bass Anglers Sportsman's Society (B.A.S.S.: National Headquarters, Montgomery, Alabama) was held in the St. Johns River at Welaka during February 6, 7, and 8, 1974. This competitive sportfishing event was utilized to obtain information concerning catch and mortality rates, areas of fishing concentration, population structure, numbers of fish caught and released, and to mark and release largemouth bass back into the river system. The tournament was monitored jointly by personnel of the U.S. Fish and Wildlife Service (Welaka National Fish Hatchery), Putnam County, and the Florida Game and Fresh Water Fish Commission.

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## METHODS

### *Tournament Rules and Procedures*

Tournament rules provided for participation, by invitation, of 200 fishermen selected from the membership of B.A.S.S. The fishermen came from 25 states, ranging from Florida northeast through Georgia and Pennsylvania to Connecticut and northwest through Alabama and Mississippi to Texas, Oklahoma and Minnesota. The fishermen were paired each day and fished competitively for three days for largemouth bass. No two persons from the same state were paired. No two fishermen were allowed to fish together more than a single day. Announcement of partners were made the evening before each fishing day. Objectives were to determine which fisherman could catch the highest poundage and the largest bass (based on 10 bass per day limit). High rewards were offered.

Each day the 100 boats were divided into three "flights". The first left Welaka (Trail Boss Camp) at 8:30, the second at 9:00 and the third at 9:30 A.M. During the first two days each flight was due back 8 ½ hours later. On the last day of the contest, check-in times were moved up one hour. Penalties were assessed for late return to the check-point. Fishing was permitted anywhere in the St. Johns River system which was accessible by boat. The fishermen were not allowed to remove the boat from the water or to leave it to fish.

Boating safety rules were rigidly enforced. Each boat was thoroughly checked daily, one-half hour before starting time, for safety equipment, including an automatic kill switch for the motor, life vests and a bilge pump. A functional live-well and aerator were required in each boat to facilitate live transportation of fish. Fish stringers were not allowed.

Since the contest emphasized live release of the bass after weighing, each fish brought in alive was awarded a bonus ounce of credit. Penalties were assessed for any bass brought in which measured less than 12 inches in total length.

As each "flight" returned, individual catches were transferred to nylon netting (the first day only) or plastic bags (the second and third days), dipped into a solution of acriflavin and transported to weighing tables. Here, in rapid assembly-line procedures, the fish were checked, counted, weighed, and results were recorded on official weigh-in forms of B.A.S.S. for contest purposes.

The live fish were then transferred to waiting hatchery tank trucks equipped with agitators and transported to two raceways, each 50 feet long by 8 feet wide, with running water at the Welaka National Fish Hatchery of the U. S. Fish and Wildlife Services. Dead fish were laid aside for further study, following which they were donated to the local Rodeheaver Boys Ranch.

### *Investigation Methods*

In order to determine areas of fishing concentration, numbers of bass under 12 inches and striped bass taken, the contestants were asked to fill out questionnaires after finishing at the weigh-in stations. They were requested to answer three questions: (1) where did you fish; (2) how many largemouth bass did you catch and release; and (3) how many striped bass did you catch. These questions could be answered quickly by placing check marks at appropriate places on the questionnaires.

On the morning of the first day (February 6) of the tournament, personnel of the Game and Fresh Water Fish Commission collected 45 live bass from the St. Johns River in the Welaka area by means of electrical shocker equipment. These fish, intended for control observations, were immediately placed into a division of one of the two National Fish Hatchery raceways into which the tournament fish were later placed. Each day's catch of tournament fish was kept separate by means of wire-mesh dividers in the raceways.

All tournament fish were held in the raceways a full five days following capture dates. During this time delayed mortality was noted and measurements of length and weight of dead fish were recorded. On the morning of the sixth day after capture each

group of tournament fish was transferred to tank trucks, anesthetized with quinaldine, transported to a nearby site on the St. Johns River (some were also placed into the tributary lake, Lake Crescent), measured in total length to the nearest millimeter, tagged and released. In order to eliminate further stress on the fish to be released, no live fish were weighed. However, observations were made of the general appearance of each fish when it was measured and tagged. Such observations were recorded on the tagging form along with tag number, length, dates of original capture and of release, and location of release.

Approximately ten percent of each day's tournament catch, and all 45 of the shocker-caught fish were retained for additional observations. Each group was kept separate in the raceways until the 8th day after the start of the tournament. On that day these fish, except for 20 of the shocker-caught bass, were anesthetized with quinaldine, hauled to a one-acre control pond at the Welaka National Fish Hatchery, measured, tagged and released. The 20 shocker-caught bass were released into the pond without being anesthetized, measured or tagged. Observations were made of the fish during their retention time in the hatchery pond. Fish found dead were removed and recorded.

Fish tags (FD68B anchor tag, monofilament inserted entirely through #20 tubing) used were obtained from the Floy® Tag and Manufacturing Company. The tags were dart-type, with reinforced attachment of the nylon tubing-tag to anchor, and were consecutively numbered on the tubing. The color of the tubing was International Orange. The tags were applied with a Mark II tagging gun. It inserted a T-shaped anchor, through a hollow needle into the left side of the fish immediately below the dorsal fin, in an "attempt to lock the anchor behind the pterygiophores". After the fish was tagged the tag was tugged on to make sure of secure fastening. If a tag was found to be loose the fish was retagged. This type tag had been tested on Florida largemouth bass and had been found superior to other dart-type tags (Wilbur and Duchrow, 1972). International Orange color was chosen because of the ease with which this color can be seen, and also because Wilbur and Duchrow (ibid) had stated that the possible superiority of retention of tags of other colors is minor.

The pond was drained on March 18, 1974. Records were made of tag numbers on fish and of tag losses from fish. The fish from the pond were anesthetized with quinaldine and transported to the release site. Largemouth bass found without tags were tagged or retagged and all were released into the St. Johns River.

## RESULTS

### *The Questionnaire*

Of the 600 fisherman-trips made during the 3-day tournament, completed questionnaires were returned for 229, or 38.2 percent. It is believed that the voluntary nature of the responses and the confusion of the crowds at the weigh-in station contributed less to bias than to randomize the results. Some fishermen failed to respond because their partner had already done so. Others received questionnaires but forgot, either to fill them out, or to return them. Some missed being contacted.

Strong winds were experienced all three days of the contest. Little Lake George and Lake George, although not far from the starting point, are wide parts of the St. Johns River and are mainly unprotected from the sweep of the winds. Lake Crescent also becomes very rough in windy weather and is the region most distant from tournament headquarters.

Table 1. Numbers and percentages of fishing trips reported from various localities of the St. Johns River drainage during the 3-day B.A.S.S. tournament at Welaka.

Locality Fished	Area (Acres)	Number Trips	Percentage
Rodman Reservoir (Lake Oklawaha)	6,500	81	35.4
Little Lake George	1,400	12	5.2
Lake George	46,000	10	4.3
Lake Crescent	16,000	3	1.3
Elsewhere in river & tributaries	800	99	43.2
Various combinations of above localities		24	10.5
Total number fisherman-trips made		600	—
Total number fisherman-trips reported		229	38.2

It is therefore not surprising that only 1.3 percent of the reported trips were made to Lake Crescent, 4.3 percent to Lake George and 5.2 percent to Little Lake George (Table 1). The largest number of trips (43.2 percent) were made to the narrower sections of the St. Johns River, its tributary streams such as Salt Springs Run, the Oklawaha River below the Rodman Dam and boat canals, all of which were more protected from the weather. Rodman Reservoir (Lake Oklawaha) was responsible for 35.4 percent of the fishing trips recorded, and 10.5 percent of the fishing trips were made to various combinations of the above localities.

Areas of the above regions fished are: Rodman Reservoir, 6,500; Little Lake George, 1,400; Lake George, 46,000; Lake Crescent, 16,000 and elsewhere in the St. Johns River and its tributaries, 800 acres (Table 1). The total area of this portion of the St. Johns River is 70,700 acres, or 28,600 hectares.

The questionnaire responses were grouped according to fishermen reporting to have fished only in Rodman Reservoir, those fishing only in parts of the St. Johns River drainage other than Rodman, and those who fished in both Rodman and the St. Johns drainage on the day of response. The percentage of fishermen who reported having caught one or more bass under 12 inches (successful trips) was somewhat higher for Rodman (80.3 percent) than for other sections of the St. Johns drainage (74.5 percent), but a smaller percentage (71.5) was successful when fishing a combination of the areas. However 76.7 percent of the fishermen reporting caught at least one small bass (Table 2).

Of the 479 small bass reported to have been released, the catch per fisherman trip (day) was 2.23, 1.96 and 2.43 fish for Rodman, the St. Johns and the combination of both, respectively. The total number of largemouth bass under 12 inches caught and released during the tournament was estimated to be 1,254.

Knowing the average length of the fishing day (from the daily official check-in and check-out times) to be 8.17 hours, the catch rate per fisherman hour of undersized bass was found to be 0.26 bass (Table 2).

The questionnaire returns also indicated the capture of 10 striped bass incidental to the contest.

Table 2. Numbers and percentages of fishermen reporting catches of largemouth bass under 12 inches from various regions of the St. Johns River drainage, with catches per fisherman-trip and per fisherman-hour, and total numbers estimated to have been caught.

	Regions Fished			
	Rodman only	St. Johns only	Rodman & St. Johns	All Regions Total
Number fishermen reporting	86	129	14	229
Percent successful	80.3	74.5	71.5	76.7
Number fish reported	192	253	34	479
Catch per fisherman-trip	2.23	1.96	2.43	2.09
Catch per fisherman-hour	0.27	0.24	0.30	0.26
Estimated total number caught	492	659	88	1254

#### *Tournament Records and Catch Rates*

The top prize winner (who caught the highest poundage) brought in a total 20 bass over 12 inches in length weighing 49 lbs. 2 oz. The weights of the nine next highest catches ranged from 47 lbs. 7 oz. to 30 lbs. 7 oz. According to tournament records there were five legal limit (10 bass per person per day) catches made of largemouth bass longer than 12 inches during the contest. The largest bass caught (10 lbs. 4 oz.) was taken from a canal not far from the check-in point.

Copies of the official weigh-in records as furnished to the Commission showed a total catch of 1,165 bass which weighed 2151.6 lbs. (Table 3). The mean catch per day was 388.3 fish weighing 712.2 lbs., and the average weight per bass was 1.84 lbs.

Since tournament weigh-in records were kept only for successful fishermen, and since 200 fishermen participated each day, it was possible to determine daily numbers of fishermen who caught no fish. During the three-day period the percentage of unsuccessful fishermen ranged from 25.5 to 32.0 percent, with a mean of 28.6 percent (Table 4).

The mean catch per fisherman day for successful fishermen was 2.72 fish weighing 5.03 lbs. (Table 5). For all fishermen, the mean catch per day was 1.94 largemouth bass with a mean weight of 3.57 lbs. The catch of bass over 12 inches in length was 0.24 fish and 0.44 lbs. per man hour. These figures are higher than the comparable catch rate found for fishing tournaments in lakes of the State of Texas during 1973, which average 0.17 fish and 0.28 lbs. per man hour (Seidensticker, 1973).

Table 3. Summary of official weigh-in records of Welaka B.A.S.S. tournament showing total and mean numbers and weights of largemouth bass.

Date	Number	Weights (lbs)	Mean Weight (lbs.) per bass
February 6	383	692.2	1.81
February 7	408	749.1	1.84
February 8	374	710.3	1.87
Total	1,165	2151.6	—
Mean	388.3	717.2	1.84

Table 4. Numbers and percentages of successful and unsuccessful fishermen competing in the 3-day Welaka Tournament of B.A.S.S.

Date	Number of Fishermen		Percentages	
	Successful	Unsuccessful	Successful	Unsuccessful
February 6	149	51	74.5	25.5
February 7	143	57	71.5	28.5
February 8	136	64	68.0	32.0
Mean	142.7	57.3	71.3	28.6

*Distribution of Size Classes*

Measurements (total length) were made in millimeters. Lengths were then grouped into one-inch increments. As previously stated, live fish were measured, but only dead fish were weighed. The length-frequency and weight summary (Table 6) includes both tournament and shocker-caught largemouth bass.

The 1,254 fish under 12 inches (30.4 cm) estimated to have been caught and released are not shown on this table. However, they represented nearly 52 percent of the total catch and at least that proportion of the population structure of largemouth bass in the river.

The largest number (816) of bass brought in were in the 13 to 16 inch groups (31.7 to 42.0 cm). The 17 to 20 inch groups (42.1 to 52.1 cm), represented 15.4 percent of the total numbers measured, and fish in the 21 to 25 inch classes (52.2 to 64.8 cm), 2.8 percent.

The range in weight for largemouth bass in the 11 to 24 inch (26.7 to 62.7 cm) groups was 0.80 to 8.75 lbs., or 363 to 3969 g. (Table 6).

Table 5. Mean Catch per fisherman-day and per fisherman-hour expressed as numbers and pounds of tournament bass (over 12 inches) caught.

Date	Hours Spent	Successful Fishermen		All Fishermen	
		Number	Pounds	Number	Pounds
February 6	8.50	2.57	4.64	1.92	3.41
February 7	8.50	2.85	5.24	2.04	3.74
February 8	7.50	2.75	5.22	1.87	3.55
Mean catch per day	8.17	2.72	5.03	1.94	3.57
Catch per fisherman-hour	--	0.33	0.61	0.24	0.44

Table 6. Length-frequency and weight range of largemouth bass from the St. Johns River.

cm.	inches	Length-frequency (percent)	Range in Weight	
			Grams	Pounds
(24.2-26.6)	10	0.1	-	-
(26.7-29.1)	11	0.3	363	0.80
(29.2-31.6)	12	10.5	331-467	0.43-1.03
(31.7-34.3)	13	23.9	381-694	0.84-1.53
(34.4-36.9)	14	20.8	467-807	1.03-1.78
(37.0-39.4)	15	13.4	640-907	1.41-2.00
(39.5-42.0)	16	12.5	785-1360	1.73-3.00
(42.1-44.5)	17	6.9	1021-1360	2.25-3.00
(44.6-47.0)	18	3.7	1361-1588	3.00-3.50
(47.1-49.6)	19	2.7	1247-1928	2.75-4.25
(49.7-52.1)	20	2.1	2495-2948	5.50-6.50
(52.2-54.6)	21	.8	2381	5.25
(54.7-57.2)	22	1.1	2608	5.75
(57.3-59.7)	23	.5	2835	6.25
(59.8-62.2)	24	.3	3969	8.75
(62.3-64.8)	25	.1	-	-
Total number fish		1156	197	

#### *Mortality Rates and Epidermal Infection in Raceways*

The highest daily mortality of tournament fish was sustained on the day of capture. It amounted to 6.1 percent of the fish placed in the raceways (Table 7).

The first day's catch (February 6), had a greater over-all mortality rate (20.5 percent) than those of subsequent tournament days (15.6 and 15.3 percent). This fact was probably due to two causes: (1) the nylon netting with which the fish were handled at the weighing station the first day produced more injuries and lesions causing bacterial and fungal infection than did the plastic bags used during the remaining two days; and (2) the amount of quinaldine (12 mg/L) used in the first tank load of bass hauled for tagging and the release. The fish were completely immobilized by this strength of solution. After tagging and release, nine fish were picked up dead. The dosage was reduced to 5 mg/L for the second and for all subsequent loads. The effect of the lowered concentration was to tranquilize the bass for handling, but not completely to immobilize them. Mortalities on the day of tagging and release for second and third-day tournament catches became almost negligible (2 and 4 fish, respectively).

Table 7 shows a gradual decline in mortality rates, through the third day of holding for fish in the raceways, and then an increase, beginning the fourth day and continuing through the release date. Some of this mortality could have been due to overcrowding and confinement. Thirty-three percent of the live tournament fish showed marked evidence of epidermal bacterial and fungal infection when examined at the time of tagging and release. None of the shocker-caught fish was found to be so infected. Mortality of tournament fish continued as long as the fish were held in the raceways. Deaths were apparently due principally to secondary infection on the body through handling, or to shock, and not to injuries of the mouth and related parts by the hook. One fish (49.7 cm in length) with a badly torn gill raker survived to be tagged and released.

Table 7. Number of tournament fish placed in raceways, by date of capture, showing daily mortality rates.

Capture Date	Number of tournament fish in raceways	Day of capture	1st day	2nd day	3rd day	4th day	5th day	Day of release	Total number	%
2/6/74	386	24	4	3	0	12	21	15	79	20.5
2/7/74	395	23	8	6	5	11	7	2	62	15.6
2/8/74	366	23	4	4	6	4	11	4	56	15.3
Total	1,147	70	16	13	11	27	39	21	197	
Percentage dead		6.1	1.4	1.1	1.0	2.4	3.4	1.8	17.2	

Note: 45 largemouth bass, captured by shocker on February 6, 1974 were held in the same raceway during the entire above period, and experienced no mortalities.

The over-all mortality rate for tournament fish held in the raceways during the full 5 days was 17.2 percent. None of the 45 non-tournament (shocker-caught) fish, held in the same raceway during the same period of time sustained any mortality (Table 7).

#### *Fish Losses From the Pond*

A total of 124 largemouth bass were stocked in the one-acre hatchery pond on February 14, 1974. They included 79 tournament and 25 shocker-caught fish, all of which were tagged. An additional 20 unmarked, shocker-caught fish were also put into the pond.

When the pond was drained 31 days later, 103 live bass (83.7%) were recovered. They consisted of 28 tagged tournament fish, 16 tagged shocker fish and 59 bass which had either lost their tags or had never been tagged. They were unidentifiable as to provenience, but must have included both tournament and shocker fish. At least 14 of the fish found without tags had been tagged, but the wound had healed, leaving no scars.

Daily observations which had been made during the time the fish were in the pond resulted in finding only four dead bass. These fish were all identified as tournament-caught, and amounted to 5.1 percent of the total numbers of this group (79 fish) in the pond. No shocker-caught fish were found dead.

Losses from the pond other than the mortality observed amounted to 17 fish, or 13.7 percent of the total number (124) stocked. It was thought that many of these fish were removed from the pond by animal and bird predators which frequently the hatchery and nearby wooded swamps. The tournament group of bass, which were in a more debilitated condition than the shocker-fish, may have been more vulnerable to predation.

This predation element prevented any exact determination of delayed mortality rates of tournament bass during the time they were in the pond. Best estimates range from 5.1 (percent found dead) to 26.6 percent (if all missing fish are assumed to have been dead or moribund tournament bass).

However, it was observed that all pond fish were healthy and free of epidermal bacterial and fungal infections at the time of their release into the river thirty-one days later.

#### *Tag Losses From Fish*

The largemouth bass had spawned during their one-month stay in the pond. A minimum of 50,000 to 75,000 fry were observed when it was drained. Aggressive action by the spawning bass, added to unnaturally crowded conditions may have contributed to high tag losses.

A total of 90 tags were recovered from the pond. Thirty-five tags (38.9 percent) were found loose on the bottom of the pond (dislodged); 9 (10.0 percent) were found with the



anchor still imbedded in the fish, but the nylon tubing with the numbered legend had separated from it and had been lost; and 46 fish (51.1 percent), including three dead bass found prior to draining the pond had retained their tags intact (Table 8).

Table 8. Numbers and percentages of bass tags recovered from pond by size classes of fish tagged, and condition of recovery.

Size Class Total Length	Total Number Tags Recovered	Tags Intact On Fish	Tags Found Dislodged	Tubing Lost: Anchor Attached
8-12"	13	(9) 69.2	(4) 30.8	None
13-16"	63	(32) 50.8	(23) 36.5	(8) 12.7
17-24"	14	(5) 35.7	(8) 57.1	(1) 7.1
Total	90	(46) 51.1	(35) 38.9	(9) 10.0

Wilbur and Duchrow (1972) reported tag losses of this type of tag from 41 largemouth bass held in a pond for three months to be 12 percent, all due to dislodgement. They used one to two pound fish, which were generally smaller than those of the present study, and each of their fish carried two tags. The presence of only a single tag on fish of the present study may have increased the risk of its loss, either by being pulled out by other fish, or to obstructions in the water. Other differences between the two studies also precluded strict comparison of results.

The arrangement of tag returns presented in Table 8 by sizes of the fish to which they were attached gives insight into differential tag retention rates. The largest fish were almost twice as susceptible to tag loss as the smallest ones. Tag retention rates for small (8-12"), intermediate (13-16"), and large bass (17-24") were 69.2, 50.8, and 37.7 percent respectively. Percentages of tags found loose in the pond (dislodgement of anchor) for the above three size groups were 30.8, 36.5, and 57.1 percent, respectively. None of the small bass, but 12.7 and 7.1 percent of the intermediate and large bass, respectively, were found with the tubing separated and lost from the anchor.

## SUMMARY AND CONCLUSIONS

1. Distribution of fishing effort by 200 fisherman during the 3-day B.A.S.S. tournament on the St. Johns River at Welaka was as follows: Rodman Reservoir, 35.4; Little Lake George, 5.2; Lake George, 4.3; Lake Crescent 1.3; elsewhere in river and tributaries, 43.2; and various combinations of the above localities, 10.5 percent.

2. A total of 1,165 largemouth bass over 12 inches, and ranging to 25 inches in length weighed 2151.6 lbs. when caught and entered in the tournament contest.

3. An additional 1,254 bass smaller than 12 inches were estimated to have been caught and released.

4. The total catch of 2,419 largemouth bass made from the 70,000 acres of water fished amounted to an average catch of one bass for each 29.2 acres of water, or 0.03 bass per acre. Obviously, the tournament has done no harm to the largemouth bass population of the St. Johns River.

5. The catch rate for largemouth bass over 12 inches in length was 0.24 fish and 0.44 lbs. per fisherman-hour.

6. The catch rate of largemouth bass under 12 inches was 0.26 fish per fisherman-hour.

7. Ten striped bass were taken in incidental catches.

8. The population structure of largemouth bass in the Putnam County region of the St. Johns River is very good. Large numbers of 1, 2 and three year-old bass are present. The larger sizes are also well represented.

9. The optimum dosage rate for quinaldine on largemouth bass in the hauling water used, was found to be 5 mg/L.

10. Thirty-three percent of the tournament-caught fish were found to have developed epidermal bacterial and fungal infections within 5 to 8 days after capture, but 31 days later a surviving sample of the epidermally infected bass were found to have completely recovered from infection.

11. Mortality on the day of capture was 6.1 percent, and after 5 days of holding in raceways 17.2 percent of the tournament catch had died.

12. Subsequent mortality, 31 days later, was estimated to have been an additional 5.1 to 26.6 percent.

13. Over-all mortality estimates of all tournament-caught bass ranged from a low of 22.3 percent (assuming none of the unaccounted bass were tournament bass) to a high of 43.8 percent (assuming all unaccounted bass were tournament bass).

14. The 31-day tag retention rate was 51.1 percent for the bass held in the pond.

15. Tag loss was directly related to length of the fish. Percentages of loss for small (8-12"), intermediate (13-16"), and large (17-24") bass were 30.7, 49.2, and 64.3 percent, respectively.

16. Approximately 950 tagged largemouth bass were released into the St. Johns River as a result of the tournament.

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