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SPORT FISHERY STATISTICS FROM THE INLAND WATERS OF NORTH CAROLINA

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ABSTRACT

Data obtained from 28,454 Wildlife Protector interviews during the course of routine license and creel checks between April 1, 1964 and March 31, 1965 supported the following estimates respecting the "rod-and-reel" sport fishery in the Inland Waters of North Carolina:

Respecting Angler Numbers:

Licensed — 404,878 (53%)
Unlicensed — 357,335 (47%)

Respecting Choice of Gear:

By licensed anglers: cane pole 32%; casting rod 49%;
fly rod 9%
By unlicensed anglers: cane pole 64%; casting rod 26%;
fly rod 4%
All anglers: cane pole 47%; casting rod 38%; fly rod 7%

Respecting Choice of Baits:

By licensed anglers: natural 63%; artificial 22%
By unlicensed anglers: natural 98%; artificial 1%
By all anglers: natural 80%; artificial 12%
(Balance indicates both baits used on same trip)

Respecting Catches:

The percentage of the estimated Statewide harvest from Inland Waters by "rod-and-reel": sunfishes 44.0%; crappie 19.1%; white perch 12.6%; catfishes 10.0%; largemouth bass 3.6%; mountain trout 3.5%; all others combined 7.2%

INTRODUCTION

The inland waters of North Carolina geographically are the fresh waters found above tidewater, but administratively they are all waters above an arbitrary line drawn generally parallel to the North Carolina coast and more or less along the upper limits of salt-water encroachment. All waters above this line, comprising in aggregate some 350,000 surface acres, legally are designated as "Inland Waters" in North Carolina and full responsibility for fishery management therein is vested in the Wildlife Resources Commission. No attempts at estimating the number of people fishing these waters nor of the magnitude and composition of their catches ever have been made.

Such an attempt was undertaken, starting on April 1, 1964 and continuing through March 31, 1965, as a cooperative study by the Division of Inland Fisheries and the Division of Protection. Throughout that one-year period, each Wildlife Protector in the process of his routine creel and license checks also completed a questionnaire on each angler contacted during one day of each week. The Protector decided in advance exactly what section of water he would patrol on the weekly angler-sampling day and then contacted every angler found within that section. To further reduce sampling bias, the angler-sampling day was scheduled on an eight-day cycle so that it advanced one day with each succeeding week. As the Wildlife Protectors have been assigned over the State in accordance with estimated work loads, the sampling is believed to have been reasonably consistent with fishing pressures. The Statewide Creel Census perforce was a practical approach to a problem and admittedly it lacked many elements of a classic statistically designed sampling; nevertheless, the results are believed sufficiently representative to provide many accurate tools for fisheries management.

The questionnaire included the name of the water being fished, the type of gear and bait being used, the type of license or license exemption as the case might be, the hours fished up to the time of contact, and the numerical catch of any of 15 categories of fishes.

The field data derived from some 28,500 Protector interviews ultimately were transferred to punch cards for electronic sorting and tabulation.

ESTIMATED NUMBER OF FISHERMEN

The principal reason why the total number of anglers fishing the Inland Waters had remained an unknown lay in the fact that, while the number of licensed fishermen was a matter of audited record, North Carolina grants license exemption privileges to minors, to landowners fishing from their own property, and to anglers fishing with natural baits within their county of residence. The best way of reaching an estimate of this unknown number of license-exempt fishermen seemed through proportions drawn between the number of licensed fishermen encountered during the Statewide Creel Census and the number of unlicensed fishermen concurrently contacted. Using data from the known license sales of the four types of resident license categories and the three types of non-resident categories in separate proportions yielded seven estimates of the Statewide total for each of the three license-exempt categories; namely, the county residents fishing with natural baits, the minors, and the landowners.

The estimates of the total number of anglers license-exempt by reason of being natural-bait fishermen within their county of residence averaged 297,825, with a 95 percent confidence limit of 161,251.

Estimates of the total number of anglers license-exempt by reason of not yet having attained their 16th birthday averaged 58,510 with a 95-percent confidence limit of 31,284.

The final category of license-exemption, that of the landowner fishing from his own property, was encountered so infrequently that the resulting data seemed quite unreliable—apparently the Statewide total was less than 1,000.

It is estimated, therefore, that during the period of the 1964-65 Statewide Creel Census a total of 761,200 anglers fished the public inland waters of North Carolina, of which approximately 356,200 — or 47 percent — were legally fishing without any fishing license.

CHARACTERISTICS OF THE TOTAL STATEWIDE CATCH

During the Statewide Creel Census, the interviewing Wildlife Protector recorded the number of fishes of certain general categories found in the angler's creel at the time of contact. When compiled into Statewide totals, these records yielded a reasonably accurate picture of the proportionate fraction that each category of fish contributed to the total catch of all fishes from the Inland Waters. These data were held in terms of percentages as even estimates of absolute numbers would be unreliable, for the catch data obtained were not totals, merely those up to the time of contact, and no reliable information was available concerning the number of fishing trips made by the average angler. The catch data, compiled in terms of the Statewide total take by rod-and-reel anglers to permit the direct comparisons of all percentages, are listed in Table 1.

These data indicate little evidence of a preference for individual fishes by certain license categories for, with the possible exception of the carp, the proportionate take of each fish agrees surprisingly well with the proportionate number of anglers in each license category.

If the sunfish category is consolidated to include the crappie and the white perch under the single title of "pan fishes," as is done in the Commission's Fishing Regulations, then this single category accounts for *three-fourths* of all fishes taken from the Inland Waters by "rod-and-reel" fishermen. Neither the "bent-pin" minors nor the unlicensed "worm fishermen" take the bulk of the pan-fish catch — the licensed resident fishermen take home 64 percent of all pan fishes caught, yet numerically they comprise but 48 percent of the anglers.

The catfishes — which are not game fishes in North Carolina — contributed another surprisingly great percentage of the total catch and particularly when it is recalled that these data exclude all catfish taken in traps or by trotline. The take-home catch of "rod-and-reel" caught catfish numerically was some two and one-half times the magnitude of the largemouth bass catch — in fact, 26 percent of all successful anglers contacted outside the trout waters had at least one catfish in their creel! Again, the licensed resident fishermen take the bulk of the sport-caught catfishes.

TABLE 1

PERCENTAGES OF THE TOTAL STATE-WIDE "ROD-AND-REEL" CATCH
FROM THE INLAND WATERS REPRESENTED IN THE TAKE OF VARIOUS FISHES
BY INDIVIDUAL LICENSE CATEGORIES

KIND OF FISH	PERCENTAGE OF STATE-WIDE TOTAL CATCH CONTRIBUTED BY INDIVIDUAL FISHES	TOTAL STATE-WIDE CATCH DISTRIBUTED ACCORDING TO LICENSE CATEGORY OF ANGLERS			
		LICENSED RESIDENT ANGLERS	LICENSED NONRESIDENT ANGLERS	UNLICENSED COUNTY RESIDENTS	UNLICENSED MINORS
Sunfishes*	44.0	24.9	0.8	16.3	1.4
Crappie	19.1	13.9	0.3	4.0	0.4
White Perch	12.6	9.6	0.7	2.0	0.2
Catfishes	10.0	5.1	0.2	4.5	0.2
Largemouth Bass	3.6	3.0	0.3	0.3	< 0.1
Trout (mountain)	3.5	2.5	0.1	0.6	0.3
Carp	1.6	0.7	< 0.1	0.9	< 0.1
White Bass	1.1	1.1	< 0.1	< 0.1	< 0.1
Striped Bass	0.8	0.8	< 0.1	< 0.1	< 0.1
Pickereel	0.8	0.6	< 0.1	0.2	< 0.1
Walleye	0.2	0.2	< 0.1	< 0.1	< 0.1
Smallmouth Bass	0.2	0.2	< 0.1	< 0.1	< 0.1
Shad	0.2	0.2	< 0.1	0.1	< 0.1
All others	2.9	1.5	0.1	1.1	0.2
Percentage of All Fishes Caught State-wide Taken by License Category	100.0	64.4	2.6	30.2	2.8
Percentage of All Anglers Represented by License Category		48	5	39	8

*As used herein, "sunfishes" include only bluegill, redbreast sunfish, rock bass, warmouth, yellow perch, flier, spotted sunfish, and other minor varieties of sunfishes.

CHOICE OF GEAR AND BAITs

Estimates of the Statewide totals respecting the choice of both gear and baits by licensed and unlicensed anglers are best shown by tabulation.

THE ESTIMATED STATEWIDE TOTAL NUMBER OF ANGLERS

		— Licensed —					
Using a	→	Cane	Fly	Casting	2	≥3	Totals for
With:		pole	rod	rod	Lines	Lines	baits
Natural baits		126,030	14,668	96,233	19,323	238	256,492 (63%)
Artificial lures		1,502	15,845	69,146	2,069	0	88,562 (22%)
Both on same trip		2,486	6,631	32,622	17,468	617	59,824 (15%)
Totals for gear		<u>130,018</u>	<u>37,144</u>	<u>198,001</u>	<u>38,860</u>	<u>855</u>	<u>404,878 (100%)</u>
		(32%)	(9%)	(49%)	(10%)	(0.2%)	
		— Unlicensed —					
Using a	→	Cane	Fly	Casting	2	≥3	Totals for
With:		pole	rod	rod	Lines	Lines	baits
Natural baits		229,526	14,621	89,184	16,762	29	350,122 (98%)
Artificial lures		27	385	4,097	55	0	4,564 (1%)
Both on same trip		82	137	1,045	385	0	1,649 (1%)
Totals for gear		<u>229,635</u>	<u>15,143</u>	<u>94,326</u>	<u>17,202</u>	<u>29</u>	<u>356,335 (100%)</u>
		(64%)	(4%)	(26%)	(5%)	(≤0.1%)	
		— All Anglers —					
Using a	→	Cane	Fly	Casting	2	≥3	Totals for
With:		pole	rod	rod	Lines	Lines	baits
Natural baits		355,556	29,289	185,417	36,085	267	606,614 (80%)
Artificial lures		1,529	16,230	73,243	2,124	0	93,126 (12%)
Both on same trip		2,568	6,768	33,667	17,853	617	61,473 (8%)
Totals for gear		<u>359,653</u>	<u>52,287</u>	<u>292,327</u>	<u>56,062</u>	<u>884</u>	<u>761,213 (100%)</u>
		(47%)	(7%)	(38%)	(7%)	(0.1%)	

In summary, there are about three-quarters of a million anglers fishing the public Inland Waters of North Carolina. Approximately one-half of these anglers legally fish without a license or any other form of monetary contribution towards the protection and perpetuation of the fisheries resources they are exploiting.

The "typical angler" of North Carolina's Inland Waters very definitely would be a natural-bait fisherman as 80 percent of all anglers seem addicted to natural bait exclusively and another eight percent use them in conjunction with artificials when the occasion demands. Only one fisherman in eight seems an artificial-lure enthusiast. A regulation restricting the natural-bait fisherman, therefore, may be expected to evoke a much greater reaction than one affecting only the man using artificial lures — if for no other reason than the fact there are so many more potential reactors.

The great preponderance of natural-bait fishermen jeopardizes future implementation of the current philosophy that "fishing-for-fun" with artificial lures will provide the ultimate relief required for the steadily increasing fishing pressures.

THE RESULTS OF A NON-UNIFORM PROBABILITY CREEL SURVEY ON A SMALL STATE-OWNED LAKE

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ABSTRACT

A non-uniform probability creel survey was conducted in conjunction with a stratified two-hour survey. The methods of each survey are described. Analysis of results in terms of fishing pressure showed that there was no statistically significant difference between the two surveys, but the non-uniform probability survey proved to be 38 percent more efficient.

INTRODUCTION

Each year since 1958 and the inception of the State-owned Lakes Investigations project, some type of creel survey work has been conducted on Shanty Hollow Lake, a 106-acre impoundment located in the Pennyroyal Physiographic Region approximately 14 miles northeast of Bowling Green, Kentucky.

From 1958 to 1964, a two-hour stratified creel survey designed by Bernard T. Carter, Director of Kentucky's Division of Fisheries, was used. In 1961, a complete creel census was initiated in which a creel clerk was employed to interview every angler visiting the lake. This complete census was conducted each year from 1961 through 1964, and it was hoped that the resulting data would provide a test of the validity of the two-hour survey. From an analysis of the total fishing pressure data supplied by the complete census and the concurrent partial survey it was determined that approximately 31.3 percent of the anglers visiting the lake were being missed in the complete census (Pfeiffer, 1965). As a result this more expensive and less reliable census was dropped in 1965.

Upon the suggestion and with the guidance of Professor Don W. Hayne of the Southeastern Cooperative Fish and Game Statistics Project, a non-uniform probability survey was designed and conducted in conjunction with the two-hour survey during 1965 to determine if there was a statistically significant difference in the results of the two surveys in terms of fishing pressure.

CREEL SURVEY METHODS

The Two-hour Survey

This survey employed systematically selected sampling periods and began on April 1 and continued through October 31. Interviews were made during a pre-selected two-hour period between 7:00 a.m. and 7:00 p.m., and each day of the week was sampled once during each month of the survey. There was a total of 49 interview and count periods in the survey.

At the beginning of each survey period the creel clerk boated completely around the lake and made a total count of all fishermen. After making the count he began interviewing fishing parties (a fishing party consists of one or more fishermen), trying first to contact two parties who had completed their trips for the day. After making or failing to make these contacts, the clerk moved around the lake interviewing fishing parties until he had boated completely around the lake, making sure he stayed within the two-hour period. The survey was then complete for that day.

To insure that interviews were taken in all areas of the lake, the clerk, after making the total count, began interviewing at the dam, moving one day to the left and the next day to the right. The third and fourth days after making the count, he began interviewing at the farthest point from the dam, moving one day to the left and the next day to the right. The fifth and sixth days he returned to the dam and repeated the procedure.