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COMMERCIAL FISHERIES INVESTIGATIONS
ANNUAL PERFORMANCE REPORT



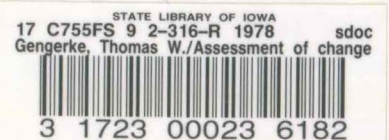
PROJECT NO. 2-316-R : ASSESSMENT OF CHANGE IN COMMERCIAL SIZE
LIMIT OF CHANNEL CATFISH (SEGMENT I)

PERIOD COVERED : 1 OCTOBER , 1977 - 30 SEPTEMBER , 1978

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COMMERCIAL FISHERIES INVESTIGATIONS
ANNUAL PERFORMANCE REPORT

Project No. 2-316-R: Assessment of change in commercial size limit of channel
catfish (Segment 1)
Period Covered: 1 October, 1977 - 30 September, 1978



ANNUAL PERFORMANCE REPORT

COMMERCIAL FISHERIES INVESTIGATIONS

STATE: Iowa TITLE: Assessment of change in commercial
PROJECT NO.: 2-316-R length limit of Channel Catfish
SEGMENT NO.: 1 PERIOD COVERED: 1 October, 1977 through
30 September, 1978

ABSTRACT: Studies to assess the effectiveness of changing the minimum commercial legal length of channel catfish from 13 inches to 15 inches were initiated 1 October, 1977. The change in minimum length limit is necessary to prevent over-exploitation and reduce fluctuations in harvest. Previous studies indicated a two-inch increase in the minimum length limit would result in the catch of fewer but larger fish, effecting an increase in the total weight harvested by 30%. Over 538,000 pounds, with an estimated value of \$280,000, were harvested by Iowa fishermen during 1977. Twenty-four percent of the fishermen marketed 85% of the catch. Four thousand four hundred forty-three fish were examined in commercial markets, and age structure determined from 863 fish. Market demand for larger fish varies by commercial fishermen operation size and is substantial (73%) for fishermen marketing 500-1,000 lbs. per year and retail outlets near the more northern pools. Abnormal fluctuations in river discharge hampered sampling of sub-adult and adult channel catfish. One thousand one hundred eighty-one sub-adult and adult fish were captured and examined. Age determinations were made for 515 of these fish. Small sample size and minimal catch per effort precludes definite analysis of seine data for relative abundance of young-of-the year channel catfish.

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INTRODUCTION

Over-exploitation of channel catfish by commercial fishing has been documented in the Mississippi River (Schoumacher, 1965 and Helms, 1967 and 1969). As a result of the nearly total harvest of channel catfish 13 inches total length or longer, many immature fish are removed via the fishery. The fishery is wholly dependent upon year class abundance and fluctuations in year class strength are reflected during subsequent seasons. Enabling legislation to permit change in the minimum length limit from statutory to administrative rule was submitted but remains inacted through this segment. The proposed legislation allows establishment of a flexible, nonstatutory, size limit by administrative rule. A 15 inch limit would reduce the harvest to about 50% immature fish. The proposal has met with some opposition from commercial fishermen, the major reason for which is the alleged loss of marketable sized fish (13 inches) to restaurants that promote "individual serving" size catfish.

Previous studies indicated that a two-inch increase in the minimum length limit would result in the harvest of fewer but larger fish, effecting an increase in the total weight harvested by about 30%. Year class abundance will increase and stabilize since 50% of the female catfish captured will be mature compared to 10% at present. Assessment of this proposal is essential to regulate exploitation and prevent over-harvest. Following this assessment, necessary adjustments in regulations will be made to facilitate optimal use of the catfish fishery in the upper Mississippi River.

Investigations were initiated on 1 October, 1977 in cooperation with the National Marine Fisheries Service and the Iowa Conservation Commission under authority of PL 88:309. Studies are under contract to continue through 30 September, 1981. This report covers the first segment of study conducted during the period 1 October, 1977 through 30 September, 1978.

RESPONSE OF THE COMMERCIAL CATFISH FISHERY TO AN INCREASED MINIMUM LENGTH LIMIT

A "before and after" comparison of catch statistics, harvest, age composition, size structure and market value of the commercial channel catfish fishery was initiated during this study segment.

CATCH STATISTICS, HARVEST INFORMATION AND MARKET VALUE

Current catch statistics were compiled from mandatory monthly licensed commercial fishermen reports submitted to the Iowa Conservation Commission. Five hundred seventy-three fishermen were licensed to fish the upper Mississippi River during 1977 (Table 1), of which 84% complied with the reporting requirements. Total catch and value of commercial fishes from the upper Mississippi River reported by Iowa fishermen, are shown in Table 2. Channel catfish ranked first in value and third in total weight. Channel catfish were reported in the harvest of 396 fishermen (Table 3). Ninety-four fishermen

Table 1. Number of commercial fishermen and quantity of gear licensed in the upper Mississippi River during 1977.

	Number
Commercial fishermen	573
Set lines (100 hooks per line)	2,636
Seine (lineal feet)	28,500
Gill net (lineal feet)	73,000
Trammel net (lineal feet)	288,400
Entrapment devices	7,629

Table 2. Catch and value of commercial fishes reported by Iowa fishermen from the upper Mississippi River during 1977.

	Weight ^a	Percent	Average Price/lb.	Estimated Value	Percent
Carp	1,034,984	32.2	.07	\$ 72,448.88	10.3
Buffalo	942,427	29.4	.22	207,333.94	29.4
Freshwater Drum	388,133	12.1	.16	62,101.28	8.8
Channel Catfish	538,521	16.8	.52	280,030.92	40.2
Flathead Catfish	88,889	2.8	.52	46,222.28	6.5
Bullhead	35,566	1.1	.18	6,401.88	.9
Shovelnose Sturgeon	14,884	.4	.35	5,209.40	.7
Paddlefish	69,426	2.2	.19	13,190.94	1.9
Carp sucker, Redhorse, & other suckers	63,191	2.0	.05	3,159.55	.4
Other species ^b	16,427	0.5	.02	328.54	.1
Total	3,192,448			\$696,427.61	

^aPounds.

^bIncludes Gar, Mooneye, Goldeye, Eel, Bowfin and other species.

Table 3. Number of fishermen, pounds harvested and estimated value per pool based upon annual catch reports.

	9	10	11	12	13	14	15	16	17	18	19	Total
Size of operation												
< 500 lbs./annum												
Fishermen Reported	14	23	25	17	21	13	13	35	16	29	41	247
harvest	2,206	4,035	4,389	2,879	4,811	2,538	2,560	5,304	2,735	4,369	6,327	42,153
500-1,000 lbs./annum												
Fishermen Reported	3	8	6	2	9	3	2	3	4	5	10	55
harvest	2,056	5,314	4,234	1,644	6,025	2,449	1,845	2,366	2,815	3,313	7,063	39,124
> 1,000 lbs./annum												
Fishermen Reported	11	6	9	7	13	8	1	5	5	15	14	94
harvest	58,452	19,506	20,793	59,996	49,280	22,941	1,300	14,738	29,780	111,538	68,875	457,244
Total												
Fishermen Reported	28	37	40	26	43	24	16	43	25	49	65	396
harvest	62,714	28,855	29,416	64,519	60,116	27,928	5,705	22,408	35,330	119,265	82,265	538,521
Estimated value ^a	32,611.28	15,004.60	15,296.32	33,549.88	31,260.32	14,522.56	2,966.60	11,652.16	18,371.60	62,017.80	42,777.80	280,030.92

^aBased upon 52¢/pound, live weight.

market more than 1,000 lbs. of channel catfish annually. The four most important pools are 18, 19, 12 and 9. Total value of the channel catfish harvest was in excess of \$280,000. Number of fishermen and mean catch per fishermen, by size of operation is shown in Table 4. Mean catch of those fishermen marketing more than 1,000 lbs. of channel catfish was 4,864 lbs. (Table 4). Mean catch for those marketing less than 500 lbs. was 171 lbs. per fishermen. Twenty-four percent of the fishermen marketed 85% of the total catch of catfish (Figure 1). Most fish were captured by entrapment devices (Figure 2).

AGE COMPOSITION AND SIZE STRUCTURE OF THE COMMERCIAL HARVEST

Four thousand four hundred forty-three channel catfish were sampled in commercial markets located in Pools 9, 11, 13 and 18 (Table 5). Samples were taken during the spawning season (May-June) and during late summer (August-September). A minimum sample of 504 fish was taken from each pool during each season. Samples were collected from major markets, landings and from individual fishermen and were representative of a variety of gear types. All fish were measured for total length (TL) to the nearest .1 in. A subsample of five fish from each .5 in. length interval was weighed to the nearest .01 lb. and a pectoral spine removed from each of these fish for age determination (Table 6). Eight hundred sixty-three fish were sampled and all aged fish compiled through SHAD (Mayhew, 1973). Complete analysis of weight-length relationships, calculated length at each annulus and incremental growth computations were not available for this report but will be included in the final report.

MARKET DAMAND FOR LARGE FISH

Market damand for larger fish is being assessed through interviews of commercial fishermen, market operators and retail outlets. The later category was added to the study as a direct response to those fishermen who feel that the "individual serving" market will be lost if the minimum length limit is raised to 15 inches. The interview follows the format outlined in Appendix A. Forty-seven fishermen, market operators and retail outlets were contacted. Seventy-three percent of those fishermen marketing 500-1,000 lbs. annually, prefer fish 15 in. and larger. Almost one-half (45%) did not express strong preferences and would accept "any size" fish. Fishermen marketing more than 1,000 lbs. per year were more evenly divided in their opinions. Fifty-three percent preferred fish 15 in. or slightly larger while 47% preferred fish in the 13-15 in. length range. Only 37% of all fishermen in this category would take "any size" fish. Eight market operators were contacted and while 38% would like "any size" fish, 62% preferred smaller individuals (< 15"). Preferences of retail outlets varied by location. Forty-four percent of those contacted serve fish one pound or larger, usually steaked. These outlets are found near the more northern pools. Forty-four percent also serve .5-1 lb. fish, two per serving. These outlets were found on the more southern pools. Twenty-two percent

Table 4. Number of fishermen, harvest in pounds and mean catch per fisherman in Pools 9-19 during 1977.

		Pool											
		9	10	11	12	13	14	15	16	17	18	19	Total
Size of operation													
< 500 lbs/ annum	Fishermen	14	23	25	17	21	13	13	35	16	29	41	247
	Reported harvest	2,206	4,035	4,389	2,879	4,811	2,538	2,560	5,304	2,735	4,369	6,327	42,153
	Mean catch/ fishermen	158	175	176	169	229	195	197	152	171	151	154	171
500-1,000 lbs/annum	Fishermen	3	8	6	2	9	3	2	3	4	5	10	55
	Reported harvest	2,056	5,314	4,234	1,644	6,025	2,449	1,845	2,366	2,815	3,313	7,063	39,124
	Mean catch/ fishermen	685	664	706	822	669	815	923	789	704	665	706	711
> 1,000 lbs/ annum	Fishermen	11	6	9	7	13	8	1	5	5	15	14	94
	Reported harvest	58,452	19,506	20,793	59,996	49,380	22,941	1,300	14,738	29,780	111,583	68,875	457,244
	Mean catch/ fishermen	5,314	3,251	2,310	8,571	3,791	2,868	1,300	2,948	5,956	7,439	4,920	4,864
Total	Fishermen	28	37	40	26	43	24	16	43	25	49	65	396
	Reported harvest	62,714	28,885	29,416	64,519	60,116	27,928	5,705	22,408	35,330	119,265	82,265	538,521

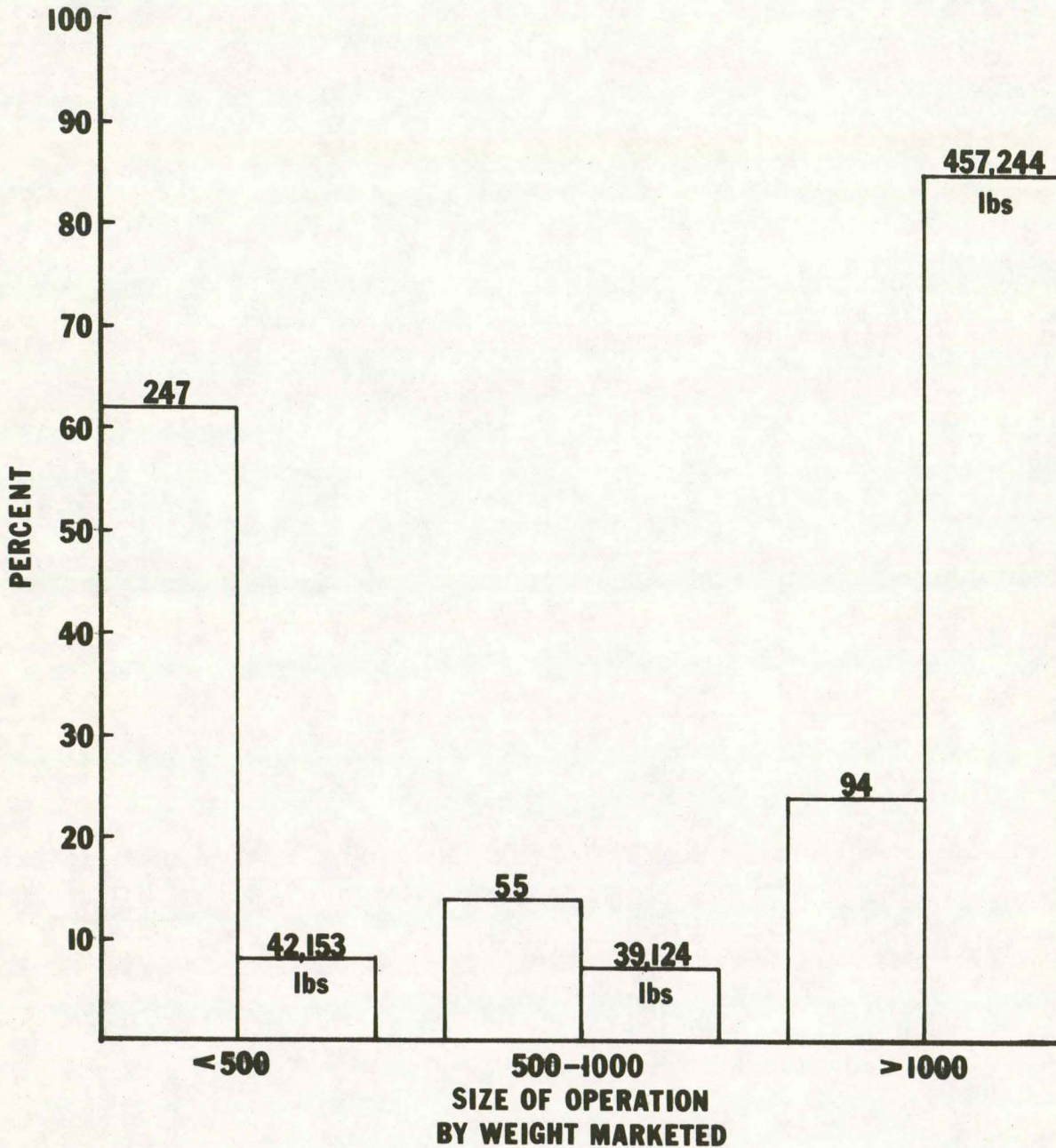


Figure 1. Number of fishermen and reported harvest, by size of operation, as determined by total weight marketed during 1977. Number of fishermen and weight in pounds are shown above bars.

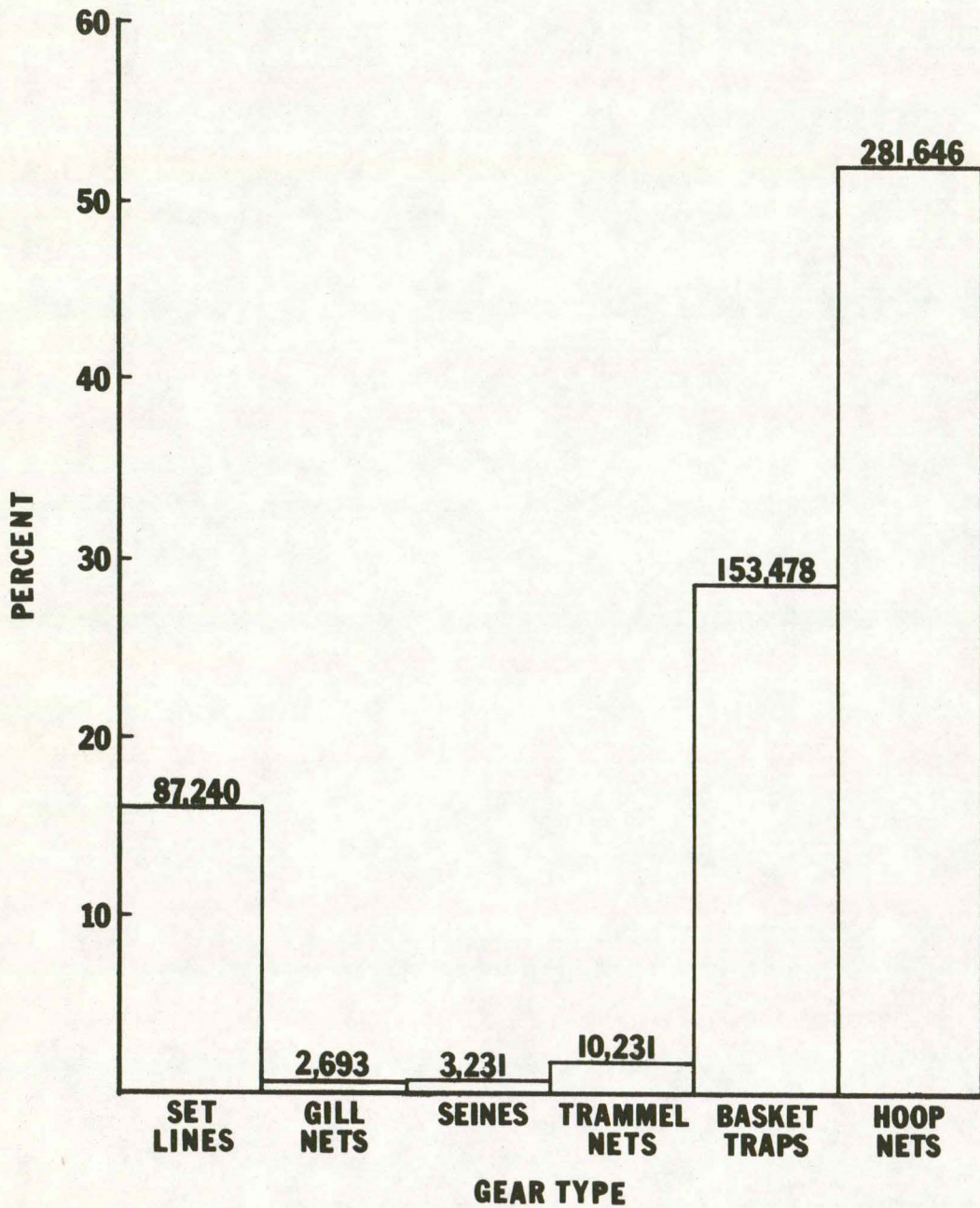


Figure 2. Percentage of channel catfish harvested, by gear type, during 1977. Total weight, in pounds, is shown above bars.

Table 5. Number of channel catfish sampled by pool, source, and sampling period.

Pool	Source	Sampling period			Total
		May	July	September	
9	Experimental	12	29	158	199
	Commercial	542		703	1,245
	Total	554	29	861	1,444
11	Commercial	507		510	1,017
13	Experimental	62	149	376	587
	Commercial	608		518	1,126
	Total	670	149	894	1,713
18	Experimental	87	173	135	395
	Commercial	504		551	1,055
	Total	591	173	686	1,450
Total					
	Experimental	161	351	669	1,181
	Commercial	3,161		2,282	4,443
	Grand Total				5,624

Table 6. Channel catfish sampled for age and weight determinations by pool, source and sampling period.

Pool	Source	Sampling period			Total
		May	July	September	
9	Experimental	12	21	68	101
	Commercial	123		90	213
	Total	135	21	158	314
11	Commercial	143		121	264
13	Experimental	40	84	86	210
	Commercial	111		107	218
	Total	511	84	193	428
18	Experimental	49	71	84	204
	Commercial	87		81	168
	Total	136	71	165	372
Total					
	Experimental	101	176	238	515
	Commercial	464		399	863
	Grand Total				1,378

of all restaurants serve only steaked fish. Apparently the loss of "individual serving" markets is localized.

RESPONSE OF CATFISH POPULATIONS TO CHANGE IN THE MINIMUM SIZE LIMIT

A "before and after" comparison of relative abundance of young-of-the-year catfish populations, growth, year class stability, and survival was initiated during this study segment.

RELATIVE ABUNDANCE AND SIZE STRUCTURE OF YOUNG-OF-THE-YEAR CHANNEL CATFISH

Young-of-the-year channel catfish were sampled during August, September and October in Pools 9, 13, and 18. Samples were taken utilizing a 50-foot small mesh straight seine and a 16-foot semi-balloon otter trawl. Twenty-two fish were captured in 277 seining hauls (Table 7). Mean catch per effort over the three month period was .08. Catch per effort declined from August-October (Figure 3). Two hundred seventeen young-of-the year were captured by trawling (Table 8). Mean catch per effort for trawling over the three month period was 1.7. As with seining, mean catch per effort declined from August-October (Figure 4).

Mean total length of fish captured by trawling was consistently smaller than mean total length of fish captured by seining (Table 9). Fish captured by trawling ranged from 1.7-1.9 in. during August to 2.5-3.0 in. during October. Small sample size precluded extensive analysis of seining date. Mean total length for combined seining and trawling data over all pools ranged from 2.1 in. during August to 3.0 in. during October.

SIZE STRUCTURE, AGE COMPOSITION AND SURVIVAL OF SUB-ADULT AND ADULT CHANNEL CATFISH

Sub-adult and adult catfish populations were sampled with hoop nets (3/4 in. bar mesh) baited with soybean cake and fished two in a string. Sampling effort was 48 net days per pool each month during May, July and September. Samples were collected from Pools 9, 13 and 18. All captured fish were measured for total body length to the nearest .1 in. and a randomly selected subsample of five fish in each .5 in. interval weighed to the nearest .01 lb. A pectoral spine was removed from each of these fish for aging.

One thousand one hundred eight-one fish were sampled in this manner (Table 5). Abnormal fluctuations in discharge were adverse to sampling. This was apparent in experimental netting success and reported harvest from commercial fishermen. Five hundred fifteen fish were aged and growth statistics compiled through SHAD. Complete analysis of weight-length relationships,

Table 7. Number of seine hauls, catch and catch per effort (C/E) of young-of-the-year (YOY) channel catfish in Pools 9, 13 and 18 during August, September and October, 1978.

Pool	Month	Seine Hauls	Catch of YOY	C/E
9	August	34	2	.06
	September	27	2	.07
	October	36	0	--
13	August	36	1	.03
	September	34	2	.06
	October	30	0	--
18	August	29	11	.38
	September	26	3	.12
	October	25	1	.04
Total		277		
Mean				.08

Table 8. Number of trawl hauls, catch and catch per effort (C/E) of young-of-the-year (YOY) channel catfish in Pools 9, 13 and 18 during August, September and October, 1978.

Pool	Month	Trawl Hauls	Catch of YOY	C/E
9	August	15	9	0.6
	September	15	19	1.3
	October	15	7	0.5
13	August	16	44	2.8
	September	16	39	2.4
	October	16	7	0.4
18	August	15	51	3.4
	September	15	32	2.1
	October	15	9	0.6
Total		128		
Mean				1.7

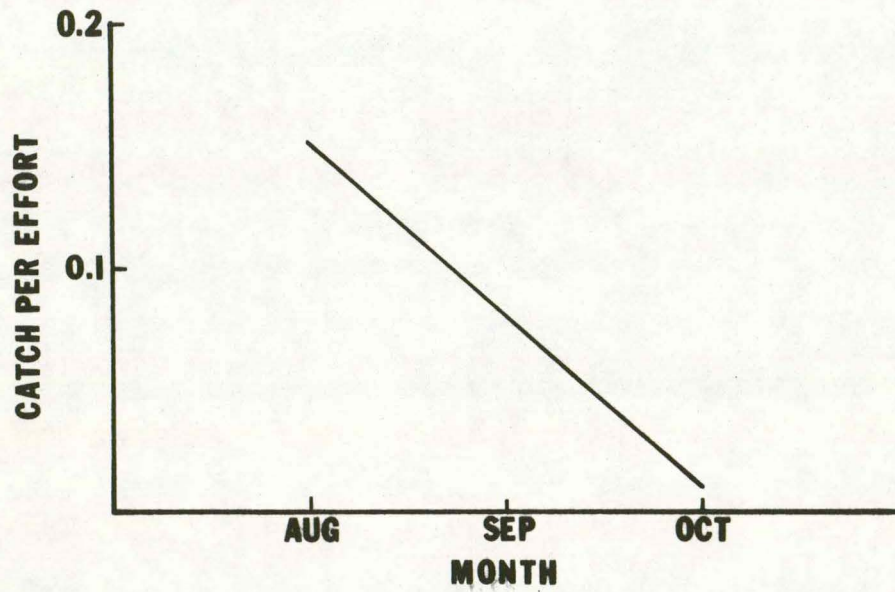


Figure 3. Mean C/E, by month, for YOY channel catfish taken by seining in Pools 9, 13 and 18 during 1978.

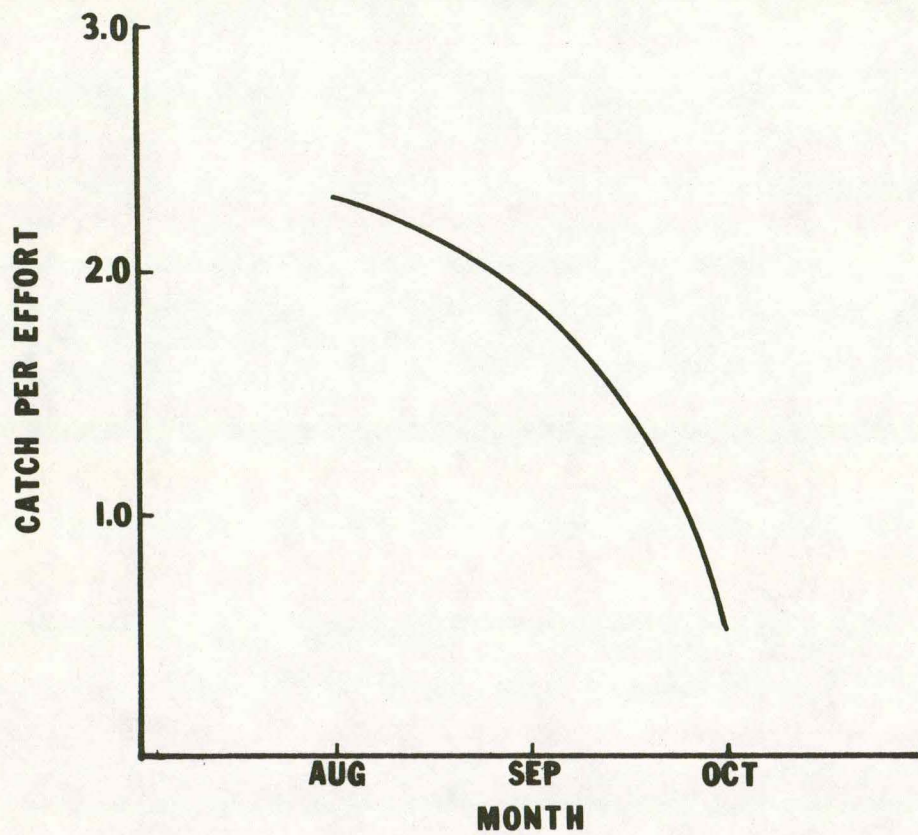


Figure 4. Mean C/E, by month, for YOY channel catfish taken by trawling in Pools 9, 13 and 18 during 1978.

Table 9. Mean total length (inches) of young-of-the-year channel catfish captured by trawling and seining in Pools 9, 13 and 18 during August, September and October, 1978.

	Pool	August	Month September	October	Mean
Seining					
	9	2.5 (2) ^a	3.1 (2)	-- (0)	2.8
	13	2.4 (1)	2.7 (2)	-- (0)	2.6
	18	2.0 (11)	3.6 (3)	3.0 (1)	2.9
	Mean	2.1	3.2	3.0	2.8
	Total	(14)	(7)	(1)	
Trawling					
	9	1.9 (9)	2.3 (19)	3.0 (7)	2.4
	13	1.9 (43)	2.7 (39)	2.5 (7)	2.4
	18	1.7 (51)	2.7 (32)	2.8 (9)	2.4
	Mean	1.8	2.6	2.8	2.4
	Total	(103)	(90)	(23)	

^aSample size.

calculated length at each annulus and incremental growth computations will follow the same format as that accomplished for commercial samples. Estimates of survival are dependent upon age frequency distributions which are being processed through the age and growth computer program.

RECOMMENDATIONS

Seining as a method of measuring relative abundance of young-of-the-year channel catfish should be discontinued. Small sample size and related catch per effort precludes any meaningful analysis using this collection method.

When enabling legislation for changing minimum length limits is received from the current General Assembly, the "after" portion of Jobs Nos. 1 and 2 will be adequately described by October, 1980. Assessment of potential equilibrium yield, using the Beverton and Holt yield model, will be initiated during 1979.

If enabling legislation is not received from the current General Assembly the project should be terminated.

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APPENDIX A

CHANNEL CATFISH STUDIES

Commercial Fishermen/Market/Retail Outlet

NAME: _____

ADDRESS: _____

PHONE: _____

POOL: _____

Reported weight marketed per year: _____

Value per pound:

Received: _____

Paid: _____

Size of Fish preferred: _____
(condition-whole, dressed, etc.)