IOWA CONSERVATION COMMISSION

FISHERIES SECTION

FEDERAL AID TO FISH RESTORATION

ANNUAL PERFORMANCE REPORT

MISSISSIPPI RIVER INVESTIGATIONS

Project No. F-109-R-1

Mississippi River Investigations

Study No. 1. An Evaluation of Largemouth Bass Populations in the Upper Mississippi River.

Job No. 1: Largemouth bass stock assessment
Job No. 3: Largemouth bass habitat requirements

Study No. 2. An Evaluation of the Effects of a Change in Commercial Harvest Regulations on the Channel Catfish Population Inhabiting the Upper Mississippi River

Job No. 1: Channel catfish population assessment
Job No. 2: Assessment of young-of-the-year channel catfish abundances

PERIOD COVERED: 1 JAN., 1985 - 31 DEC., 1985

FEDERAL AID TO FISH RESTORATION

ANNUAL PERFORMANCE REPORT

MISSISSIPPI RIVER INVESTIGATIONS

PROJECT NO. F-109-R

Study No. 1: An Evaluation of Largemouth Bass Populations in the Upper Mississippi River

Job 1. Largemouth bass stock assessment
Job 3. Largemouth bass habitat requirements

Study No. 2: An Evaluation of the Effect of a Change in Commercial Harvest Regulations on the Channel Catfish Populations Inhabiting the Upper Mississippi River

Job 1. Channel catfish population assessment
Job 2. Assessment of young of the year channel catfish abundance

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Date Prepared: January 1986

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Don Bonneau 3/17/86

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ANNUAL PERFORMANCE REPORT

RESEARCH PROJECT SEGMENT

STATE:	Iowa	NAME:	An Evaluation of Largemouth Bass Populations in the Upper Mississippi River
PROJECT NO.:	F-109-R		
STUDY NO.:	1		
JOB NO.:	1	TITLE:	Largemouth bass stock assessment

Period Covered: 1 January 1985 through 31 December 1985

ABSTRACT: Over 1,800 largemouth bass were captured, marked with Floy tags and released in the five study areas. Scales were removed from 393 fish for age and growth determination. Population estimates were obtained for three of the five study areas. Density estimates of largemouth bass $\geq$ 9 inches ranged from 12 to 33 fish/acre and standing stocks ranged from 14.3 to 41.0 lbs/acre. Population estimates for two study areas were not calculated because high river stages and current velocities hampered sampling.

JOB 1 OBJECTIVE

To estimate the abundance, standing stock, age, growth and total mortality of largemouth bass in selected areas of Pools 9, 10, 12 and 13.

INTRODUCTION

Largemouth bass is an important game fish inhabiting Upper Mississippi River backwater complexes and is highly sought by anglers. The mean weight of largemouth bass creeled by anglers fishing the Upper Mississippi River in 1962 and 1967 was 1.22 and 1.30 lbs, respectively (Nord, 1964 and Wright, 1970). In contrast, Ackerman (1978) found the mean weight of harvested bass was 0.70 lbs in Pool 10 while Van Vooren (1983) found the mean weight was 0.65 lbs for bass harvested from Pool 17. These figures indicate a 50% reduction in the mean weight of angler harvested bass has occurred. This decrease in mean weight, the 88% increase in angler preference for largemouth bass by Iowa anglers between 1975 and 1981 (Anonymous, 1982) and the nearly 40% exploitation rate reported by Van Vooren (1983) cause concern relative to over-exploitation of the species. High angler pressure on largemouth bass is also reflected in fishing diaries submitted annually by Iowa's organized bass anglers. One-third of their entire fishing effort is expended on the Mississippi River and Pools 9-12 received 73% of that effort (Iowa Conservation Commission, unpublished data). Presently, information on the population dynamics of largemouth in Pools 9-15 is insufficient to make management decisions. A better understanding of natural mortality, exploitation and growth of largemouth bass inhabiting Pools 9-15 is needed to determine if various management strategies would significantly benefit the largemouth bass population size structure.

METHODS AND PROCEDURES

Largemouth bass were collected September, October and November with pulsed DC and AC electrofishing gear. All largemouth bass $\geq$ 9 inches were measured for total length to the nearest .1 inch, weighed to the nearest .1 lb, and a serialized Floy tag was inserted below the dorsal fin. The left pelvic fin on each Floy tagged bass was excised to determine tag loss. Subsequent mark and recapture information (using the Schumacher-Eschmeyer estimator (Ricker, 1975) was used to obtain numerical population estimates of bass $\geq$ 9 inches. Lengths of bass smaller than 9 inches were also recorded to allow computation of proportional stock density (PSD).

At each study area, scales were removed from the first 12 fish sampled from each one inch length group. Scale samples were taken from bass 8.0 inches and larger. Scales were mounted on gummed paper and heat pressed on acetate cards for age-growth determination. A microprojector was used to magnify scale imprints 40X and annuli were counted and measurements made through the anterior scale margin. Scales were collected in the fall; thus, an annulus was assumed on the scale edge.

Weight-length relationships were computed independently for each study area by the transformed linear regression model:

$$\log_{10} W = a + b \log_{10} TL$$

where W = weight in ounces
TL = total length in inches
a & b = mathematical constants

The number of largemouth bass in each age group was estimated by extrapolating aged subsamples in proportion to the length-frequency distribution. Instantaneous mortality was estimated directly from largemouth bass age structure from the modal age in the catch curve to the oldest age group. The analysis from Ricker (1975):

$$Z = \frac{(\log_e N_{t+1} - \log_e N_t)}{t}$$

where Z = instantaneous mortality rate
N = number of fish
t = the age group

The equation measures the geometric change in the number of fish in two successive age groups. Annual mortality (A) was obtained directly from a table of exponential functions (Ricker, 1975). A second mortality estimate was obtained by plotting numerical age composition on age. A straight line was fitted to the data by simple linear regression where the slope (b) represented instantaneous mortality:

$$\log_e Y = a + bX$$

where Y = the number of fish in any age group
X = age
a = mathematical constant
b = instantaneous mortality

Population biomass of fish $\geq$ 9 inches was determined by multiplying the mean weight of fish in a length group by the estimated numerical abundance of fish in that length group. The abundance of fish in each length group was obtained from proportions established in the length frequency distribution.

THE STUDY AREAS

Minnesota Slough, the study area in Pool 9, is bounded on the north by the Iowa-Minnesota state line and on the south by the mouth of the Upper Iowa River (River mile 671.3-673.9). Minnesota Slough is a large backwater slough that has low to moderate current velocities and several connected side channels and shallow lakes (Figure 1). The habitat consists of logs and brush in the slough and weed beds in the shallow lakes. The study area is about 3.1 miles long, 0.25-0.40 miles wide and encompasses about 525 acres.

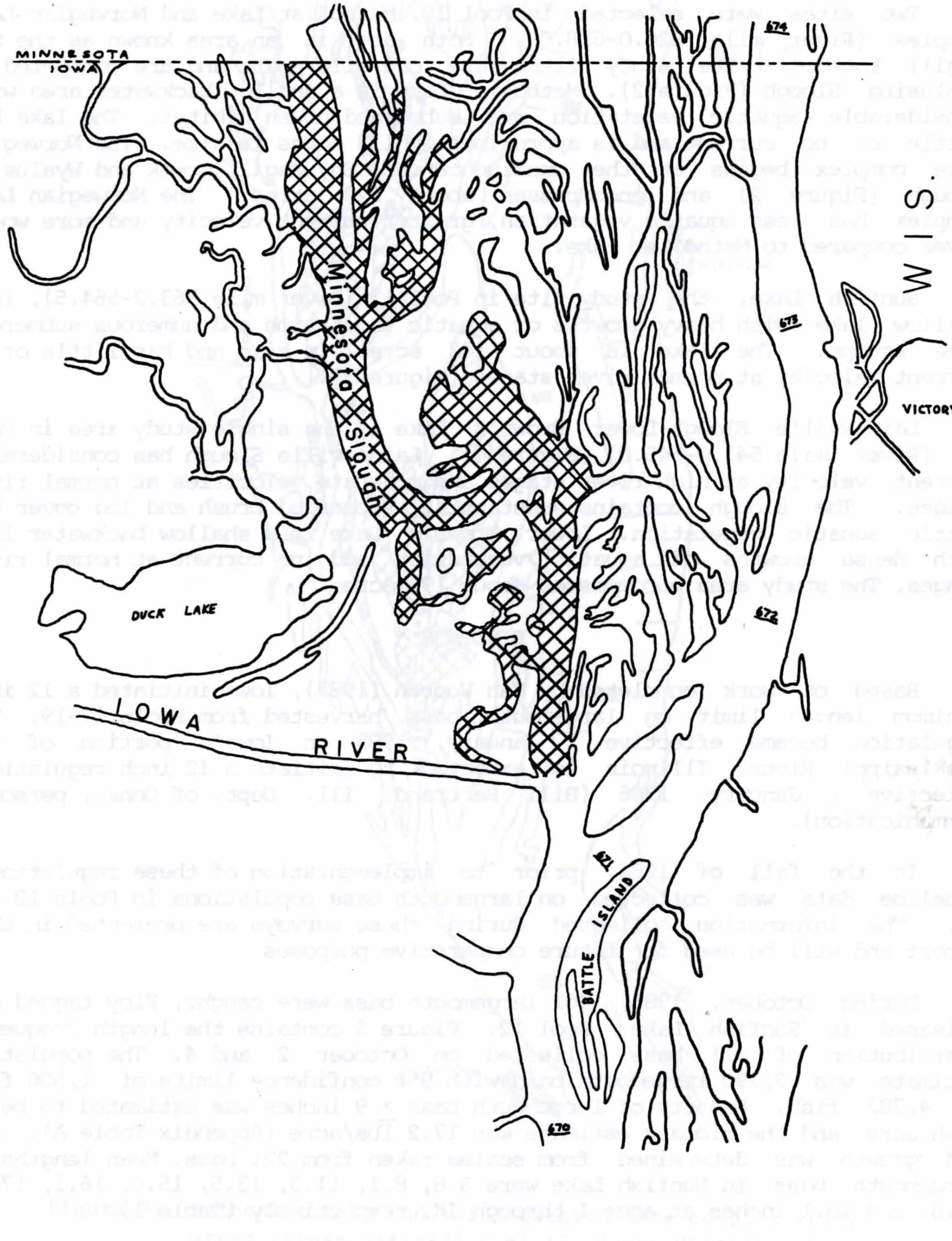

Figure 1. The Minnesota Slough study area (cross hatched) Pool 9, Upper Mississippi River.

Two sites were selected in Pool 10, Methodist Lake and Norwegian Lake complex (River mile 626.0-628.0). Both are in an area known as the Sny Magill bottoms. The study sites are one mile apart and are connected by Wyalusing Slough (Figure 2). Methodist Lake is a shallow backwater area with considerable aquatic vegetation and submerged brush habitat. The lake has little or no current and is approximately 113 acres in size. The Norwegian Lake complex begins at the confluence of Sny Magill Creek and Wyalusing Slough (Figure 2) and encompasses about 128 acres. The Norwegian Lake complex has less aquatic vegetation, greater current velocity and more woody cover compared to Methodist Lake.

Sunfish Lake, the study site in Pool 12 (River mile 563.2-564.5), is a shallow lake with heavy growths of aquatic vegetation and numerous submerged tree stumps. The lake is about 143 acres in size and has little or no current velocity at normal river stages (Figure 3).

Lainesville Slough-Lower Brown's Lake is the single study area in Pool 13 (River mile 541.0-545.0) (Figure 4). Lainesville Slough has considerable current velocity at high river stages and moderate velocities at normal river stages. The slough contains substantial submerged brush and log cover but little aquatic vegetation. Lower Brown's Lake is a shallow backwater lake with dense growths of aquatic vegetation and no current at normal river stages. The study area encompasses about 195 acres.

FINDINGS

Based on work completed by Van Vooren (1983), Iowa initiated a 12 inch minimum length limit on largemouth bass harvested from Pools 12-19. The regulation became effective 1 January, 1985 on Iowa's portion of the Mississippi River. Illinois is expected to initiate a 12 inch regulation effective 1 January, 1986 (Bill Bertrand, Ill. Dept. of Cons., personal communication).

In the fall of 1984, prior to implementation of these regulations, baseline data was collected on largemouth bass populations in Pools 12 and 13. The information collected during these surveys are presented in this report and will be used for future comparative purposes

During October, 1984, 401 largemouth bass were caught, Floy tagged and released in Sunfish Lake, Pool 12. Figure 5 contains the length frequency distribution of all bass collected on October 2 and 4. The population estimate was 2,290 largemouth bass with 95% confidence limits of 1,506 fish to 4,783 fish. Density of largemouth bass $\geq$ 9 inches was estimated to be 16 fish/acre and the biomass estimate was 17.2 lbs/acre (Appendix Table A). Age and growth was determined from scales taken from 221 bass. Mean lengths of largemouth bass in Sunfish Lake were 3.8, 8.1, 11.3, 13.5, 15.0, 16.1, 17.3, 18.0, and 18.1 inches at ages I through IX, respectively (Table 1).

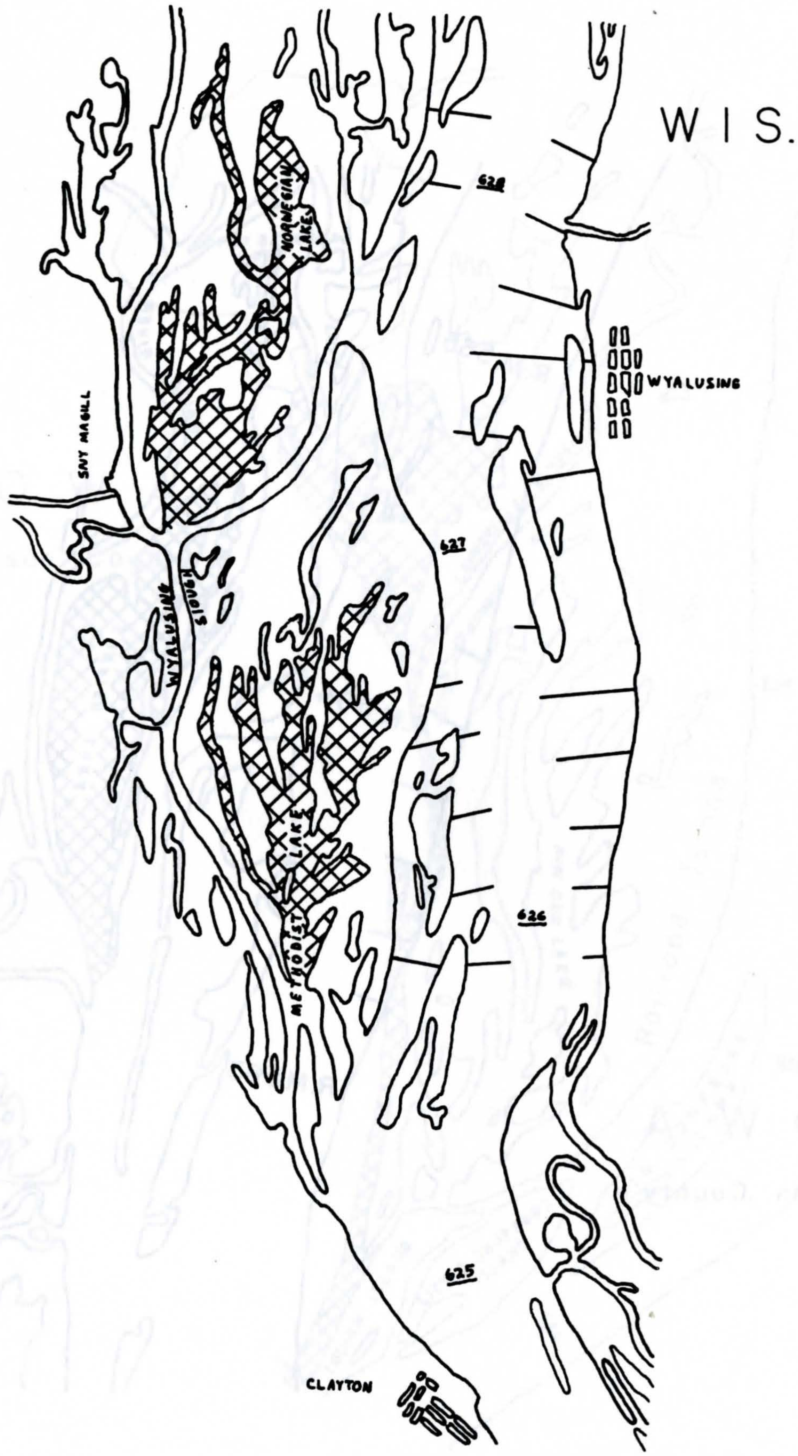

Figure 2. Methodist Lake and the Norwegian Lake complex study areas (cross hatched) Pool 10, Upper Mississippi River.

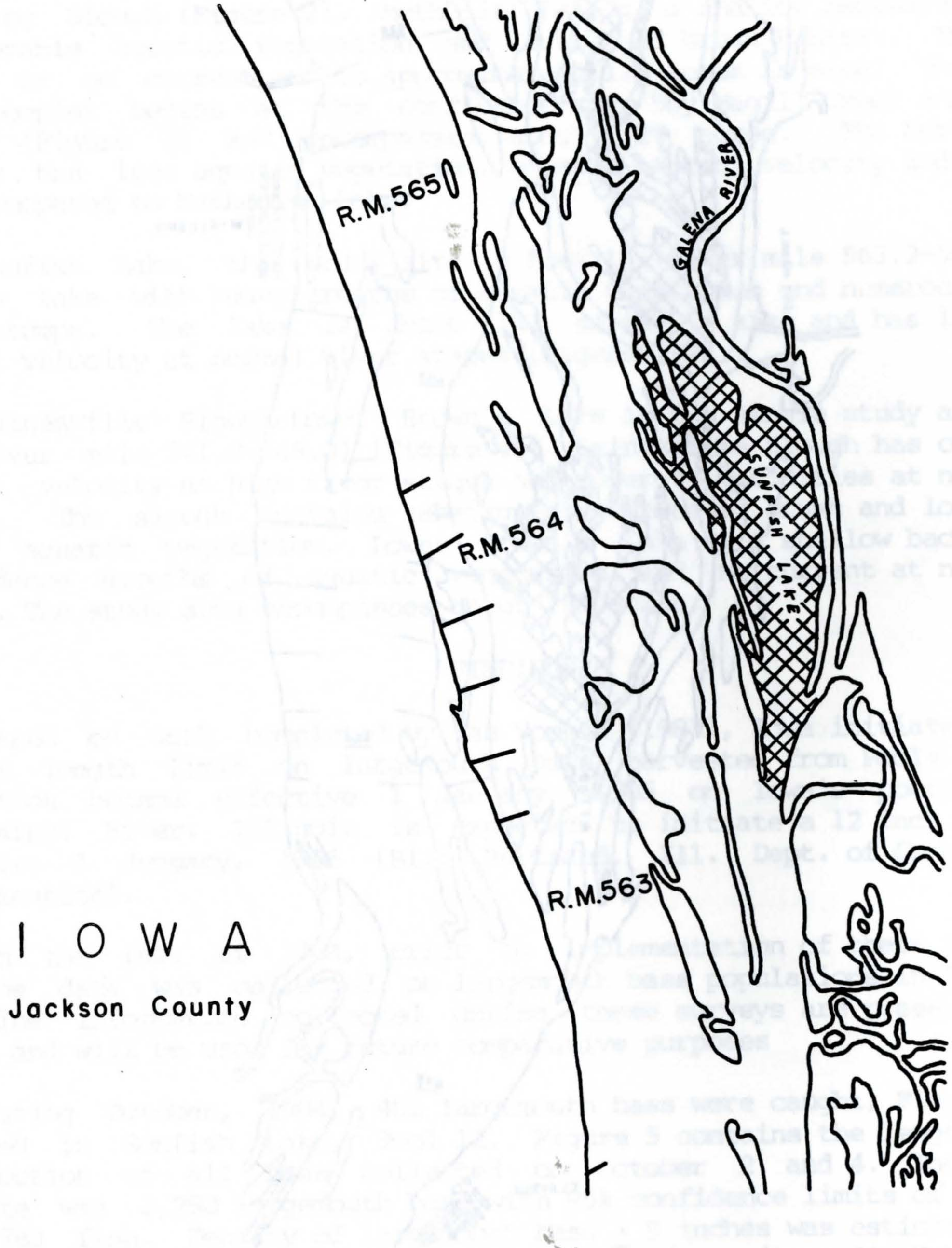

Figure 3. The Sunfish Lake study site (cross hatched area), Pool 12, Upper Mississippi River.

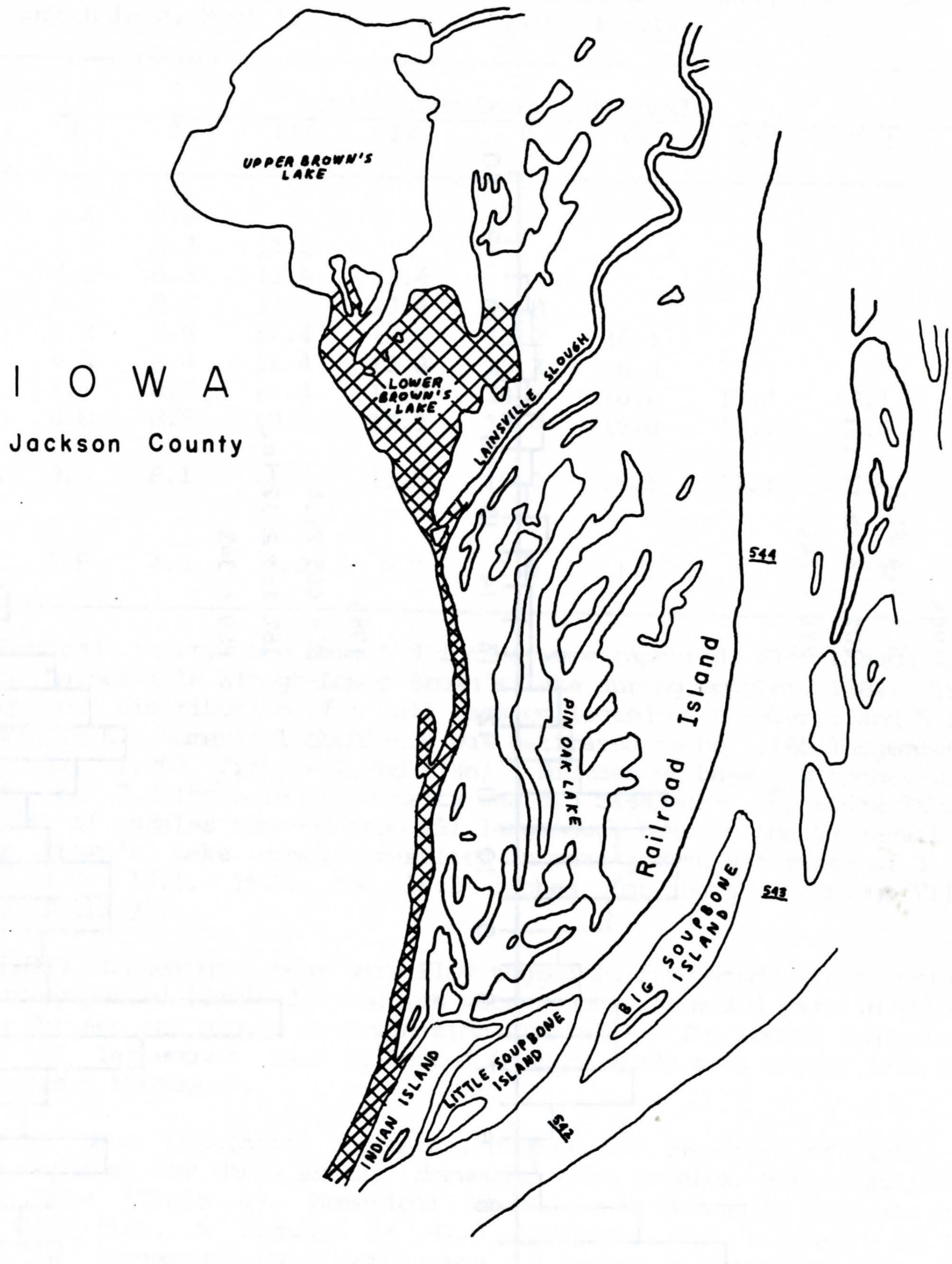

Figure 4. The Lainesville Slough-Lower Brown's Lake study site (cross hatched area), Pool 13, Upper Mississippi River.

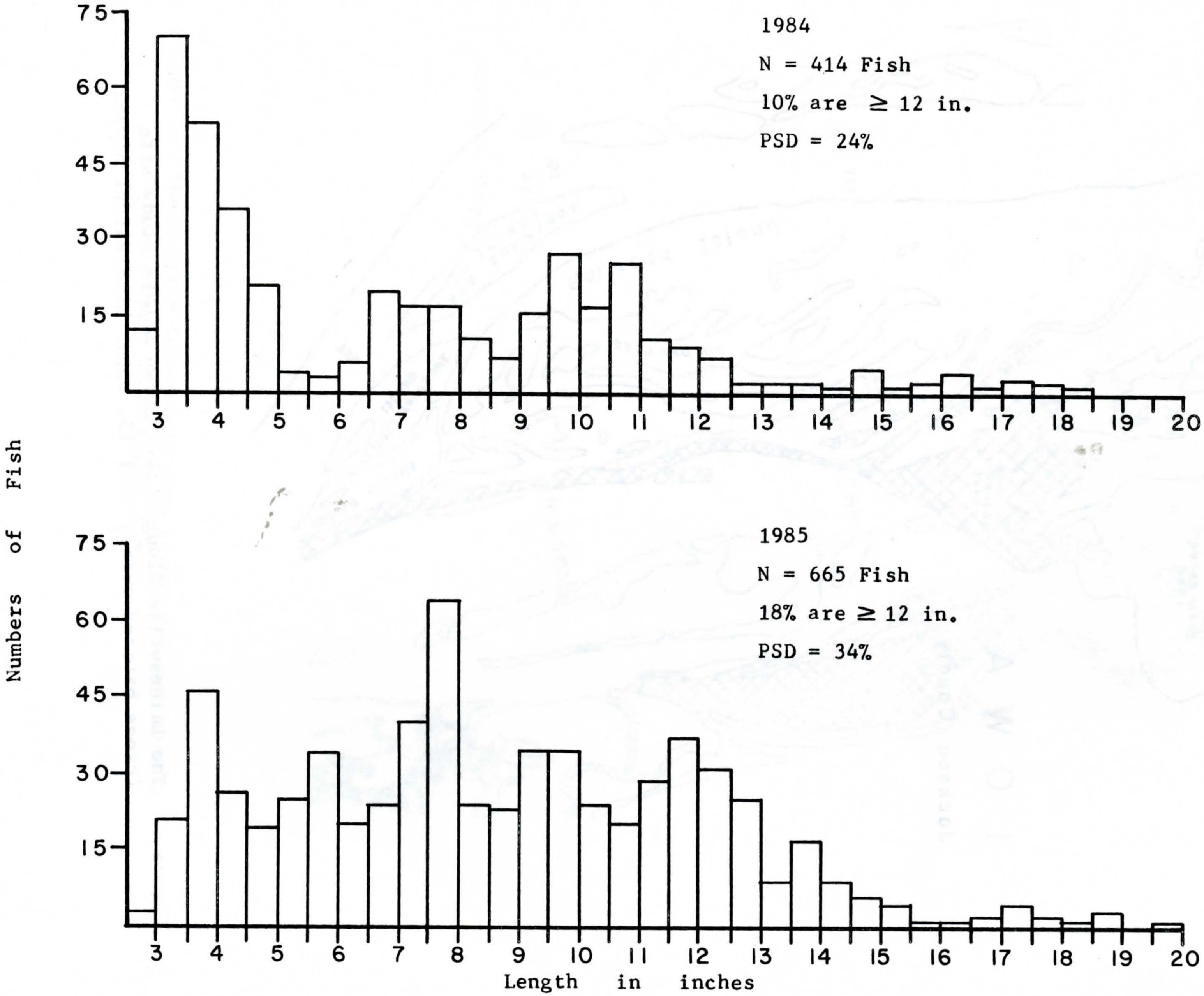

Figure 5. Length frequency distribution of largemouth bass collected in Sunfish Lake, Pool 12, Upper Mississippi River.

Table 1. Summary of the average calculated lengths and increments for each year of life for largemouth bass collected in October, 1984 from Sunfish Lake, Pool 12, Upper Mississippi River.

Age Group	N	Calculated Length at Annulus I	II	III	IV	V	VI	VII	VIII	IX
I	64	3.8								
II	77	3.4	7.8							
III	19	4.2	8.3	11.2						
IV	24	4.1	8.3	11.4	13.4					
V	13	4.1	8.0	11.0	13.4	14.8				
VI	16	4.2	8.6	11.4	13.6	15.2	16.1			
VII	4	4.3	8.4	11.4	13.8	15.3	16.4	17.2		
VIII	3	3.9	8.5	11.4	13.0	14.6	16.0	17.4	18.1	
IX	1	4.8	8.5	10.3	12.9	14.4	15.8	17.1	17.6	18.1
Mean Length		3.8	8.1	11.3	13.5	15.0	16.1	17.3	18.0	18.1
Mean Increment		3.8	4.3	3.2	2.2	1.5	1.1	1.2	0.7	0.1

Five hundred thirty one bass $\geq$ 9 inches were captured, Floy tagged and released in Lainesville Slough-Lower Brown's Lake during October, 1984. The length frequency distribution for all bass collected on October 3 and 5 is shown on Figure 6. Numerical abundance was estimated to be 1,665 largemouth bass (95% C.I., 1,283 fish - 2,368 fish). Biomass of bass $\geq$ 9 inches was estimated to be 7.0 lbs/acre and density was 8.5 bass/acre (Appendix Table A). Analysis of scales removed from 251 largemouth bass in the Lainesville Slough-Lower Brown's Lake complex resulted in mean growth estimates of 3.5, 7.5, 10.6, 13.0, 14.5, 15.7, and 18.3 inches for ages I through VII, respectively (Table 2).

Over 1,800 largemouth bass were Floy tagged in five study areas during the 1985 survey period (Table 3). Scales were removed from 393 bass in three study areas for age and growth determination (Table 3). The length frequency distribution of largemouth bass collected in each study area during 1985 is shown in Figures 5 through 9.

Largemouth bass population estimates, biomass and densities of fish $\geq$ 9 inches were obtained for three areas: Norwegian Lake complex, Methodist Lake and Sunfish Lake (Table 4). Numerical abundance in Norwegian Lake was an estimated 4199 fish, a biomass of 41.0 lbs/acre, and a density of 33 fish/acre. The largemouth bass population $\geq$ 9 inches in Methodist Lake was estimated to be 1344 fish, biomass of 14.3 lbs/acre, and density of 12 fish/acre (Appendix Table A). Sunfish Lake had an estimated bass population of 2,299 fish, a biomass of 17.0 lbs/acre and a density of 16 fish/acre. The Sunfish Lake data in 1985 were similar to data from 1984 (Appendix Table A).

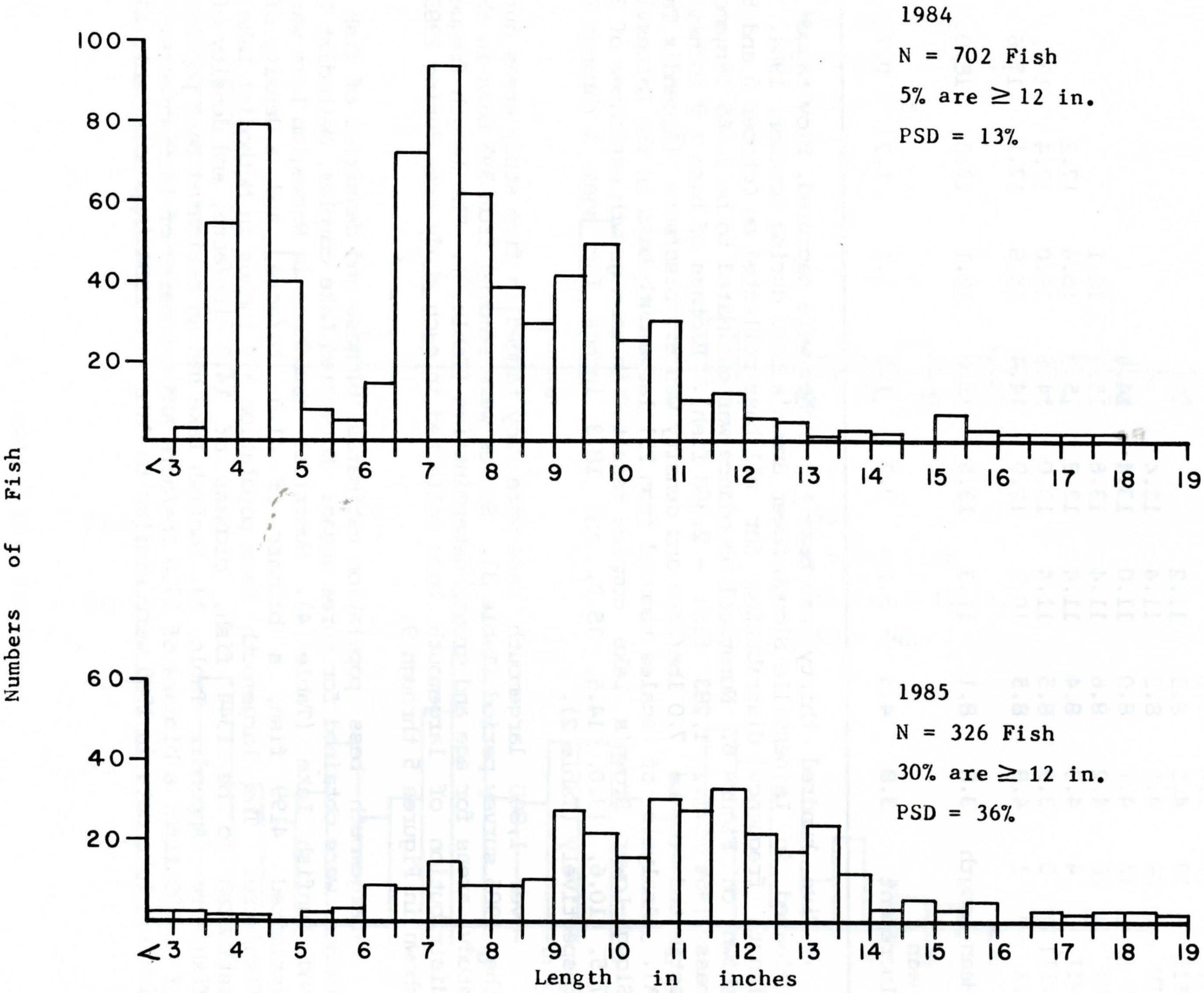

Figure 6. Length frequency distribution of largemouth bass collected in Lainesville Slough-Lower Brown's Lake complex, Pool 13, Upper Mississippi River.

Table 2. Summary of the average calculated lengths and increments for each year of life for largemouth bass collected in October, 1984 from Lainesville Slough-Lower Brown's Lake complex, Pool 13, Upper Mississippi River

Age Group	N	Calculated Length at Annulus I	II	III	IV	V	VI	VII
I	55	3.5						
II	139	3.4	7.4					
III	16	4.3	8.9	10.9				
IV	12	3.9	7.9	10.7	12.9			
V	17	3.8	7.5	10.5	12.8	14.7		
VI	11	3.8	7.0	10.2	12.5	14.1	15.6	
VII	1	3.1	7.1	11.8	13.6	15.4	16.5	18.3
Mean Length		3.5	7.5	10.6	13.0	14.5	15.7	18.3
Mean Increment		3.5	4.0	3.1	2.4	1.5	1.2	2.6

Table 3. The number of largemouth bass Floy tagged, the number recaptured, and the number of scale sample collected in the Upper Mississippi River, 1985.

Area	Pool	No. Tagged	No. Recaptured	Percent Recaptured	No. Bass Aged
Minnesota Slough	9	642	26	4	138
Norwegian Lake	10	325	13	4	126
Methodist Lake	10	358	40	11	129
Sunfish Lake	12	302	18	6	-
Lainesville Slough-Lower Brown's Lake	13	255	2	<1	-

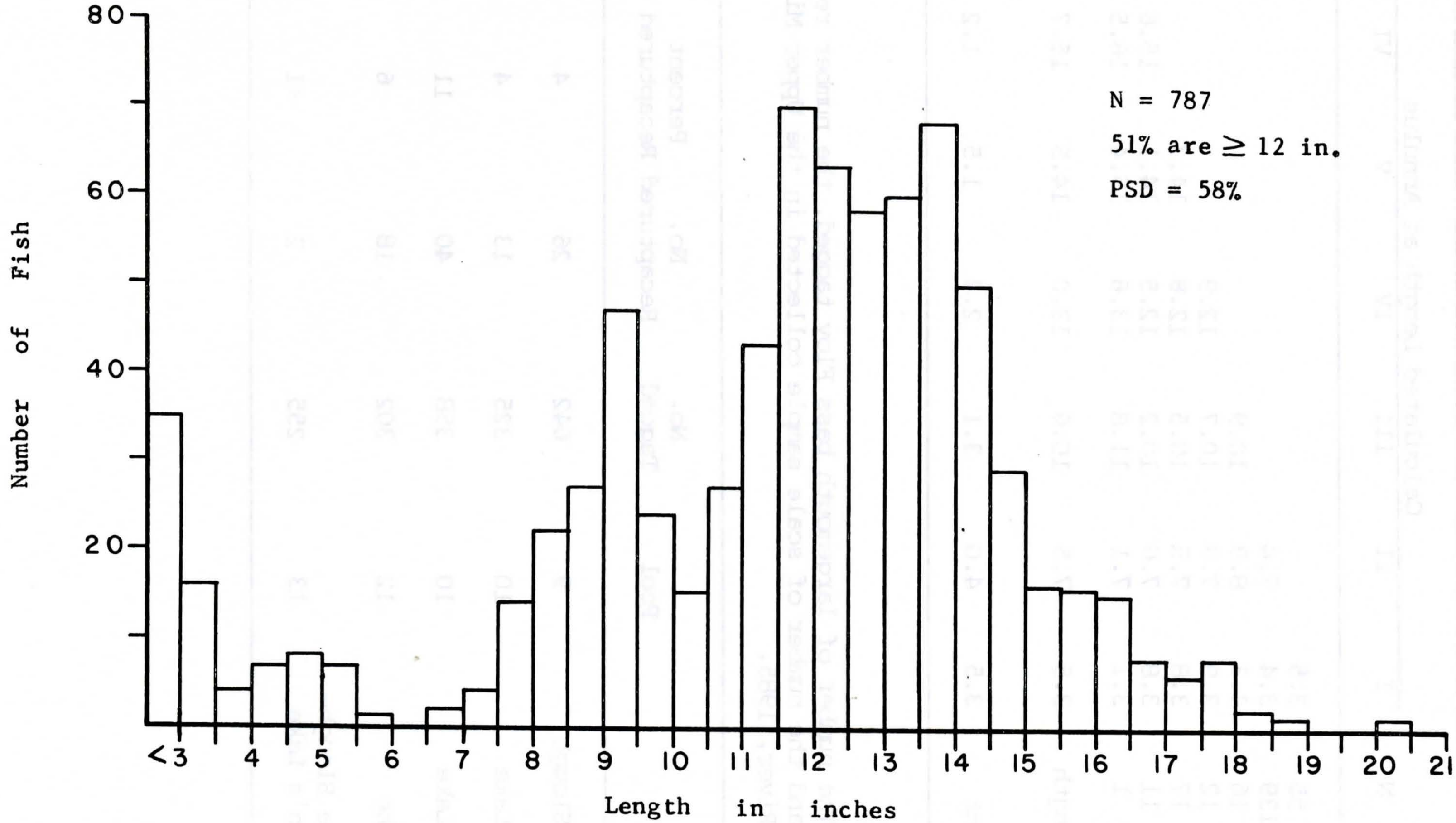

Figure 7. Length frequency distribution of largemouth bass collected in Minnesota Slough, Pool 9, Upper Mississippi River, 1985.

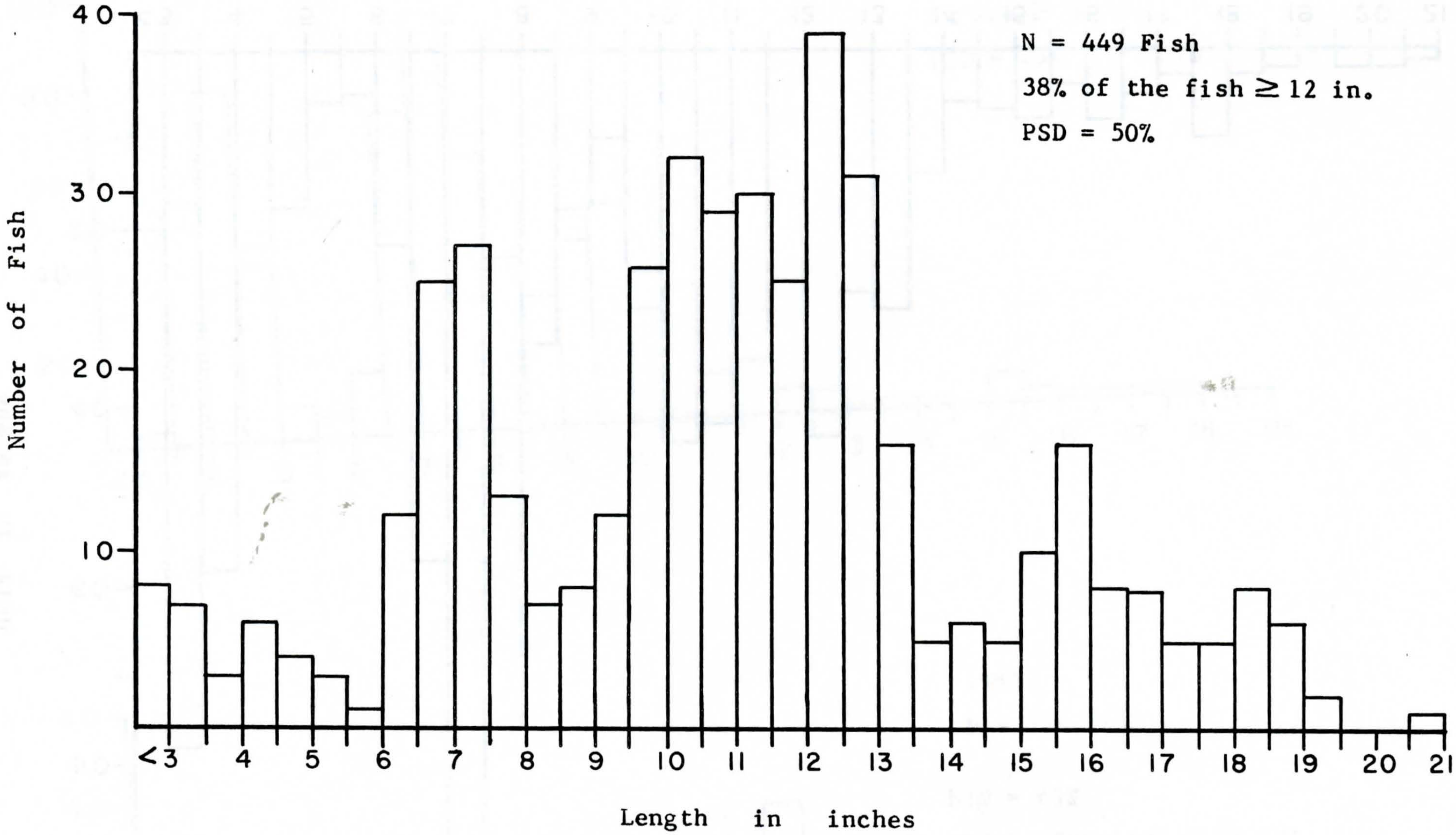

Figure 8. Length frequency distribution of largemouth bass collected in the Norwegian Lake complex, Pool 10, Upper Mississippi River, 1985.

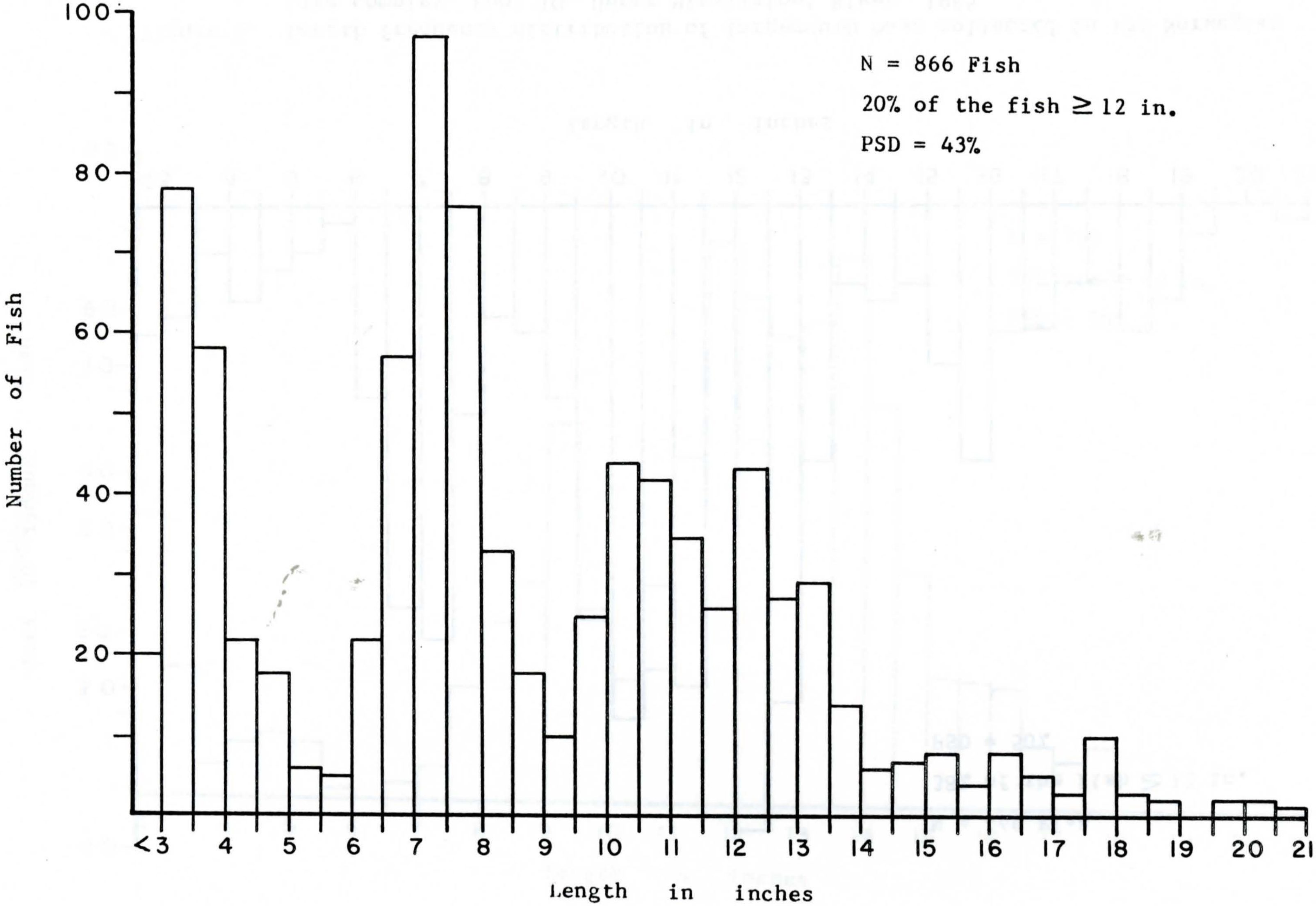

Figure 9. Length frequency distribution of largemouth bass collected in Methodist Lake, Pool 10, Upper Mississippi River 1985.

Table 4. Estimates of largemouth bass $\geq$ 9 inches in total length in five study areas of the Upper Mississippi River, 1984 and 1985.

Area	Population Estimate	C.I.[a] Lower	C.I.[a] Upper
Minnesota Slough (Pool 9)			
1985	None	-	-
Norwegian Lake (Pool 10)			
1985	4,199	1,759	Inf.
Methodist Lake (Pool 10)			
1985	1,344	937	2,375
Sunfish Lake (Pool 12)			
1984	2,290	1,506	4,783
1985	2,299	1,673	3,677
Lainesville Slough-Lower Brown's Lake (Pool 13)			
1984	1,665	1,283	2,368
1985	None	-	-

[a]95% confidence interval.

Extremely high river stages during October interrupted sampling and population estimates from two study areas were not calculated (Figure 10). High water scattered largemouth bass over newly inundated shorelines and islands. Catch rates dropped to near zero in the Minnesota Slough and the Lainesville Slough-Lower Brown's Lake complex because of the high water velocities experienced during the high river stages. Nearly 30 days elapsed between the first and second tagging efforts in Minnesota Slough. During this period, anglers returned several Floy tags from bass caught outside the study area.

DISCUSSION OF FINDINGS

Scales collected during this project segment will be analyzed during the winter and included in the next segment report.

Mortality estimates will be made when scale aging is completed and included in the next segment report.

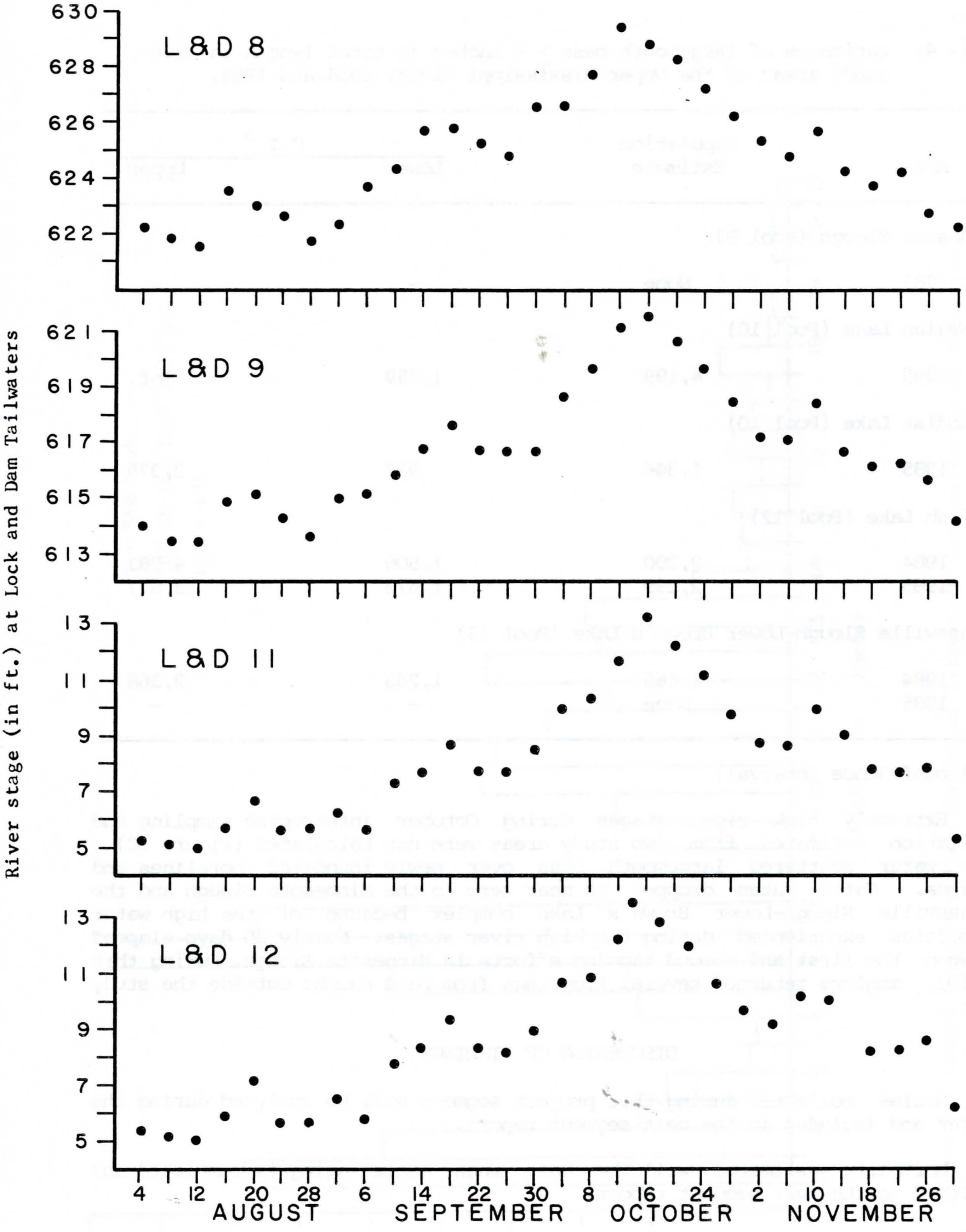

Figure 10. River stage in tailwaters of Upper Mississippi River Locks and Dams, 1985.

RECOMMENDATIONS

1. Tag returns indicated some fish moved out of the study area during high water periods; therefore, to reduce bias, population estimates should be obtained in the shortest time period possible and not during perods of high flow.

2. This study should be extended one year. Unseasonably high river stages encountered during the fall survey period negated sampling efforts on Minnesota Slough and Lainesville Slough-Lower Brown's Lake complex.

3. The creel survey which was scheduled to begin during Segment 2 of the study will be delayed one year because too few bass were tagged in the Minnesota Slough study area.

LITERATURE CITED

Ackerman, G. L. 1978. Exploitation of largemouth bass in the Mississippi River. In Fish. Manage. Branch, Job Comp. Rpt., Fish. Sec., Iowa Cons. Comm., Des Moines, IA.

Anonymous. 1982. Fishing in Iowa. Iowa Cons. Comm., Des Moines, IA.

Nord, R. C. 1964. The 1962-1963 sport fishery survey of the Upper Mississippi River. Contribution of the Upper Mississippi River Conservation Committee, Rock Island, IL.

Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Information Canada, Ottawa, Canada. 382pp.

Van Vooren, A. 1983. Population dynamics of Mississippi River largemouth bass. In Fish. Manage. Branch, Job Comp. Rpt., Fish. Sec., Iowa Cons. Comm., Des Moines, IA.

Wright, K. E. 1970. The 1967-1968 sport fishery survey of the Upper Mississippi River. Contribution of the Upper Mississippi River Conservation Committee, Rock Island, IL.

Appendix Table A. The numerical population estimate, acreage, biomass, and density of largemouth bass in the Upper Mississippi River.

Area	Acreage	Population Estimate	No./Acre	Lbs/Acre
Minnesota Slough (Pool 9)				
1985	525	None	--	--
Norwegian Lake (Pool 10)				
1985	128	4,199	33	41.0
Methodist Lake (Pool 10)				
1985	113	1,344	12	14.3
Sunfish Lake (Pool 12)				
1984	143	2,290	16	17.2
1985	143	2,299	16	17.0
Lainesville Slough-Lower Brown's Lake (Pool 13)				
1984	195	1,665	9	7.0
1985	195	None	--	--

ANNUAL PERFORMANCE REPORT

RESEARCH PROJECT SEGMENT

STATE:	Iowa	NAME:	An Evaluation of Largemouth Bass Populations in the Upper Mississippi River
PROJECT NO.:	F-109-R		
STUDY NO.:	1		
JOB NO.:	3	TITLE:	Largemouth bass habitat requirements

Period Covered: 1 January 1985 through 31 December 1985

ABSTRACT: Radio transmitters were implanted into the body cavities of seventeen largemouth bass. Movement and habitat selection of tagged bass have been monitored since implantation.

JOB 3 OBJECTIVE

To determine largemouth bass habitat requirements, response to low oxygen conditions, spawning nest depth, and response to water level fluctuations.

INTRODUCTION

Sedimentation has been identified as one of the major causes of habitat degredation of backwater complexes of the Upper Mississippi River (Brietenbach and Peterson, 1980). Water depths are reduced and nuisance growths of aquatic vegetation are encouraged by sedimentation. These, in turn, result in stagnation and oxygen depletion. Largemouth bass inhabiting such backwater areas must move or die. However, tolerance to low oxygen concentrations, movements, distance moved and secondary habitat selection by largemouth bass during such periods are unknown. Knowledge of these parameters will provide baseline information needed in the selection and development of backwater rehabilitation projects.

Water flow in the Mississippi River is regulated by the 29 locks and dams operated by the U.S. Army Corps of Engineers. Water levels are manipulated to maintain commercial tow passage and flood control. Water level fluctuations during spawning of largemouth bass and other nest building species can be devastating. Information is needed to determine largemouth bass spawning bed location, depth and response of the species to water level fluctuations. This information, when included in a water level management plan, will benefit not only largemouth bass but also other nest building species.

METHODS AND PROCEDURES

Radio transmitters were implanted into largemouth bass captured by elctro-fishing gear from Sunfish Lake (Pool 12) and Lainesville Slough-Lower Brown's Lake (Pool 13) study area. Implantation procedures were similar to those described by Pitlo (1983). Captured largemouth bass were anesthetized by immersion in a tub of water containing 25 ppm MS-222. Anesthetized fish were weighed, measured for total length, and scales removed for aging. Fish were then placed on a surgical table (Courtois, 1981) and the gills bathed with water containing the anesthetic. All surgical equipment and transmitters were placed in a sterilant (Novalsan) prior to use. Transmitters were inserted anteriorly into the abdominal cavity through a 1.25 inch incision which was placed approximately 2 inches anterior the anal opening and 0.50 to 0.75 inch to the side of the mid-ventral line. The flexible whip antenna was attached to a needle and a small hole made so the antenna exited the body wall approximately 1.50 inches posterior and slightly dorsal the incision. Four sutures were used to close the incision. The surture material was a non-absorbable surgical suture made of multifilament nylon threads twisted and encased in a smooth nylon casing. A single suture was made over the antenna wire at the point of exit from the body wall to reduce movement and abrasion. Oxytetracycline hydrochloride was injected (20 mg/1 lb of body weight) into the body cavity of the fish to combat infection. After surgery, fish were placed in a tub of fresh water which contained 10 ppm Furacin. A numbered Floy tag was inserted below the dorsal fin of each fish for external identification. After complete recovery, radio tagged fish were released in quiet water at the capture location.

Transmitters, receivers, and antennas were obtained from Advanced Telemetry Systems Inc., Bethel, Minnesota. The transmitters operated on the 48-49 MHz band and individual frequencies were spaced 10-15 KHz apart. Various frequencies and pulse rates were used to distinguish between individual fish. Transmitters were single stage, weighed 0.92 ounce (air weight), measured 2.3 inches in length, 0.8 inches in diameter and had an expected life of 275-310 days. Transmitters were activated by a magnetic reed switch embedded in the potting material. Rose and McCormick (1981) recommended transmitter weight (in water) not exceed 1.5% of the air weight of fish. This guideline was followed and the minimum weight of fish used in this study was 2.2 lbs.

Receivers were portable, programmable, and contained a manual/automatic scan function. Desired transmitter frequencies were programmed into the receiver and the 48-49 MHz bands automatically scanned. Scan rates available using the automatic mode ranged from 2 seconds to 16 minutes per channel.

Two types of receiving antennas were used, a large Yagi type and a smaller hand held loop antenna. The 48-49 MHz, 4 element Yagi boom antenna measured 10 ft by 12 ft and was mounted vertically on a tracking boat. The boom rotated and telescoped to allow maximum extension and signal reception distance. The hand held antenna was diamond shaped, 22 inches wide and 24 inches high. The hand held loop antenna was tunable which helped determine signal strength and direction.

Search for radio tagged fish commenced at the point the fish was last located. A search pattern for lost fish was conducted one mile upstream and downstream of this point. When lost fish were not relocated in the smaller search area, the entire pool was searched, starting in the tailwaters and proceeding downstream along the Iowa side of the main channel to the next lock and dam. The search included backwaters and running side channels. A similar search was made on the return trip along the Illinois side of the channel. Once a tagged fish was located, date, time, water depth, water temperature, and Secchi disc transparency were recorded. Landmarks and a Rangematic 1000 rangefinder were used to plot the locations of fish on navigation maps.

FINDINGS

Seventeen largemouth bass were radio tagged. Tagging commenced in June; however, the majority of the bass were tagged in October (Table 1). The fish tagged in June was recaptured July 5, 1985 by an angler and the transmitter was recovered.

Radio tagged fish were monitored until freeze-up in late November and fish were located several times under the ice. Movements and habitat selection will be presented in the next segment report.

RECOMMENDATIONS

1. Continue the project as outlined.

Table 1. Vital statistics of radio tagged largemouth bass inhabiting Sunfish Lake (Pool 12) and Lainesville Slough-Lower Brown's Lake complex (Pool 13) of the Upper Mississippi River, 1985.

Date Tagged	Radio Number	Weight (lbs)	Length (inches)	Area
06/12	48.102	2.2	15.9	Sunfish Lake[a]
07/18	48.318	3.6	17.9	Sunfish Lake
07/23	48.578	3.3	17.1	Lainesville Slough
09/11	49.037	3.4	17.6	Lainesville Slough
09/12	49.112	3.2	17.8	Sunfish Lake
09/12	49.133	2.6	17.0	Sunfish Lake
10/07	48.136	4.4	19.0	Sunfish Lake
10/07	49.253	2.6	16.0	Sunfish Lake
10/07	49.173	2.6	16.1	Sunfish Lake
10/08	49.219	2.3	15.5	Sunfish Lake
10/08	49.318	2.3	15.3	Sunfish Lake
10/21	49.340	2.3	15.2	Sunfish Lake
10/21	49.593	4.1	18.3	Sunfish Lake
10/21	48.475	3.7	18.6	Sunfish Lake
10/22	48.065	3.1	17.2	Sunfish Lake
10/22	49.520	3.3	17.3	Sunfish Lake
10/22	49.504	2.9	16.6	Sunfish Lake

[a]Captured by an angler on 7/5/85.

ACKNOWLEDGEMENT

I would like to thank technicians Maurice Anderson and Dennis Weiss for their efforts in data collection. Excellent cooperation was received from management biologist and technicians who aided in collection and tagging of largemouth bass. Don Bonneau reviewed this manuscript and provided consultation when needed.

LITERATURE CITED

Brietenbach, R. and G. Peterson (eds). 1980. Fish and wildlife management work group appendix, Great River Environmental Action Team II (GREAT II), U.S. Fish and Wildlife Service, Rock Island, IL.

Courtois, L. A. 1981. Lightweight, adjustable, and portable surgical table for fisheries work in the field. Prog. Fish Culturist. 43(1):55-56.

Pitlo, J. Jr. 1983. Wing and closing dam investigations. Fed. Aid to Fish Restor., Proj. No. F-96-R-2. Iowa Cons. Comm., Des Moines, IA.

Ross, M. J. and J. H. McCormick. 1981. Effects of external radio transmitters on fish. Prog. Fish Culturist. 43(2):76-72.

ANNUAL PERFORMANCE REPORT

RESEARCH PROJECT SEGMENT

STATE:	Iowa	NAME:	An Evaluation of the Effect of a Change in Commercial Harvest Regulations on the Channel Catfish Populations Inhabiting the Upper Mississippi River
PROJECT NO.:	F-109-R		
STUDY NO.:	2		
JOB NO.:	1		
		TITLE:	Channel catfish population assessment

Period Covered: 1 January 1985 through 31 December 1985

ABSTRACT: Over 4,600 hoop net hours captured 817 channel catfish during this study segment. Catch per unit of effort (CPUE) ranged from 2.8 fish/net day in Pool 16 to 12.7 fish/net day in Pool 9. Age III fish dominated the catch in Pools 9 and 11, while age II fish dominated the catch in Pool 18. From 1955 to 1984, trend data for commercially harvested channel catfish has been dominated by fish caught from Pools 18 and 19. The annual commercial harvest of channel catfish taken from Pools 9-17 shows a downward trend despite wide fluctuations. The 1982 through 1984 annual commercial harvest of catfish from Pools 9-17 was the lowest ever reported for a consecutive three year period.

JOB 1 OBJECTIVE

To determine length-weight relationships, length-frequency distributions, harvest rates, and relative abundance of channel catfish.

INTRODUCTION

Channel catfish are valuable to Iowa fishermen and consistently rank number one in preference of sport anglers (Anonymous, 1975 and 1982). To commercial fishermen fishing the Mississippi River the channel catfish is among the top three species in economic value and yield (Pitlo, 1979). Commercial fishing for catfish is intense and has resulted in over exploitation of the species (Schoumacher, 1965; Helms, 1967 and 1969; and Pitlo, 1979). The increase in the minimum legal length limit from 13 to 15 inches for commercially harvested channel catfish was recommended as a method of reducing overharvest (Helms, 1979). The increase in the minimum length limit was predicted to (1) increase and stabilize year class abundance, (2) reduce the numerical harvest but increase the weight of fish harvested by 30%, and (3) increase the number of fish available to sport anglers. Legislation to change the legal length limit on commercially harvested catfish became effective January 1, 1984. The channel catfish population will be monitored to determine if the change in minimum legal length will achieve the predicted and desired changes in the population.

METHODS AND PROCEDURES

Adult channel catfish were collected with hoop nets baited with soybean cake during August and September in Pools 9, 11, 16, and 18. Hoop nets were of two designs (1) a net made of 0.75 inch web (bar measure) and seven hoops each 2 feet in diameter, and (2) a net made of 1.25 inch web (bar measure) and seven hoops each 3.50 feet in diameter. One large and one small net were fished in tandem and termed a set. Six sets were made per pool and locations were similar to those described by Helms (1967 and 1969). Each set was fished for 48 hrs between lifts. Nets were fished a minimum of 24 net days (576 net hrs) per pool. However, 48 net days (1,152 net hrs) were fished per pool if a 300 fish quota was not achieved during the first netting period. All channel catfish were measured for total length to the nearest .1 inch and weighed to the nearest .1 lb. Ages were assigned to length-frequency distributions for channel catfish from tables prepared by Pitlo (1979). Commercial harvest information was obtained from the from commercial fisherman's required monthly reports.

FINDINGS

Over 6,000 net hrs in 1984 and 4,600 net hrs in 1985 resulted in the capture of 2,204 and 817 channel catfish, respectively (Table 1). Catch per unit of effort (CPUE) ranged from 2.8 fish/net day in Pool 16 in 1985 to 22.3 fish/net day in Pool 9 during 1984 (Table 1). Length-frequency distributions for channel catfish captured in 1984 and 1985 are shown in Appendix Table A.

Table 1. Fishing effort and catch of channel catfish in baited hoop nets from the Upper Mississippi River.

	Small Mesh Hoop Nets			Large Mesh Hoop Nets		
	Net Days	Fish Caught	Fish/ Net Day	Net Days	Fish Caught	Fish/ Net day
Pool 9						
1984	24	536	22.3	24	4	0.2
1985	24	304	12.7	24	20	0.8
Pool 10						
1984	32	1,054	32.9	32	35	1.1
Pool 11						
1985	24	194	8.1	24	60	2.5
Pool 16						
1984	48	213	4.4	48	70	1.5
1985	24	68	2.8	24	10	0.4
Pool 18						
1984	24	270	11.3	24	22	0.9
1985	24	142	5.9	24	19	0.8
Totals						
1984	128	2,073	16.2	128	131	1.0
1985	96	708	7.4	96	109	1.1

The channel catfish age frequency distribution by pool showed differences north to south. Age III fish dominated the 1985 catch in Pools 9 and 11. This indicated a strong 1982 year class (Table 2). In contrast, age IV and V fish dominated the catch in Pool 16, indicating strong 1980 and 1981 year classes. Age II channel catfish dominated the catch in Pool 18 during both years (Table 2).

Table 2. Age distribution of channel catfish captured in baited hoop nets from the Upper Mississippi River.

Area	Fish in Sample	Percent Occurance in Age Class						
		I	II	III	IV	V	VI	VII
Pool 9								
1984	541	39	55	7	0.2			
1985	321	3	34	62	1			
Pool 11								
1985	191	9	23	60	5	2		
Pool 16								
1984	280	20	11	40	25	2	1	
1985	78	21	17	28	22	8	5	
Pool 18								
1984	279	15	54	28	2			
1985	138	14	52	32	2			

Commercial harvest of channel catfish reported by Iowa fishermen fluctuated from 300,000 to 800,000 lbs between 1955 and 1983 (Figure 1). Average annual harvest from 1955-1983 was 504,713 lbs. The trend in commercial channel catfish harvest from 1956 to 1976 was downward with 11 years of below average harvest (Figure 1). The commercial harvest of channel catfish showed improvement from 1977 to 1981. During this period harvest was above average and the 1980 harvest approached the record catch of 840,000 lbs (Figure 1). Channel catfish harvested from Pools 18 and 19 dominated harvest statistics and contributed 21-61% of the total channel catfish harvested on the Mississippi River (Appendix Table B). Therefore, trend data for combined pool catches of commercially harvested channel catfish is dominated by data obtained from Pools 18 and 19 (Figure 2).

The commercial catfish harvest reported for Pools 9-17 had an overall downward trend despite wide fluctuations (Figure 3). In addition, the 1982, 1983, and 1984 reported harvests show the lowest consecutive three year catch ever recorded (Figure 3). For the river reach comprising Pools 9-17, considerable variation in harvest has been reported from individual pools during the 1955-1984 period. Pool 9 channel catfish harvests show drastic declines (Figure 4), Pool 11 harvests indicate a general downward trend (Figure 5) and Pool 16 shows slight improvement in harvest (Figure 6).

RECOMMENDATIONS

1. Length-weight relations will be computed and reported in the next segment report.

2. Continue the project as outlined in the project agreement.

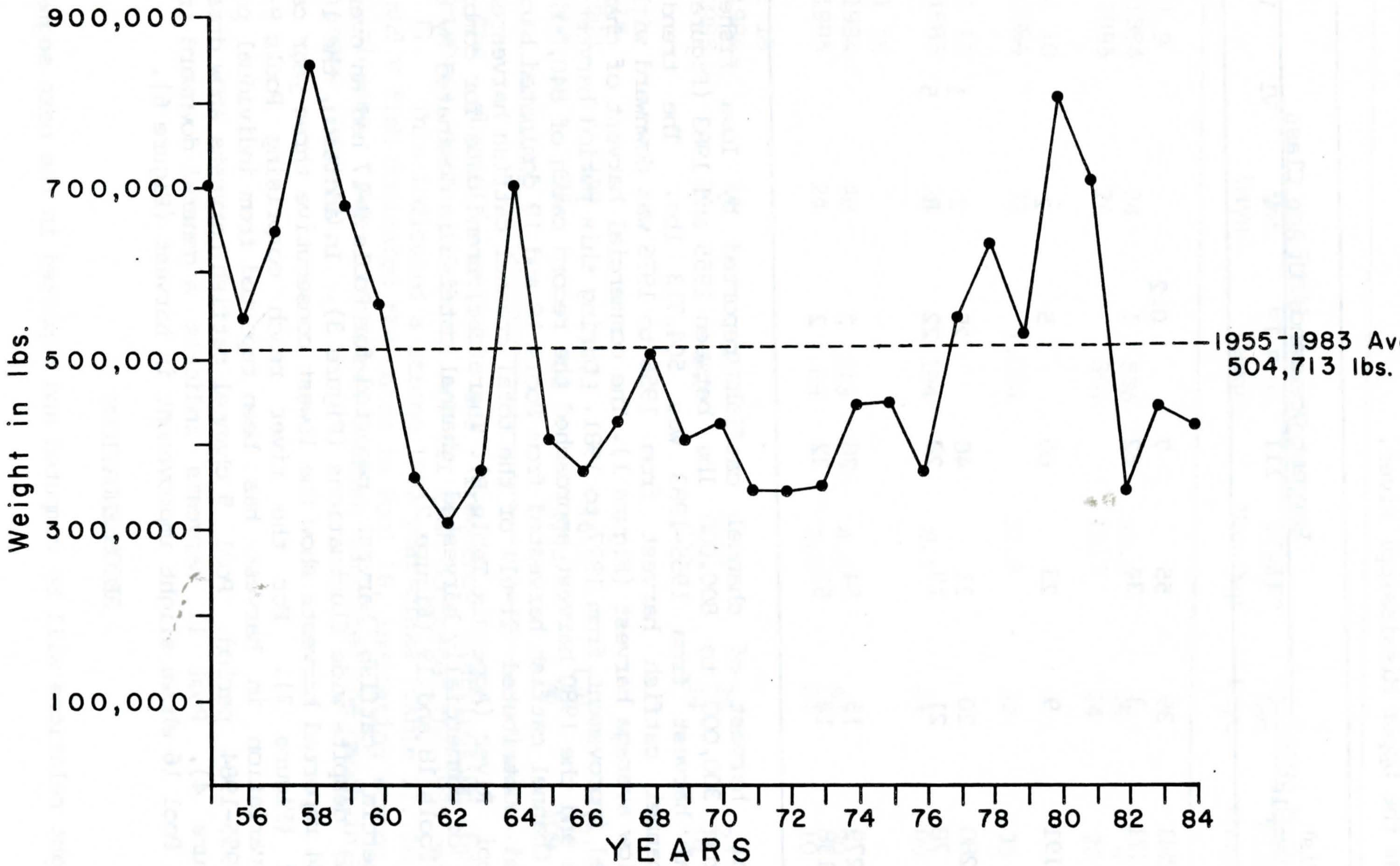

Figure 1. The channel catfish harvest as reported by Iowa commercial fishermen fishing Pools 9-19 of the Upper Mississippi River.

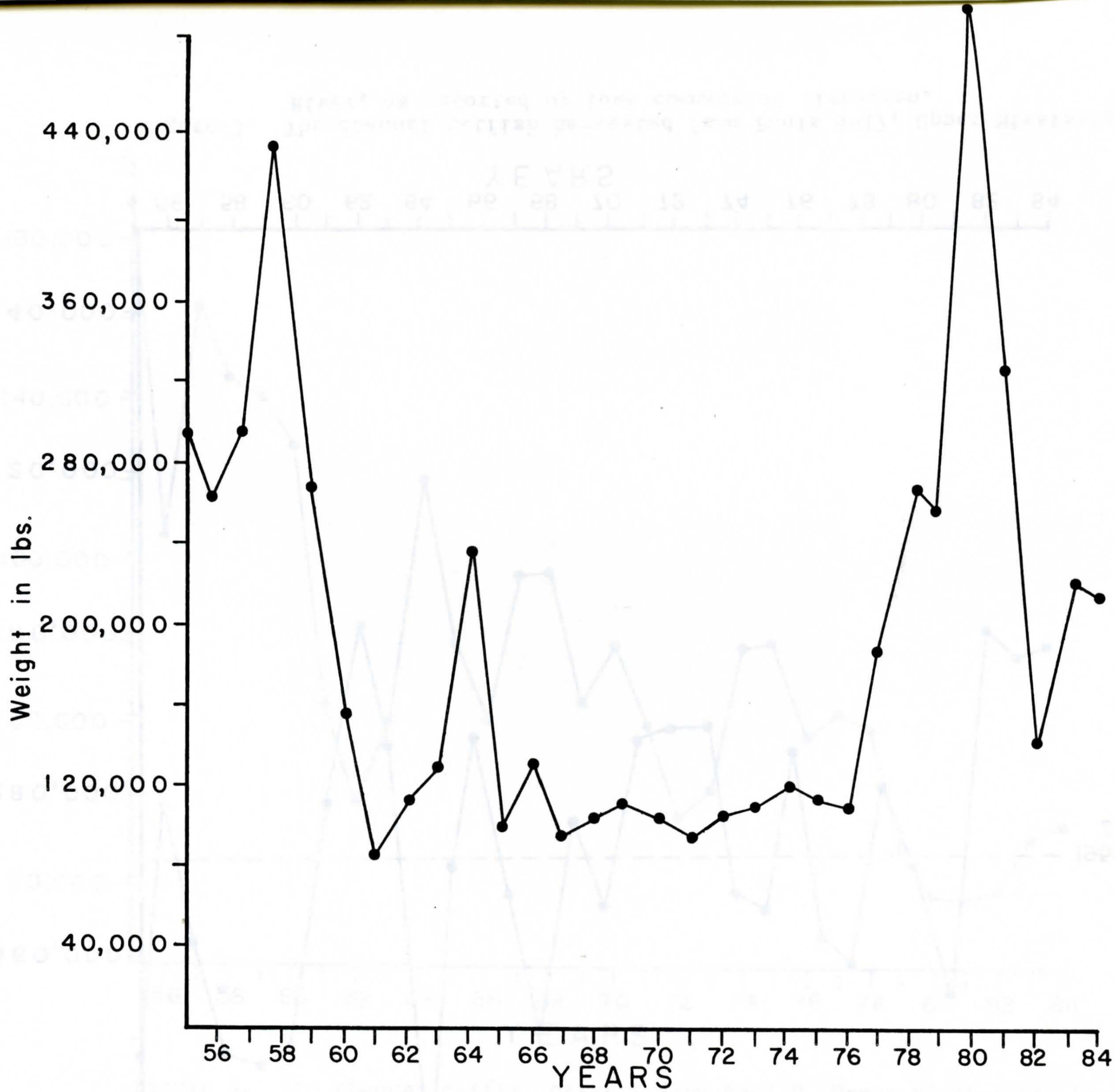

Figure 2. The channel catfish harvested from Pools 18 and 19, Upper Mississippi River, as reported by Iowa commercial fishermen.

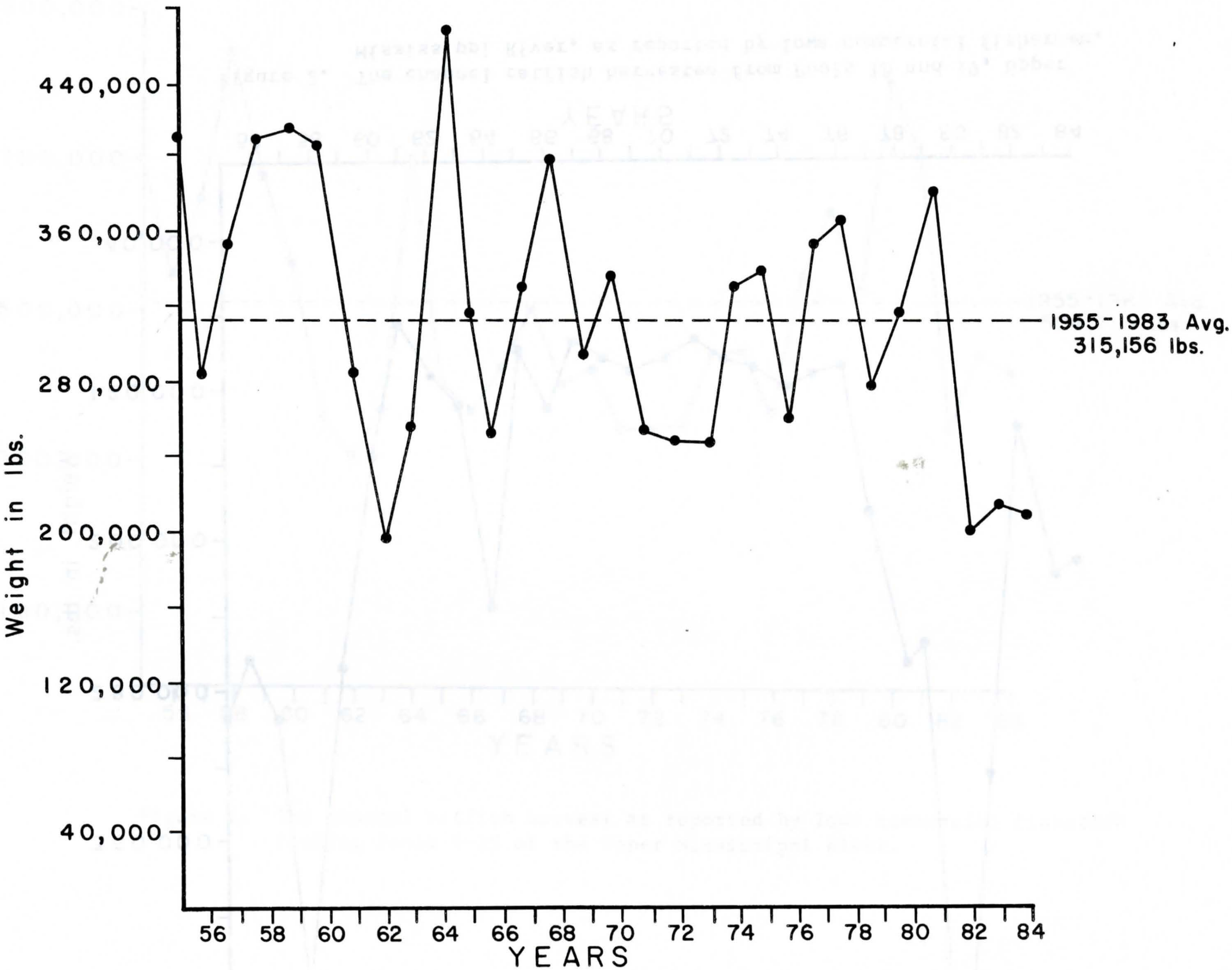

Figure 3. The channel catfish harvested from Pools 9-17, Upper Mississippi River, as reported by Iowa commercial fishermen.

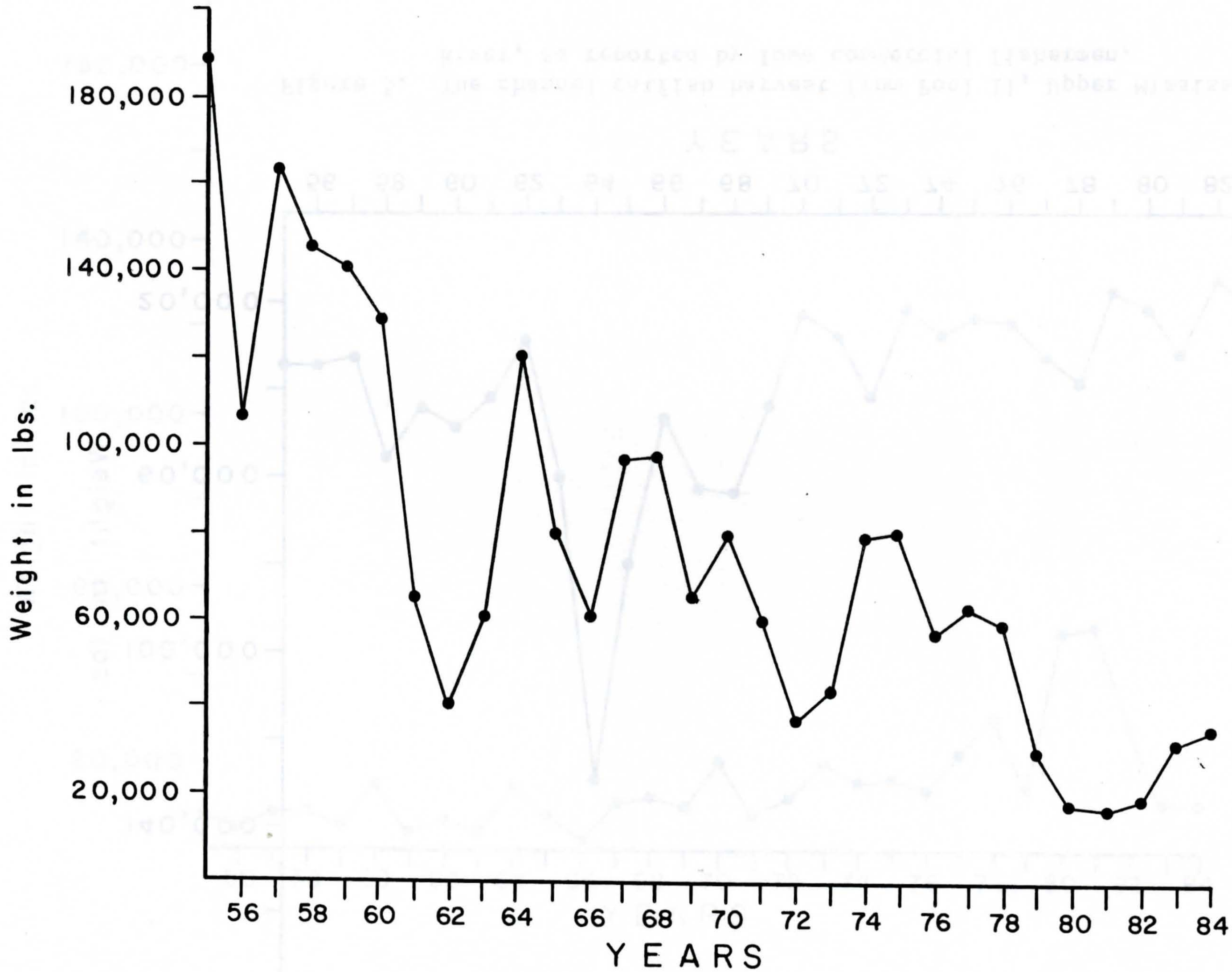

Figure 4. The channel catfish harvest from Pool 9, Upper Mississippi River, as reported by Iowa commercial fishermen.

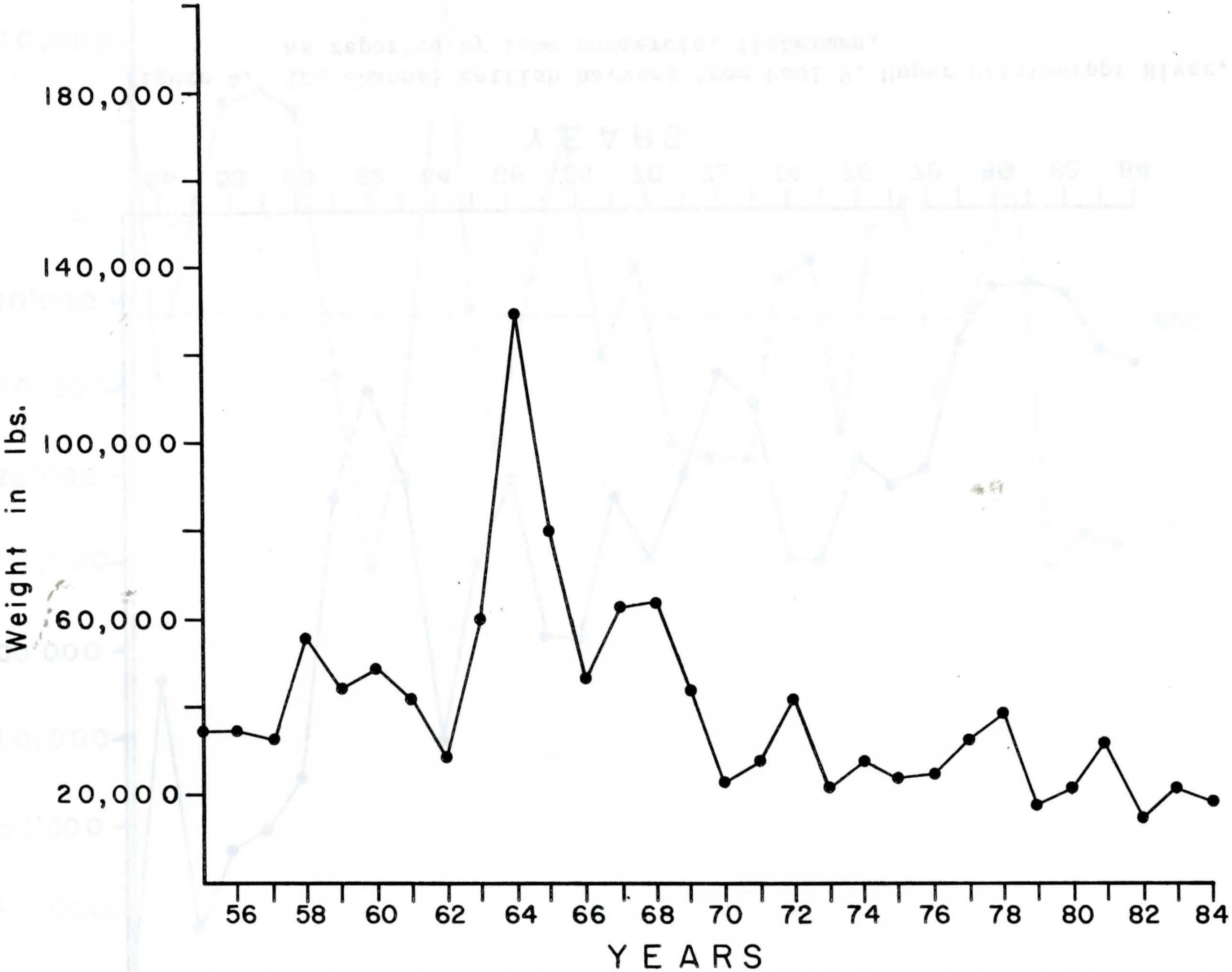

Figure 5. The channel catfish harvest from Pool 11, Upper Mississippi River, as reported by Iowa commercial fishermen.

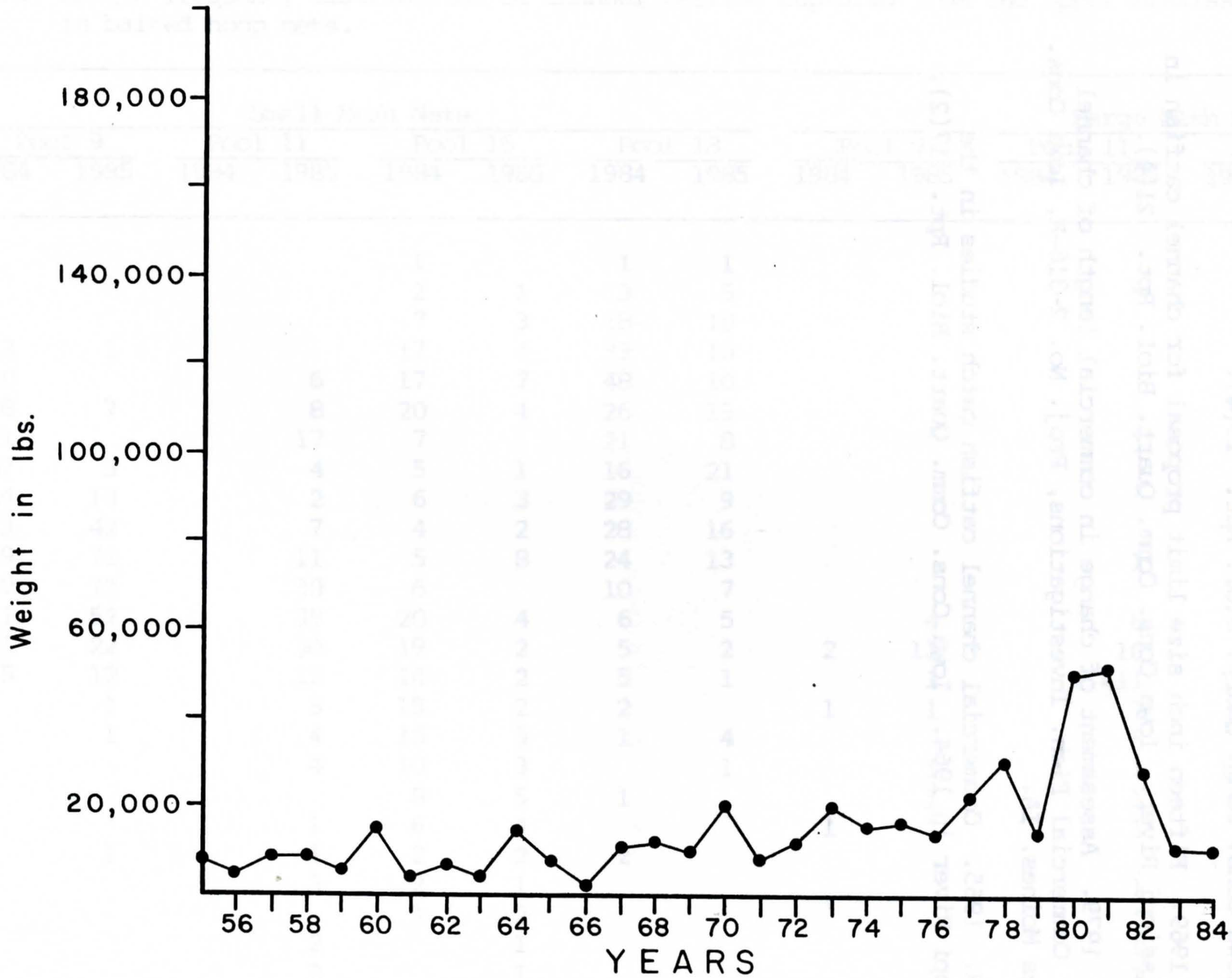

Figure 6. The channel catfish harvested from Pool 16, Upper Mississippi River, as reported by Iowa commercial fishermen.

LITERATURE CITED

Anonymous. 1975. Fishing in Iowa. Iowa Cons. Comm., Des Moines, IA.

Anonymous. 1982. Fishing in Iowa. Iowa Cons. Comm., Des Moines, IA.

Helms, D. R. 1967. Trends in channel catfish harvest in the Mississippi River. Iowa Cons. Comm. Quart. Biol. Rpt. 19(4).

Helms, D. R. 1969. Fifteen inch size limit proposal for channel catfish in the Mississippi River. Iowa Cons. Comm. Quart. Biol. Rpt. 21(4).

Pitlo, J. Jr. 1979. Assessment of change in commercial length of channel catfish. Commercial Fish. Investigations, Proj. No. 2-316-R, Iowa Cons. Comm., Des Moines, IA.

Schoumacher, R. 1965. Commercial channel catfish catch studies in the Mississippi River in 1964. Iowa Cons. Comm. Quart. Biol. Rpt. 17(2).

Appendix Table A. Length-frequency distribution of channel catfish captured from the Upper Mississippi River in baited hoop nets.

	Small Mesh Nets								Large Mesh Nets							
	Pool 9		Pool 11		Pool 16		Pool 18		Pool 9		Pool 11		Pool 16		Pool 18	
	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985
4.6- 5.0					1		1	1								
5.1- 5.5					2	1	3	5								
5.6- 6.0					7	3	18	10								
6.1- 6.5	3	1			17	4	33	10								
6.6- 7.0	20			6	17	7	48	10								
7.1- 7.5	118	7		8	20	4	26	15								
7.6- 8.0	221			17	7		21	8				1				
8.1- 8.5	87	3		4	5	1	16	21								
8.6- 9.0	34	14		2	6	3	29	9								
9.1- 9.5	13	42		7	4	2	28	16						1		1
9.6-10.0	9	72		11	5	8	24	13				1	1		1	
10.1-10.5	10	73		30	6		10	7							1	
10.6-11.0	11	52		39	20	4	6	5		4		8	4	1	4	5
11.1-11.5	5	22		30	19	2	5	2	2	11		16	7		1	2
11.6-12.0	5	12		12	16	2	5	1		1		11	10	1	5	3
12.0-12.5		1		8	15	2	2		1	1		7	6	1	2	3
12.6-13.0		1		4	15	5	1	4				5	9		1	2
13.1-13.5				4	10	3		1		1		1	11			
13.6-14.0					8	5	1			1		1	8		2	1
14.1-14.5				1	6	4			1	1		1	5	2	1	3
14.6-15.0		1		1	2	2	2						3		1	
15.1-15.5				3	2	1						1			1	
15.6-16.0					1	2							1	1	1	
16.1-16.5				2		1						1	1	1		
16.6-17.0				2		1						1	1	1	1	
17.1-17.5					1	1						2				
17.6-18.0					1							1	1			
18.1-18.5																

Appendix Table B. Channel catfish harvest reported by Iowa commercial fishermen and the percent Pools 18 and 19 contributed to the total.

Year	Pool 18	Pool 19	All Pools (9-19)	% Contributed by Pools 18 and 19
1955	142,755	153,061	707,386	42
1956	137,324	125,777	547,212	48
1957	189,720	103,794	650,864	45
1958	193,823	240,843	846,144	51
1959	146,266	119,889	680,757	39
1960	103,338	54,462	566,011	28
1961	34,042	47,723	366,812	22
1962	42,892	72,449	310,816	37
1963	41,496	80,767	371,182	33
1964	143,148	94,159	701,175	34
1965	65,108	24,820	405,818	22
1966	41,401	89,563	373,699	35
1967	45,621	50,540	429,009	22
1968	55,008	51,127	505,234	21
1969	70,936	40,909	402,271	28
1970	74,420	27,421	424,103	24
1971	56,723	37,495	346,462	27
1972	57,758	46,202	346,472	30
1973	54,175	56,733	353,342	31
1974	64,859	56,222	448,802	27
1975	63,570	54,478	449,542	26
1976	64,647	49,501	366,812	31
1977	119,442	80,127	556,869	36
1978	124,687	154,308	639,660	44
1979	94,940	166,079	535,831	49
1980	196,260	289,670	803,056	61
1981	128,920	202,386	711,446	47
1982	57,101	85,953	343,253	42
1983	99,443	129,505	444,647	51
1984	55,428	162,985	421,763	52
1955-1984 Average	92,145	98,297	504,713	38

ANNUAL PERFORMANCE REPORT

RESEARCH PROJECT SEGMENT

STATE: Iowa

PROJECT NO.: F-109-R

STUDY NO.: 2

JOB NO.: 2

NAME: An Evaluation of the Effect of a Change in Commercial Harvest Regulations on the Channel Catfish Populations Inhabiting the Upper Mississippi River

TITLE: Assessment of young-of-the-year channel catfish abundance

Period Covered: 1 January 1985 through 1 December 1985

ABSTRACT: Over 100 channel catfish young-of-the-year (YOY) were captured in 180 trawl hauls. Catch of YOY channel catfish ranged from 0 in Pool 9 to 55 in Pool 16. Freshwater drum and *Cyprinid* sp. dominated the trawl haul catches with 234 and 183 fish, respectively. The length frequency distribution of YOY channel catfish sampled in Pool 16 indicated two spawning peaks.

JOB 2 OBJECTIVE

To determine the abundance of young of the year channel catfish.

METHODS AND PROCEDURES

Young of the year (YOY) channel catfish were collected during August and September in Pools 9, 11, 16, and 18 with a 16 ft semi-balloon otter trawl. The tail of the trawl contained a 1/8 inch cod liner. Trawl samples were approximately 1,200 ft in length and in a downstream direction. The sample consisted of a minimum of 44 trawl hauls and a maximum of 74 trawl hauls per pool. Habitats sampled were main channel, main channel border, and major side channels. Areas sampled were similar to those sampled by Helms (1967 and 1969) and Pitlo (1979). Young of the year channel catfish were measured for total length to the nearest .1 inch. Other fish were recorded by species and enumerated.

FINDINGS

One hundred eighty trawl hauls captured 111 YOY channel catfish and 525 other fish during the 1985 sample period (Table 1). Catch of YOY channel catfish ranged from 0 in Pool 9 to 55 in Pool 16 (Table 2). The most abundant fish captured were freshwater drum (234), Cyprinid sp. (183) and YOY channel catfish (111) (Table 3).

DISCUSSION OF FINDINGS

Catches of YOY channel catfish showed higher catch rates (mean YOY/trawl) in 1984 than 1985, 2.28 as compared to 0.62 (Table 4). A considerable difference was also noted between catch of YOY channel catfish sampled from Pool 9 and Pool 18. Mean catches of YOY channel catfish declined from 0.42 to 0 YOY/trawl in Pool 9 and from 4.00 to 0.64 YOY/trawl in Pool 18 for 1984 and 1985, respectively (Table 4).

Length of YOY channel catfish varied by pool and collection year. The 1984 YOY channel catfish length distribution in Pool 11 was bi-modal which indicated two spawning periods (Figure 1). Similarly, bi-modal length distributions were also noted in Pool 16 during the 1985 survey (Figure 1).

RECOMMENDATIONS

1. Continue with project as outlined in the project agreement.

ACKNOWLEDGEMENT

I would like to thank fishery technicians Maurice Anderson and Dennis Weiss who collected the majority of the field data for these projects. Also Don Bonneau for review of this manuscript.

Table 1. The number of trawl hauls and catch of fish from the Upper Mississippi River, 1985.

Date	Pool	No. Trawl Hauls	No. YOY[a] Channel Catfish	Other Fish
8/26	9	15	0	12
8/29	9	15	0	34
9/16	9	15	0	15
8/26	11	15	13	43
8/28	11	15	6	48
9/17	11	15	8	29
8/20	16	15	19	71
8/22	16	15	20	49
9/09	16	15	16	77
8/19	18	15	12	58
8/23	18	15	15	46
9/10	18	15	2	43
Totals		180	111	525

[a]Young-of-the-year.

Table 2. A summary of the catch of young-of-the-year channel catfish captured by trawl samples taken from the Upper Mississippi River, 1985.

Pool	No. Trawl Hauls	No. YOY[a] Channel Catfish	Mean No./Haul
9	45	0	0
11	45	27	0.60
16	45	55	1.22
18	45	29	0.64

[a]Young-of-the-year.

Table 3. Fish captured in trawl haul samples taken from the Upper Mississippi River, 1985.

Species	Pool 9	11	16	18	Total
Shovelnose Sturgeon	1		1		2
Channel Catfish					
Young-of-the-Year		27	55	29	111
Sub-adult	12	9	10	6	37
Adult	3		7	11	21
Freshwater Drum	7	29	87	111	234
Walleye/Sauger	3	3	2	1	9
Flathead Catfish	1	1	2	2	6
Carp				2	2
Smallmouth Buffalo				1	1
Bluegill	1	1		1	3
White Bass	8	5			13
Redhorse	3	1		3	7
Carpsucker sp.		2	1	2	5
Cyprinid sp.	22	66	86	9	183
Blue Sucker			1		1
Mooneye		3			3

Table 4. A summary of young-of-the-year channel catfish taken in trawl haul samples from the Upper Mississippi River.

	No. Trawl Hauls	No. YOY[a]	Mean No. YOY[a]/haul
Pool 9			
1984	72	30	0.42
1985	45	0	0
Pool 11			
1984	75	142	1.89
1985	45	27	0.60
Pool 16			
1984	75	234	3.12
1985	45	55	1.22
Pool 18			
1984	59	236	4.00
1985	45	29	0.64
Total			
1984	281	642	2.28
1985	180	111	0.62

[a]Young-of-the-year.

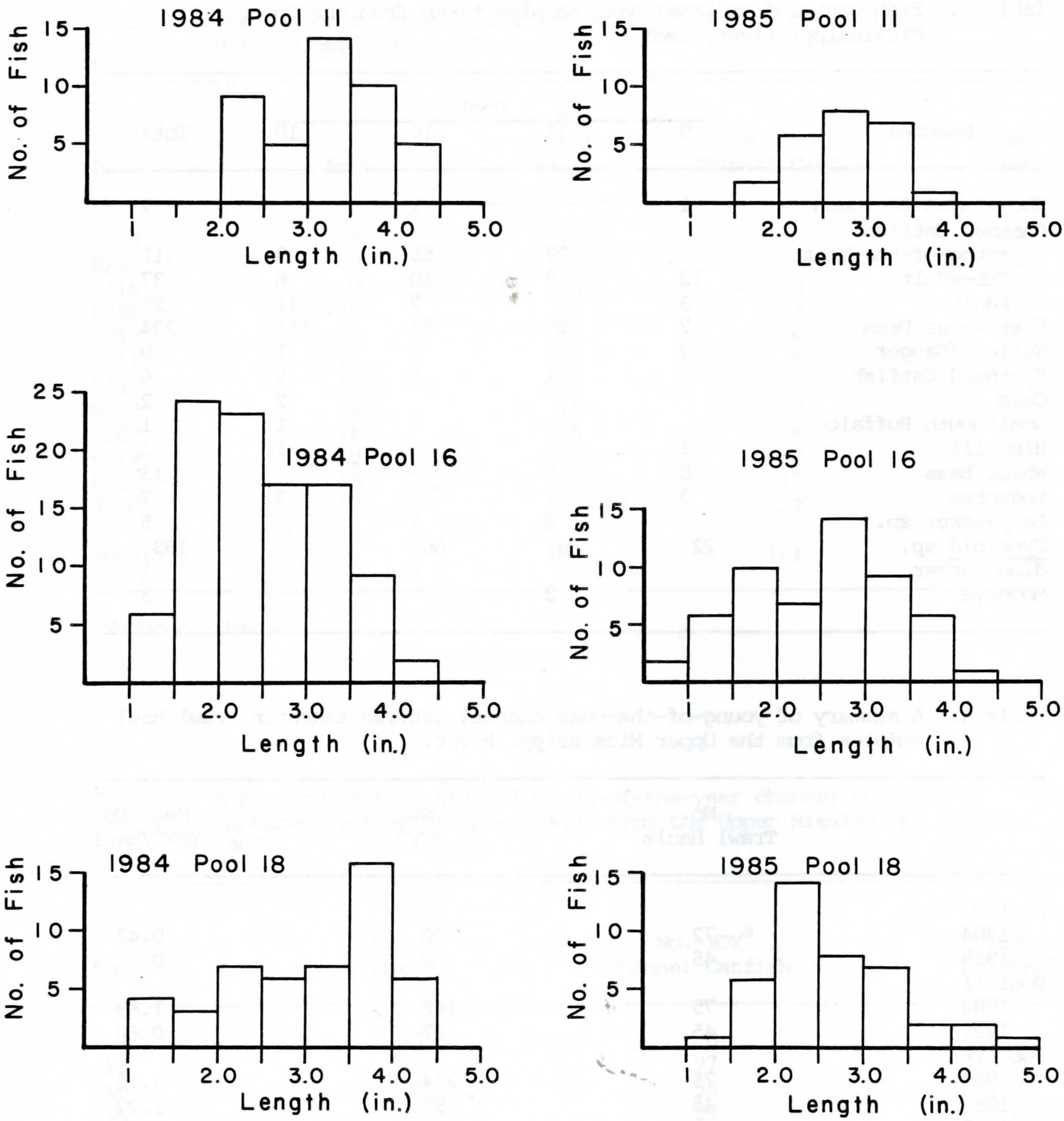

Figure 1. The length frequency distribution of YOY channel catfish collected in trawl haul samples taken from the Upper Mississippi River.

LITERATURE CITED

Helms, D. R. 1967. Trends in channel catfish harvest in the Mississippi River. Iowa Cons. Comm. Quart. Biol. Rpt. 19(4).

Helms, D. R. 1969. Fifteen inch size limit proposal for channel catfish in the Mississippi River. Iowa Cons. Comm. Quart. Biol. Rpt. 21(4).

Pitlo, J. Jr. 1979. Assessment of change in commercial length of channel catfish. Commercial Fish. Investigations, Proj. No. 2-316-R, Iowa Cons. Comm., Des Moines, IA.