

THE COMMERCIAL AND SPORT FISHERIES OF THE ATCHAFALAYA BASIN FLOODWAY

BY

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Presented at the Annual Meeting of
Southern Division of
American Fisheries Society
held in conjunction with the
Seventeenth Annual Conference
of the Southeastern Association of
Game and Fish Commissioners

September 29 - October 2, 1963
Hot Springs, Arkansas

INTRODUCTION

The Atchafalaya Basin is a vast, scenic, semi-wilderness area, highly productive of fish and wildlife. Work presently being considered by the U. S. Corps of Engineers in the lower portion of the basin, *i.e.*, the Atchafalaya Basin Floodway, includes enlargement of the Atchafalaya River channel by dredging, closure of distributary channels and the extension of the Atchafalaya River levees to confine floodwaters to the extent practicable. This proposed work would have tremendous detrimental effects on the commercial and sport fisheries of the Basin and has become extremely controversial, *e.g.*, see Gresham (1963). Therefore, the Louisiana Wild Life and Fisheries Commission conducted a short-term intensive survey to evaluate the commercial and sport fisheries of the Atchafalaya Basin Floodway. The purpose of this report is to present the results of this survey and to describe the sport and commercial fisheries of the area.

DESCRIPTION OF THE ATCHAFALAYA BASIN

The Atchafalaya River is the major tributary of the Mississippi River (Figure 1). Old River which flows out of the Mississippi River joins Red River to form the Atchafalaya River. The river then flows a distance of approximately 140 miles to Atchafalaya Bay, an arm of the Gulf of Mexico. The Atchafalaya River has formed during very recent geological times. For an excellent geological history of the river see Fisk (1952). The river was a minor drift-choked stream until about 1900. Since then developments for navigation and flood control have aided a natural tendency for the river to enlarge and to convey even larger quantities of Mississippi River flow during ordinary and low water stages. The river has enlarged itself to such an extent that some 30 percent of the total annual Mississippi River flow is now diverted down its channel. A control structure put in place during 1963 will prevent further increases in the diversion of Mississippi River flow.

The leveed Atchafalaya Basin consists of 860,000 acres of alluvial bottom land (Figure 1). Various segments of the basin are given in Table 1 and Figure 1. There is also 422,400 acres of coastal marshland south of Morgan City associated with the Atchafalaya River. Because of the construction of levees, the basin north of Krotz Springs does not annually overflow and is relatively unimportant as a fish and wildlife area. The 562,000 acre Atchafalaya Basin Floodway, *i.e.*, the portion of the basin between Krotz Springs and Morgan City, annually overflows and is extremely productive of fish and wildlife.

The Atchafalaya Basin Floodway is dissected by an intricate system of large numbers of shallow lakes of various shapes and sizes, bayous, sloughs, distributaries, and canals (Figures 2 and 3). This is a back-water area of the general type described by Lambou (1959). During the annual periods of high water in the Atchafalaya River, practically the

whole Atchafalaya Basin Floodway overflows. Most high water stages occur during late winter, spring and early summer, however, the depth and duration of overflow varies from year to year. The high production of aquatic organisms in the area is dependent upon this annual water cycle of flooding the land during part of the year and annually de-watering large areas, except the permanent pools. One of the most important links in the food chain for the production of higher aquatic animals in the basin appears to be crayfish (Lambou 1959, 1961).

The Atchafalaya Floodway Basin has remained largely a wild overflow forest and swamp land. It supports a very extensive flora and fauna. The common aquatic organisms mentioned in this report are given in Table 2.

FLOOD CONTROL

The Atchafalaya Basin is a major feature of the design to pass a project flood of the magnitude of 3,000,000 c.f.s. in the lower Mississippi Alluvial Valley (Flood Control Act of 1928). Half of this flood or 1,500,000 c.f.s. is designed to go down the Atchafalaya Basin while the other 1,500,000 c.f.s. will continue down the Mississippi River (Figure 4).

SPORT FISHING

CREEL SURVEY

The Atchafalaya Basin Floodway had the reputation of supporting an extensive sport fishery of exceptional quality, however, very little data were available to document this. The only available estimate of sport fishing in the floodway was contained in a River Basin Report (U. S. Fish and Wildlife Service, 1959) where it was estimated that there was an average of 700,000 man-days of fishing per year. Because of the lack of factual data, an intensive short-term creel survey was conducted from May 11 through 19, 1963. An estimate of the fishing pressure in the Atchafalaya Basin Floodway would virtually be impossible were it not for the fact that the floodway levees limit access to a relatively few points. By maintaining 18 check stations, it was possible to check all sport fishermen leaving the Atchafalaya Basin Floodway. The 18 check stations are described in Table 3 and their locations are shown in Figure 5.

It was originally planned to maintain all stations throughout the survey period. However, because of the lack of sufficient personnel, this was not possible. Therefore, the checking schedule shown in Table 4 was followed. Stations were maintained from 7 a.m. through 9 p.m. All persons, cars, etc., leaving the floodway were stopped and asked if they had been sport fishing in the Atchafalaya Basin Floodway. If so, their catches were examined and pertinent data recorded on standard creel survey forms described by Lambou and Stern (1959). No data were obtained on the weights of the fish caught, and it was not possible to count the number of crayfish caught by the sport fishermen.

Estimates of the sport fishing occurring during the nine days were made for each checking station. The total for a parameter at any checking station is given by,

$$T_i = \sum_{e=11}^{n=19} x_{ei}$$

where T_i = total for the i th check station location

x_{ei} = total for the e th day of May at the i th check station location.

In making estimates of T_i , the data were stratified by weekdays, Saturdays, and Sundays, therefore, considering the checking schedule (Table

4), three different formulas were used to obtain estimates, t_i , for the various check station locations. These are

$$t_i = 2.5(x_{16,i} + x_{17,i}) + 2(x_{13,i} + x_{18,i}) \quad (i = 1, 8, 10, 16, 17, 18)$$

$$t_i = 1.25(x_{13,i} + x_{15,i} + x_{16,i} + x_{17,i}) + 2x_{19,i} + x_{11,i} + x_{18,i} \\ (i = 2, 3, 4, 5, 6, 7)$$

and

$$t_i = 1.6667(x_{14,i} + x_{16,i} + x_{17,i}) + 2x_{18,i} + x_{12,i} + x_{19,i} \\ (i = 9, 11, 12, 13, 14, 15).$$

Estimates of totals for the east and west side of the floodway were obtained as follows,

$$t_{\text{eastside}} = t_1 + t_2 + t_3 + t_4 + t_5 + t_6 + t_7 + t_8$$

and

$$t_{\text{westside}} = t_9 + t_{10} + t_{11} + t_{12} + t_{13} + t_{14} + t_{15} + t_{16} + t_{17} + t_{18}.$$

Other computations were performed in a straightforward manner. Because of the immediate need of the results of the survey, only a preliminary analysis of the data were attempted.

During the nine days, there were 17,723 man-days of fishing (other than sport crayfishing) and 200,168 fish caught or 11.29 fish per trip (Table 7). The quality of the fishing was exceptional. There were 267 man-days of fishing for crayfish making a total of 17,990 man-days of sport fishing. The catch was composed of 137,772 sunfish, 28,497 crappie, 16,840 bass, 13,974 catfish, 191 striped bass and 2,894 other fish.

The fishing pressure was the highest on the west side of the Atchafalaya Basin Floodway where there were 10,811 man-days of fishing and 136,347 fish caught (Table 5). On the east side there were 7,179 man-days of fishing and 63,821 fish caught. The catch rate was 12.65 fish per trip on the west side while 9.20 fish per trip were caught on the east side. The catch of sunfish and crappie was the highest on the west side with 97,736 and 25,892 fish being caught respectively, while there were 40,036 sunfish and 2,605 crappie caught on the east side. The catch of bass and catfish was the highest on the east side with 10,373 and 9,004 fish being caught, respectively, while there were 6,467 bass and 4,970 catfish caught on the west side.

Estimates of the man-days of fishing and the catch at the various check station locations are given in Table 6. The man-days of fishing at the various check stations varied from 107 to 5,429 man-days at check station location numbers 15 and 11, respectively. The catch per trip was high at all check stations. At check station location number 14, even though the fishing pressure was relatively light, the catch rate was the highest with 17.51 fish per trip. Approximately 42 percent of the total number of fish was caught at check station location number 11; 34 percent of the total number of bass was caught at check station location number 3; 59 percent of the total number of crappie was caught at check station location number 9; and 50 percent of the total number of sunfish was caught at check station location number 11. It is believed that the differences in man-days of fishing, number of fish caught, and the composition of the catch at the various check stations are due primarily to local preference of the fishermen rather than differences in the fish population.

DISCUSSION OF SPORT FISHING IN THE ATCHAFALAYA BASIN FLOODWAY

The Atchafalaya Basin Floodway offers good fishing for most of the fresh water fish associated with the warm waters of the south, including largemouth bass, spotted bass, black crappie, white crappie, white bass, bluegill, redear sunfish, warmouth, channel catfish and blue catfish.

Largemouth bass are abundant throughout the Atchafalaya Basin Floodway including the backswamp lakes, bayous, sloughs, distributaries, canals, and the main river channels and lakes. Spotted bass are taken in quantity throughout the area, however, largemouth bass predominate in

the catch. Spotted bass appear to reach their greatest abundance in those bodies of water which maintain some flow of water throughout the year. In such areas, catches of bass consisting entirely or almost entirely of spotted bass are common.

Many of the more remote waters of the floodway are fished almost solely for bass, even though other species are abundant. Sport fishermen have discovered in recent years that exceptionally good bass fishing is available in the main channel and major distributaries of the Atchafalaya River and in the Six-Mile Lake segment of the Atchafalaya Basin Floodway (Figure 1). Surprisingly good catches of bass are often made in some areas during low water periods when the water is exceptionally turbid. I have seen and have made good catches of bass in waters where I would estimate Secchi disk reading would not exceed 3 or 4 inches. This is not to imply that clear waters are not available elsewhere in the floodway during such periods.

Both the white and black crappie are common in the area, however, black crappie seem to be more abundant.

All species of sunfish common to Louisiana occur in the floodway, however, bluegill, redear sunfish and warmouth compose most of the catch. In certain areas and at certain times of the year, warmouth are the principal sunfish caught. Large catches are often made casting, while the other species of sunfish are caught in a conventional manner. The predominance of warmouth in some areas probably can be explained by their ability to utilize the abundant supply of crayfish for food and their ability to survive in habitats having low concentrations of dissolved oxygen which are unfavorable to most other species of game fish (Larimore, 1957). During high water periods, localized areas of the floodway will often have low dissolved oxygen concentrations due to the rapid decay of vegetation. In these areas, large catches of warmouth are often made, while the other sport fishes have either left such areas or because of distress due to low oxygen concentrations are not feeding.

White bass are common throughout the floodway, however, they appear to be extremely migratory. Generally, white bass are abundant in lakes and bayous remote from the main channels and distributaries during high water periods and evidently leave such areas during low water periods. In the main channels and distributaries, and the Six-Mile Lake segment of the floodway, they are abundant throughout the year. Even though large catches of white bass are possible, especially when they are schooling and feeding on the surface, relatively few are harvested. Most fishermen of the area prefer largemouth and spotted bass and do not fish for them.

Catfish are not normally considered a sport fish in south Louisiana; however, a considerable sport fishery appears to be developing for them in the Atchafalaya Basin Floodway. Probably this is due to the high esteem in which they are held as a food fish and the ease with which large catches can be made in the floodway. Sport catches are made by pole fishing and with trot line. Channel catfish predominate in the catch, however, blue catfish are common.

Considerable sport fishing for crayfish occurs in the Atchafalaya Basin Floodway, however, it is limited to the spring and early summer months. During high water stages, when the water is backed up on the floodway levees, considerable sport fishing for crayfish is done with drop nets baited with fish or meat of some type (Figure 6). Sport fishermen also use the standard crayfish trap and these are fished in relatively deep water (Figure 7).

PAST AND FUTURE TRENDS

Considerable sport fishing used to occur in the many lakes and bayous located in the West Atchafalaya Basin Floodway and Morganza Floodway (Figure 1). However, because of the construction of levees along the Atchafalaya River, these areas no longer receive the overflow and the sport fishing pressure is now relatively light. With the extension of levees along the Atchafalaya River and the damming of the distributaries, sport fishing has gradually moved further and further down the basin. The extensions of levees has adversely affected the sport fisheries in the extreme northern section of the Atchafalaya Basin Floodway.

It has only been since World War II that there has been any significant amount of sport fishing in the Atchafalaya Basin Floodway. Based on my own personal observations, its utilization by sport fishermen has increased manifold in the past five years. Probably this is true because of the following reasons: (1) the area has become somewhat more accessible, (2) the number of sport fishermen in Louisiana has increased, (3) Louisiana has lost many of its other productive sport fishing waters and (4) sport fishermen have only recently discovered the area.

Access to the Atchafalaya Basin Floodway is still a major problem. The area is urgently in need of the development of access roads, boat trails, camping areas, parking areas, boat launching sites, etc. The potential for greatly increasing the amount of sport fishing in the Atchafalaya Basin Floodway, with no loss in the quality of fishing, is good under the present conditions existing there.

COMMERCIAL FISHING

REGULATIONS

The size limits which apply to the Atchafalaya Basin Floodway are as follows: (1) blue crabs, five inches in width; (2) buffalofish, sixteen inches minimum length; (3) catfish, other than bullheads, 14 inches minimum length; (4) freshwater drum, twelve inches minimum length; (5) paddlefish, minimum weight, fifteen pounds in the rough; and (6) bullfrogs, five and one-half inches from tip to muzzle to the posterior end of the body. There are no size limits on bullheads, bowfin, carp, garfish, mullet, crayfish, river shrimp, and turtles. The season is closed on taking, selling or possessing of bullfrogs during April and May.

Minimum mesh requirements for the Atchafalaya Basin Floodway are: (1) seines and hoop-nets, one inch square mesh; (2) gill and trammel nets, three-inch square mesh; and (3) bait seines, thirty feet or less in length, one-fourth inch square mesh. There are no requirements on crayfish traps, crayfish drop nets, crab nets, shrimp traps, and dip nets. The use of wood baskets or slat traps and traps in general is illegal. Hooks on trot lines must be spaced twenty-four inches apart. Leads or leaders on hoop-nets not to exceed twenty yards in length are allowed in the Atchafalaya Basin Floodway. The taking of fresh water game fish (legally defined as bass, crappie, yellow bass, white bass, and sunfish) are prohibited.

SURVEY OF COMMERCIAL FISHERIES

The U. S. Fish and Wildlife Service (1959) estimated that 3,600,000 pounds of commercial fish, frogs, crayfish, river shrimp, and turtles valued at approximately \$900,000 are harvested during an average year by about 1,300 licensed fishermen from the Atchafalaya Basin. The Louisiana Wild Life and Fisheries Commission (1962) estimated that the basin annually contributes 40 percent of the state's freshwater commercial fish harvest. During the fiscal year 1955, it was estimated that the harvest of freshwater commercial species was 4,923,400 pounds valued at \$1,208,336. The U. S. Fish and Wildlife Service (1963) determined that the Atchafalaya Basin Floodway produced 6,764,700 pounds of commercial fish returning to the fishermen \$902,613 during 1955; 6,055,600 pounds returning \$937,828 during 1957; 7,822,500 pounds returning \$1,239,823 during 1958; 7,391,100 pounds returning \$1,179,646 during 1959; 5,964,800 pounds returning \$950,383 during 1960; and 6,954,000 pounds returning \$1,190,121 during 1961.

It is readily seen that an extensive commercial fishery occurs in the Atchafalaya Basin Floodway, however, there were still considerable gaps in our knowledge of this fishery. Therefore, a short-term intensive survey was conducted during February and March of 1963 to evaluate this fishery. This consisted of (1) a survey of licensed commercial fishermen, (2) a survey of retail fish dealers, (3) a survey of wholesale fish dealers, and (4) a survey of non-licensed commercial fishermen who had a motor boat license. The samples for the surveys were drawn from various 1962 license registrations.

LICENSE REQUIREMENTS

Inasmuch as the samples for the surveys were drawn from various

license registrations, an explanation of Louisiana's license requirements is in order. Residents buying or handling commercial or bait species taken into the state or fresh or processed commercial fish shipped into the state for the purpose of sale to wholesale or retail dealers, whether handled on a commission basis or otherwise, and residents shipping fish out of the state are wholesale dealers and pay an annual license of fifty dollars. The privileges of a wholesaler includes the privileges of a retailer. Other residents buying or selling commercial or bait fish for retail sale to the consumer, including oyster counters are retail dealers and pay an annual license fee of five dollars.

Commercial fishermen are required to have an annual license based on the amount of gear used. For each separate fresh water seine, trammel net or gill net, the license fee is five dollars on each one hundred feet or fraction thereof of webbing. On each set of fifteen hoop-nets or fraction thereof, a license of five dollars is required. In the Atchafalaya Basin Floodway, by custom, no license is required for trot lines, crayfish traps, crayfish drop nets, shrimp traps, dip nets, and cast nets.

Commercial fish in Louisiana as stated by law, includes all fish, shell fish, frogs, turtles and other aquatic organisms which have a food value or commercial or other economic value, excepting alligators, commercial salt water shrimp and oysters when their conservation and regulation is covered by other statutes. Nutria and raccoon meat even though they could be considered an aquatic organism in the Atchafalaya Basin Floodway are not covered by the commercial fishing regulations. In the survey, considerable quantities of nutria meat were reported by the wholesale and retail fish dealers; however, undoubtedly there are many other dealers besides the ones covered in these surveys who buy nutria meat.

All motor boats exceeding ten horsepower are required to have a license. There are six different classes of motor boat licenses: (1) pleasure, (2) livery, (3) dealer, (4) commercial fishing, (5) commercial passenger, and (6) other. Of concern here is the commercial fishing boat license.

SURVEY OF LICENSED COMMERCIAL FISHERMEN

A systematic sample with one random start was selected from a printed tabulation of the commercial fishermen licensed during 1962 in the parishes of Assumption, St. Martin, St. Mary, Iberia, Iberville, St. Landry and Pointe Coupee (Figure 8). A sample of 158 fishermen was selected from the 790 licensed commercial fishermen in these parishes. However, 11 of these fishermen could not be contacted, therefore the sample fraction is .18608.

The selected fishermen were contacted at their residence and if one was not at home, return trips were made until the license holder was interviewed. The respondent was asked for data for only the year 1962. Estimates of totals were made by

$$t = x/f = xN/n = N\bar{x}$$

where t = estimate of total for the Atchafalaya Basin Floodway

$$f = n/N$$

x = number possessing an attribute or the total amount for a variate for the Atchafalaya Basin Floodway in the sample

and $\bar{x} = x/n$.

Estimates of proportions were made by

$$p = x/m$$

where p = proportion

and m = total number for the Atchafalaya Basin Floodway.

The value of the fish harvested is based on the average price paid to the commercial fishermen as determined from the surveys of wholesale and retail fish dealers.

During 1962, there were 419 licensed commercial fishermen utilizing the Atchafalaya Basin Floodway (Table 7). The characteristics of these licensed commercial fishermen are given in Table 8, while the amount of gear they fished in the Atchafalaya Basin Floodway is given in Table 9. These fishermen harvested 5,300,489 pounds of aquatic organisms from the Atchafalaya Basin Floodway during 1962 returning \$732,706 (Table 10). There were 1,179,099 pounds of buffalofish; 1,089,127

pounds of catfish; 763,146 pounds of crayfish; 661,013 pounds of freshwater drum; and 660,964 pounds of garfish harvested. These fishermen sold 144,507 pounds or approximately three per cent of their catch to non-licensed buyers.

SURVEY OF RETAIL FISH DEALERS

Retail fish dealers from the parishes in the vicinity of the Atchafalaya Basin Floodway were surveyed (Figure 8). The sample was stratified by groups of parishes depending upon their distance from the floodway. A systematic sample with one random start was selected from a printed tabulation of the dealers in each strata.

In the parishes of Pointe Coupee, St. Martin, St. Landry, Iberville, Iberia, Assumption and St. Mary, a sample of 76 dealers was selected from the 397 dealers licensed during 1962. Thus, for these parishes the sample fraction equals .1914. In the parishes of Avoyelles, Evangeline, Acadia, Vermilion, Lafayette, East Baton Rouge, West Baton Rouge, Ascension, St. James, St. John, St. Charles, Jefferson, Lafourche, Terrebonne, a sample of 48 dealers was selected from the 943 dealers licensed during 1962. Thus, for these parishes the sample fraction equals .0509. In the parish of Orleans, a sample of 25 dealers was selected from the 768 dealers licensed during 1962. Thus, for this parish the sample fraction equals .0326.

The selected retail dealers were contacted at their place of business and if one was not present, return trips were made until the dealer was interviewed. Only fish which the dealers said they bought direct from fishermen and which were caught in the Atchafalaya Basin Floodway during 1962 were included in the interview data.

Fish bought from other wholesale dealers were not included. Estimates of totals were made by

$$t = x/f = xN/n = N\bar{x}$$

where the symbols are as previously defined. The value of the fish represents what the dealer paid the fishermen for their catch.

During 1962, there were 112 retail dealers buying fish from the Atchafalaya Basin Floodway (Table 11). They purchased fish from 501 fishermen, however, this is a maximum estimate of the number of commercial fishermen, as more than one retail dealer could buy fish from an individual fisherman. These retail dealers during 1962 bought 3,990,980 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at \$653,214 (Table 12).

SURVEY OF WHOLESALE FISH DEALERS

Wholesale fish dealers from the parishes in the vicinity of the Atchafalaya Basin Floodway were surveyed (Figure 8). The sample was stratified into two strata. In the parishes of Acadia, Allen, Ascension, Assumption, Avoyelles, East Baton Rouge, East Feliciana, Evangeline, Iberia, Iberville, Jefferson Davis, Lafayette, Livingston, Pointe Coupee, St. Charles, St. James, St. John, St. Landry, St. Martin, St. Mary, Vermilion, West Baton Rouge, and West Feliciana, an attempt was made to survey all wholesale fish dealers licensed during 1962. Five dealers could not be located and no corrections in the interview data were made for their omission.

A systematic sample with one random start was selected from a printed tabulation of the wholesale dealers in the parishes of Jefferson, Lafourche, Orleans and Terrebonne. From these parishes, a sample of 34 dealers was selected from the 138 licensed during 1962. Thus, for these parishes the sample fraction equals .2464. The survey was conducted in the same manner as the survey of the retail fish dealers.

During 1962, there were 41 wholesale dealers buying fish from the Atchafalaya Basin Floodway (Table 11). They purchased fish from 1,213 fishermen, however, this was a maximum estimate of the number of commercial fishermen, as more than one retail dealer could buy fish from an individual fisherman. These wholesale dealers bought 11,039,793 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at \$1,974,723 (Table 12).

FISH BOUGHT BY BOTH WHOLESALE AND RETAIL DEALERS

Inasmuch as only the aquatic organisms which the wholesale and retail fish dealers bought direct from the commercial fishermen were included in the interview data, there should be no duplication of the commercial production presented in Table 12. Thus, a combination of the fish bought by both the retail and wholesale dealers should furnish the best available estimate of the commercial production of aquatic organisms in the Atchafalaya Basin Floodway. During 1962, these dealers bought over 15 million pounds of aquatic organisms valued at \$2,627,000 (Table 12). Crayfish lead in production with 5,089,000 pounds; followed by 4,876,000 pounds of catfish; 1,721,000 pounds of buffalofish; 1,188,000 pounds of freshwater drum; 439,581 pounds of nutria meat; 413,000 pounds of garfish; 319,000 pounds of blue crab; 227,000 pounds of bullheads; 224,000 pounds of turtles; 182,000 pounds of baby turtles (or nine million baby turtles); 159,000 pounds of carp; 113,000 pounds of bullfrog; 86,000 pounds of bowfin; and 17,000 pounds of river shrimp.

The catch of catfish returned the commercial fishermen the most money and was valued at \$1,150,000; followed by crayfish valued at \$911,000; buffalofish valued at \$179,000; freshwater drum valued at \$114,000; baby turtles valued at \$69,000; bullfrog valued at \$48,000; turtles valued at \$40,000; bullheads valued at \$31,000; garfish valued at \$26,000; blue crabs valued at \$21,000; and nutria meat valued at \$20,000.

SURVEY OF NON-LICENSED COMMERCIAL FISHERMEN WHO HAD A MOTOR BOAT LICENSE

The commercial fishing boat license registration for the parishes of Assumption, St. Martin, St. Mary, Iberia, Iberville, St. Landry and Pointe Coupee (Figure 8) was checked against the commercial fishing license registration for these parishes. In these parishes there were 1,021 fishermen who had a commercial fishing boat license and no commercial fishing license. Originally, it was planned that a 10 percent sample of these would be interviewed, however, because of the lack of personnel this survey was terminated after only 14 fishermen were interviewed. Thus, for this survey the sampling fraction equals .0137. Estimates were made from these 14 interviews; however, it should be emphasized, because of the small sample size, these estimates should be considered as only a very rough index. The survey was conducted in the same manner as the survey of the licensed commercial fishermen.

During 1962, there were 803 commercial fishermen with a commercial fishing boat license but with no commercial fishing license utilizing the Atchafalaya Basin Floodway (Table 13). The characteristics of these fishermen are given in Table 13, while the amount of gear they fished in the Atchafalaya Basin Floodway is given in Table 14. These fishermen harvested 6,946,350 pounds of aquatic organisms from the Atchafalaya Basin Floodway valued at \$1,224,404 (Table 15). There were 3,061,000 pounds of catfish; 1,226,277 pounds of crayfish; and 1,313,869 pounds of blue crab harvested.

ESTIMATES OF COMMERCIAL FISHERMEN WITHOUT EITHER A COMMERCIAL FISHING BOAT LICENSE OR A COMMERCIAL FISHING LICENSE.

A commercial fisherman in the Atchafalaya Basin Floodway may or may not have a commercial fishing license. Let's represent these conditions by the following symbols:

F = Fishermen who have commercial fishing licenses

f = Fishermen who have no commercial fishing licenses

These same fishermen may or may not have a commercial fishing boat license. This can be represented by:

B = Fishermen who have commercial fishing boat licenses

b = Fishermen who have no commercial fishing boat licenses

Thus, the following conditions are possible: (1) FB, (2) Fb, (3) fB, and (4) fb. Conditions 1 through 3 will appear in one or more of the license registrations. However, condition 4 will not appear in the license registrations and these fishermen will not appear in any of the

samples. Therefore, an estimate of the number of these fishermen is desirable.

From our survey of the licensed commercial fishermen, it is possible to determine the proportion of these fishermen which don't have a commercial fishing boat license or p_b . If we assume that the conditional probability of a fishermen not having a boat license, given that he has a commercial fishing license, is equal to the probability of a fishermen not having a boat license, P_b will be an estimate of P_b , the probability that a fisherman in the Atchafalaya Basin Floodway does not have a commercial fishing boat license. Under similar assumptions, p_r , the proportion which don't have a commercial fishing license can be obtained from the commercial fishing boat registration, and this will give an estimate of P_r , the probability of a fisherman not having a commercial fishing license.

Still assuming that the two events P_b and P_r are mutually independent, the compound probability that both events will occur together is given by $P_{rb} = P_b P_r$ where P_{rb} is the probability that the fisherman will have neither license. Thus, an estimate of condition 4 is given by $p_{rb} = p_b p_r$. However, the assumption of mutually independent events can be questioned. I believe it is reasonable to assume that if a fisherman has a commercial fishing license he is more likely to buy a commercial fishing boat license than one that does not have a boat license and vice versa. If this is true, however, I have no data to substantiate this, then, on the average $p_r > P_r$ and $p_b > P_b$ and $p_{rb} > P_{rb}$. Thus, p_{rb} should be a maximum estimate of P_{rb} and q_{rb} should be a minimum estimate of Q_{rb} where $q_{rb} = 1 - p_{rb}$ and $Q_{rb} = 1 - P_{rb}$. Maximum estimates of $P_{rb, \max}$ and minimum estimates of $Q_{rb, \min}$ were made in this manner.

Thus from Table 8, $p_b = .269$ and from the examination of the commercial fishing boat registration in the parishes of Assumption, St. Martin, St. Mary, Iberia, Iberville, St. Landry and Pointe Coupee, it was found that $p_r = 1021/1333 = .766$. Thus, $p_{rb, \max} = .269 (.766) = .2061$ and $q_{rb, \min} = .7939$. From Tables 7 and 13 it is found that the number of fishermen which utilized the Atchafalaya Basin Floodway during 1962 and which had a commercial fishing boat license and/or a commercial fishing license is equal to 419+803 or 1,222. Then, an estimate of the maximum number of Commercial fishermen utilizing the Atchafalaya Basin Floodway is equal to 1,222/.7939 or 1,539. This is reasonably close to the estimate of 1,714 obtained from the survey of retail and wholesale fish dealers (Table 11). Thus, there is probably a maximum of 317 fishermen in the area which don't have either a commercial fishing boat license or a commercial fishing license.

I would assume, that the average catch of these fishermen is probably more similar to the catch of the fishermen who had a commercial fishing boat license but no commercial fishing license, than the fishermen with a commercial fishing license. Based on the average catch of the fishermen with a commercial fishing boat license but who had no commercial fishing license, it is estimated that these 317 fishermen harvested 2,742,050 pounds of commercial organisms from the Atchafalaya Basin Floodway during 1962. The combined catch for all types of commercial fishermen is equal to 2,742,050+6,946,350+5,300,489 or 14,988,889 pounds of aquatic organisms, which is very close to the estimated catch of 15,030,773 pounds obtained from the surveys of wholesale and retail dealers. Because there are fewer assumptions involved, I consider the data obtained from the wholesale and retail dealers as the best available estimate of the commercial production of aquatic organisms in the Atchafalaya Basin Floodway during 1962.

GENERAL DESCRIPTION OF THE COMMERCIAL FISHERIES

The commercial fishery for crayfish is peculiar to Louisiana. It is seasonal, being limited almost entirely to the spring and early summer months. Almost all of the commercial catch is taken in traps constructed of $\frac{3}{4}$ -inch poultry wire baited with fish or meat of some type (Figure 7). These traps are fished in deep water, sometimes in water of depths of 15 or 20 feet or more, during the overflow periods in the Atchafalaya Basin Floodway. Crayfish from the area are rela-

tively large and I have weighed specimens which were running six to the pound. All of the commercial catch is sold for human consumption.

The commercial catch of catfish consists of three species, channel, blue and flathead catfish. However, channel catfish seem to predominate in the catch. A considerable portion of the total production is taken on trot lines, however, many are taken in hoop-nets.

Buffalofish, freshwater drum, garfish, are harvested mainly with gill nets, trammel nets, seine, and hoop-nets and these fish are sold mainly for human consumption. Nutria meat is shipped mainly to the northern and western states for use as mink food, while baby turtles are sold as pets and novelties. Blue crabs are caught mainly on trot lines. River shrimp are taken mainly in small baited wire traps and are sold mainly for human consumption.

PAST AND FUTURE TRENDS

An extensive commercial fishery used to occur in the many lakes and bayous located in the West Atchafalaya Basin Floodway and Morganza Floodway. However, since the construction of levees along the Atchafalaya River, these areas are relatively unimportant for the production of commercial aquatic organisms. Presently, most of the commercial fishing in the basin is concentrated in the Atchafalaya Basin Floodway. The extension of the levees has also adversely affected the commercial fishing in the extreme northern section of the Atchafalaya Basin Floodway.

Even though 15,030,773 pounds or 27 pounds per acre of commercial aquatic organisms were produced in the 562,000-acre Atchafalaya Basin Floodway during 1962, I believe that the potential for greatly increasing the commercial harvest is good under the present conditions existing in the floodway. Many of the species of fish in the area are under-exploited. I am of the opinion that the production of crayfish could be increased substantially, simply by increasing the fishing pressure on them during the times of the year when they are available. The catch of such fish as bowfin, bullheads, freshwater drum, etc., could be increased. The take of nutria meat could be expanded greatly. Mullet, even though it is one of the most abundant of all species of fish in the Atchafalaya Basin Floodway is almost completely unexploited. Yet, this same fish is one of the most valuable food fish in the south. Markets need to be developed for this species. No data are available on the rate of exploitation of catfish in the area, and since the catch is rather high, it is not known whether or not their exploitation could be increased substantially.

Depending upon conditions in the Atchafalaya Basin Floodway, exceptionally large catches are often made in relatively short periods of time. This results in the market becoming glutted and the fishermen either find it difficult to sell their catch or have to sell it at reduced prices. The process of marketing the commercial catch from the Atchafalaya Basin Floodway is in urgent need of study and modernization. If this is done, and markets for the under-exploited species are developed, the commercial production of aquatic organisms in the Atchafalaya Basin Floodway should in the future increase greatly, assuming that the present ecological conditions existing in the basin are maintained.

ACKNOWLEDGMENTS

I am indebted to the many employees of the Louisiana Wild Life and Fisheries Commission who assisted in the collection and analyses of the data and who made many useful suggestions. The many employees who assisted in conducting the surveys are too numerous to acknowledge here by name, however, personnel of the Enforcement Division; Oyster, Water Bottoms and Seafood Division; Fish and Game Division; and Education Section of the Commission rendered assistance.

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TABLE 1 SEGMENTS OF THE ATCHAFALAYA BASIN.

Segment	Area in Acres
Morganza Floodway	71,000
West Atchafalaya Basin Floodway	151,200
Atchafalaya Basin Floodway	562,000
Pointe Coupee Sump Area	12,800 ¹
Leveed Atchafalaya River and other segments	64,000
TOTAL	860,000

¹Area includes only sump area on which flowage easements have been obtained by Federal Government. Total area of this segment is 84,000 acres.

TABLE 2 COMMON AQUATIC ORGANISMS OCCURRING IN THE ATCHAFALAYA BASIN FLOODWAY MENTIONED IN THIS REPORT.

Common name	Scientific name
Bass	
Largemouth bass	<i>Micropterus salmoides</i>
Spotted bass	<i>Micropterus punctulatus</i>
Crappie	
Black crappie	<i>Pomoxis nigromaculatus</i>
White crappie	<i>Pomoxis annularis</i>
Sunfish	
Bluegill	<i>Lepomis macrochirus</i>
Redear sunfish	<i>Lepomis microlophus</i>
Warmouth	<i>Chaenobryttus gulosus</i>
Striped bass	
White bass	<i>Roccus chrysops</i>
Yellow bass	<i>Roccus mississippiensis</i>
Catfish	
Blue catfish	<i>Ictalurus furcatus</i>
Channel catfish	<i>Ictalurus punctatus</i>
Flathead catfish	<i>Pylodictis olivoris</i>
Bullheads	
Yellow bullhead	<i>Ictalurus natalis</i>
Black bullhead	<i>Ictalurus melas</i>
Freshwater drum	<i>Aplodinotus grunniens</i>
Mullet	<i>Mugil cephalus</i>
Bowfin	<i>Amia calva</i>
Buffalofish	
Smallmouth buffalo	<i>Ictiobus bubalus</i>
Bigmouth buffalo	<i>Ictiobus cyprinellus</i>
Black buffalo	<i>Ictiobus niger</i>
Carp	<i>Clinostomus funduloides</i>
Garfish	
Spotted gar	<i>Lepisosteus oculatus</i>
Longnose gar	<i>Lepisosteus osseus</i>
Shortnose gar	<i>Lepisosteus platostomus</i>
Alligator gar	<i>Lepisosteus spatula</i>
Paddlefish	<i>Polydom spathula</i>
Blue crab	<i>Callinectes sapidus</i>
Crayfish	<i>Procambarus clarki</i>
River shrimp	<i>Macrobrachium ohione</i>
Turtles	(numerous species)
Raccoon	<i>Procyon lotor</i>
Nutria	<i>Myocastor coypus</i>

TABLE 3 DESCRIPTION OF CREEL SURVEY CHECK STATIONS. LOCATION NUMBERS REFER TO THOSE SHOWN IN FIGURE 5.

Location Number	Description of check station
1	Boat launching sites at Morgan City south of railroad bridge on east side of Atchafalaya River
2	Morgan City and levee road on East Floodway levee
3	Belle River Bridge
4	Bayou Pigeon Bridge
5	Bayou Sorrel Ferry
6	Ramah Bridge
7	Levee Road on East Floodway levee and U. S. Highway 190
8	U. S. Highway 190 and road to Sherburne
9	Levee road on West Floodway levee and U. S. Highway 190
10	Road from Portage and Levee Road on West Floodway levee
11	Henderson Bridge and Levee Road on West Floodway levee
12	Bridge over Catahoula Lake
13	Road from Coteau Holmes and levee road on west floodway levee
14	Charenton Beach Road and West Floodway levee
15	Verdunville Canal Road and West Floodway levee
16	Patterson Bridge
17	Landings along U. S. Hwy. 190 on west side of Atchafalaya
18	Levee road south of Krotz Springs

TABLE 4 CHECKING SCHEDULE FOR ATCHAFALAYA BASIN FLOODWAY CREEL SURVEY.

Check Station location number	Sat. May 11	Sun. May 12	Mon. May 13	Tues. May 14	Wed. May 15	Thurs. May 16	Fri. May 17	Sat. May 18	Sun. May 19
1	---	---	---	---	---	X	X	X	X
2	X	---	X	---	X	X	X	X	X
3	X	---	X	---	X	X	X	X	X
4	X	---	X	---	X	X	X	X	X
5	X	---	X	---	X	X	X	X	X
6	X	---	X	---	X	X	X	X	X
7	X	---	X	---	X	X	X	X	X
8	---	---	---	---	---	X	X	X	X
9	---	X	---	X	---	X	X	X	X
10	---	---	---	---	---	X	X	X	X
11	---	X	---	X	---	X	X	X	X
12	---	X	---	X	---	X	X	X	X
13	---	X	---	X	---	X	X	X	X
14	---	X	---	X	---	X	X	X	X
15	---	X	---	X	---	X	X	X	X
16	---	---	---	---	---	X	X	X	X
17	---	---	---	---	---	X	X	X	X
18	---	---	---	---	---	X	X	X	X

TABLE 5 ESTIMATED MAN-DAYS OF FISHING AND THE NUMBER OF FISH CAUGHT FROM THE ATCHAFALAYA BASIN FLOODWAY.

	Man-days of fishing other than crayfishing	Fish caught by sport fishermen other than sport crayfish fishermen					Man-days of man-days of fishing of fishing	Total number of fishermen checked
		Bass						
		Crappie	Sunfish	Striped Bass	Catfish	Other Fish		
EAST SIDE								
Number	6,941	10,373	2,605	40,036	117	9,004	63,821	
Number per trip	---	---	---	---	---	---	9,20	
WEST SIDE								
Number	10,782	6,467	25,892	97,736	74	4,970	136,347	
Number per trip	---	---	---	---	---	---	12.65	
TOTAL								
Number	17,723	16,840	28,497	137,772	191	13,974	200,168	
Number per trip	---	---	---	---	---	---	11.29	

TABLE 6 ESTIMATED MAN-DAYS OF FISHING AND THE NUMBER OF FISH CAUGHT FROM THE ATCHAFALAYA BASIN FLOODWAY BY CHECK STATION LOCATIONS

Check Station number	Man-days of fishing other than crayfishing	Fish caught by sport fishermen other than crayfish fishermen										Man-days of Crayfishing	Total man-days of fishing	Number of fishermen checked
		Number												
		Bass					Other Fish							
		Bass	Crappie	Sunfish	Striped Bass	Catfish	Total	Other Fish	Total	per Trip	Total Number			
1	301	274	18	2,106	---	262	---	---	---	2,660	---	8.84	301	146
2	134	237	9	729	49	49	5	---	---	1,029	---	7.68	135	106
3	1,401	5,693	483	8,837	11	549	181	15,754	11.24	17	1,418	1,125	1,418	1,125
4	720	1,144	211	1,362	15	2,620	80	5,432	7.54	129	849	655	849	655
5	592	316	46	2,392	18	1,451	76	4,299	7.26	72	664	525	664	525
6	2,961	1,667	554	18,172	53	3,747	394	24,587	8.30	13	2,974	2,516	2,974	2,516
7	179	157	6	1,804	115	9	---	---	---	2,091	---	11.68	185	130
8	653	885	1,278	4,634	20	211	941	7,969	12.20	---	---	653	311	311
9	3,182	1,153	16,781	16,381	3	322	263	34,903	10.97	---	---	3,182	2,253	2,253
10	1,229	20	65	553	---	80	65	783	6.07	---	---	3	132	60
11	5,429	3,187	7,964	69,633	60	3,571	128	84,543	15.57	---	---	5,429	3,848	3,848
12	283	283	203	1,415	2	314	35	2,252	7.96	---	---	3	286	212
13	298	588	404	1,810	0	131	18	2,946	9.89	---	---	3	301	204
14	222	761	270	2,380	2	193	353	3,887	17.51	---	---	11	223	160
15	96	59	9	353	7	30	12	470	4.90	---	---	11	107	56
16	278	96	0	394	0	106	16	612	2.20	---	---	8	286	143
17	457	232	96	2,830	0	64	189	3,411	7.46	---	---	---	457	211
18	408	93	100	2,059	---	159	129	2,540	6.23	---	---	---	408	190

TABLE 7 NUMBER OF LICENSED COMMERCIAL FISHERMEN UTILIZING THE ATCHAFALAYA BASIN FLOODWAY DURING 1962.

Parish	Number
Pointe Coupee	4
St. Landry	93
Iberia	8
St. Mary	121
Iberville	110
St. Martin	49
Assumption	4
Total	419

TABLE 8 CHARACTERISTICS OF LICENSED COMMERCIAL FISHERMEN UTILIZING ATCHAFALAYA BASIN FLOODWAY DURING 1962.

Item	Number	Per cent of total number for the floodway
(1) People involved in fishing operation, including helpers	602	—
(2) Fishermen depending on it as main source of income	220	52.6
(3) People depending on it as a source of income	2,128	—
(4) People depending on it as a main source of income	1,118	52.5
(5) Fishermen (licensed) fishing exclusively in the floodway	349	83.3
(6) Boats owned by fishermen	548	—
(7) Fishermen with a boat license	306	73.1
(8) Boat licenses		
Pleasure	0	—
Commercial fish.	408	100.00
Comm. passenger	0	—
Other	0	—
Total	408	—
(9) Fishermen with a commercial fishing boat license	306	73.1

TABLE 9 ESTIMATED AMOUNT OF GEAR USED BY LICENSED COMMERCIAL FISHERMEN IN ATCHAFALAYA BASIN FLOODWAY DURING 1962.

Gear	Amount
Trot lines	144,668 hooks or drops
Seines	15,579 feet
Gill nets	77,434 feet
Trammel nets	73,624 feet
Hoop nets	8,324
Crayfish traps	15,294
Crab nets	537
Crayfish drop nets	215
Shrimp traps	403
Dip nets (for river shrimp)	22

TABLE 10 ESTIMATED HARVEST OF FISH FROM THE ATCHAFALAYA BASIN FLOODWAY BY LICENSED COMMERCIAL FISHERMEN DURING 1962

Kind of fish	Total		Sold to non-license buyers	
	Pounds	Value in dollars	Pounds	Percent of total Pounds
Bowfin	140,315	\$ 11,660.18	8,921	6.358
Buffalofish	1,179,099	122,272.56	14,590	1.237
Bullheads	271,495	37,140.52	7,255	2.672
Carp	148,054	5,137.47	4,837	3.267
Catfish	1,089,127	256,816.15	30,530	2.803
Garfish	660,964	41,640.73	17,063	2.582
Paddlefish	4,917	419.70		0.000
Fresh-water				
drum	661,013	63,523.35	13,913	2.105
Mullet	193,464	5,803.92	672	0.347
Blue crab	41,380	2,755.90	2,687	6.493
Crayfish	763,146	136,679.45	27,676	3.627
River shrimp	7,927	2,204.50	3,224	40.671
Turtles (baby)	23,941	9,095.19		0.000
Turtles				
(other)	35,764	6,455.40	13,032	36.439
Nutria meat	6,825	307.81	108	1.382
Bullfrog	73,060	30,721.73		0.000
Total	5,300,489	\$732,706.56	144,507	2.726

TABLE 11 CHARACTERISTICS OF WHOLESALE AND RETAIL DEALERS BUYING FISH FROM THE ATCHAFALAYA BASIN FLOODWAY DURING 1962.

	Retail	Wholesale	Total
Number of dealers buying fish from the floodway	112	41	153
Number of people employed in establishments	769	258	1,027
Number of fishermen in the Atchafalaya Basin Floodway from whom they buy fish	501	1,213	1,714

TABLE 12 FISH BOUGHT BY WHOLESALE AND RETAIL DEALERS FROM
ATCHAFALAYA BASIN FLOODWAY DURING 1962.

Kind of fish	Wholesale dealer		Retail dealers		Total	
	lbs.	value in dollars	lbs.	value in dollars	lbs.	value in dollars
Bowfin	49,100	\$ 2,263.00	36,568	\$ 4,858.32	85,668	\$ 7,121.32
Buffalofish	1,474,708	156,016.88	246,312	22,484.10	1,721,020	178,500.98
Bullheads	152,600	14,835.00	74,703	16,257.09	227,303	31,092.09
Carp	122,001	3,667.03	36,568	1,828.40	158,569	5,495.43
Catfish	4,004,818	985,393.62	871,189	164,294.91	4,876,007	1,149,688.58
Garfish	346,250	18,588.00	67,390	7,465.10	413,640	26,053.10
Paddlefish	3,900	390.00	.....	.....	3,900	390.00
Freshwater-drum	977,863	94,599.80	210,162	19,540.89	1,188,025	114,140.69
Mullet	1,100	33.00	.....	.....	1,100	33.00
Blue crab	300,600	18,030.00	17,677	3,177.50	318,630	21,207.50
Crayfish	2,782,817	525,809.35	2,306,341	385,572.57	5,089,158	911,381.92
River shrimp	16,287	4,621.75	1,045	198.51	17,332	4,820.26
Turtles (baby)	182,157	69,195.70	.....	.....	182,157	69,195.70
Turtles (other)	82,916	18,223.92	141,048	22,202.00	223,964	40,429.92
Raccoon meat	.....	.....	1,045	783.60	1,045	783.60
Nutria meat	439,581	19,833.24	.....	.....	439,581	19,833.24
Bullfrog	100,843	43,110.30	12,276	4,453.46	113,119	47,563.76
Trash fish	2,252	112.60	.....	.....	2,252	112.60
Total	11,039,793	\$1,974,723.19	3,990,980	\$653,214.68	15,030,773	\$2,627,937.87
						\$.1748

TABLE 13 CHARACTERISTICS OF COMMERCIAL FISHERMEN FISHING IN THE ATCHAFALAYA BASIN FLOODWAY DURING 1962 WHO HAD A COMMERCIAL BOAT LICENSE BUT NO COMMERCIAL FISHING LICENSE.

Item	Number	Percent of total number for area
(1) Number of fishermen	803	—
(2) People involved in fishing operation, including helpers	1095	—
(3) Fishermen depending on it as a main source of income	511	63.6
(4) People depending on it as a source of income	3504	—
(5) People depending on it as a main source of income	2263	64.6
(6) Fishermen fishing exclusively in area	511	63.6

TABLE 14 ESTIMATED AMOUNT OF GEAR USED BY COMMERCIAL FISHERMEN IN THE ATCHAFALAYA BASIN FLOODWAY DURING 1962, WHO HAD A COMMERCIAL BOAT LICENSE BUT NO COMMERCIAL FISHING LICENSE.

Gear	Amount
Trot lines	379,562 hooks or drops
Crayfish traps	30,073
Dip nets	730
Cast nets	292

TABLE 15 ESTIMATED HARVEST OF FISH FROM THE ATCHAFALAYA BASIN FLOODWAY DURING 1962 BY FISHERMEN WHO HAD A COMMERCIAL BOAT LICENSE BUT NO COMMERCIAL FISHING LICENSE.

Kind of fish	Pounds	Value in dollars
Catfish	3,660,584	\$ 863,165.70
Crayfish	1,226,277	219,626.21
Blue crab	1,313,869	87,503.68
Nutria meat	675,182	30,450.71
Bullfrog	36,496	15,346.57
Turtles (baby)	2,920	1,109.31
Turtles (other)	14,599	2,635.12
River Shrimp	16,423	4,567.24
Total	6,946,350	\$1,224,404.54

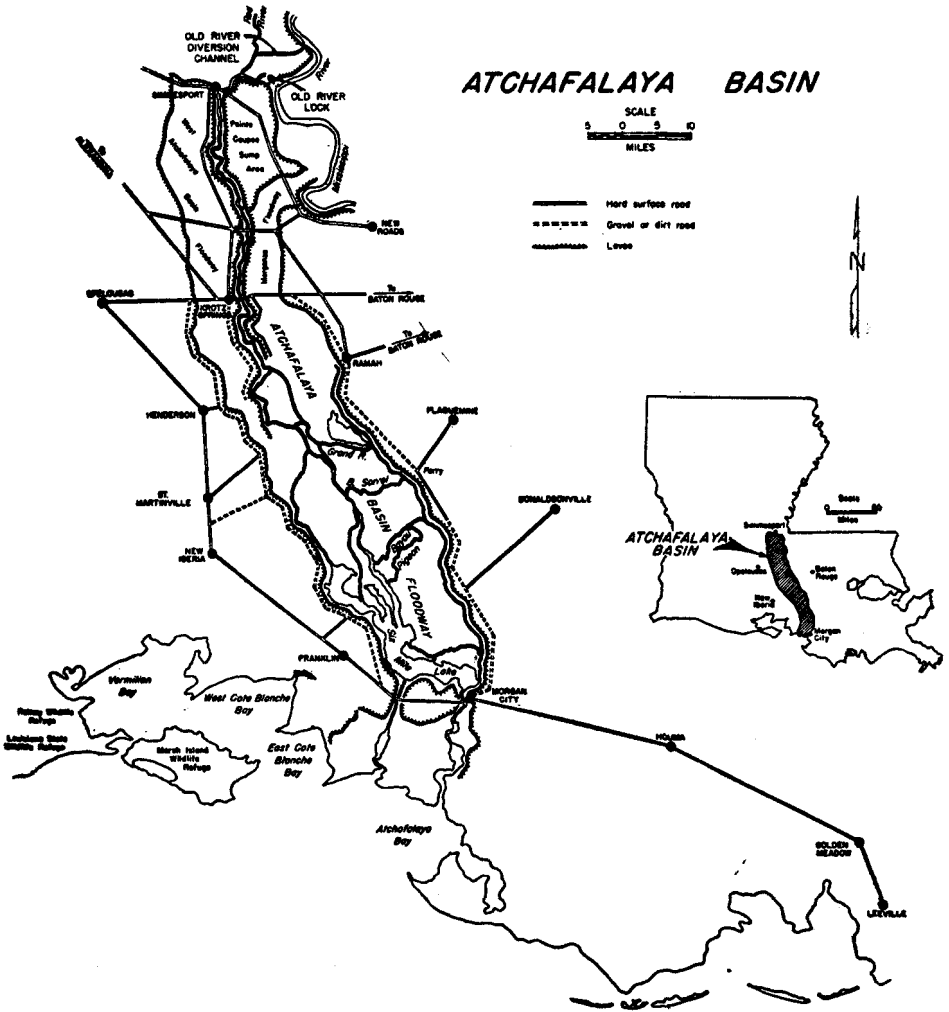


Figure 1. The Atchafalaya Basin.



Figure 2. Typical view of the Atchafalaya Basin Floodway.

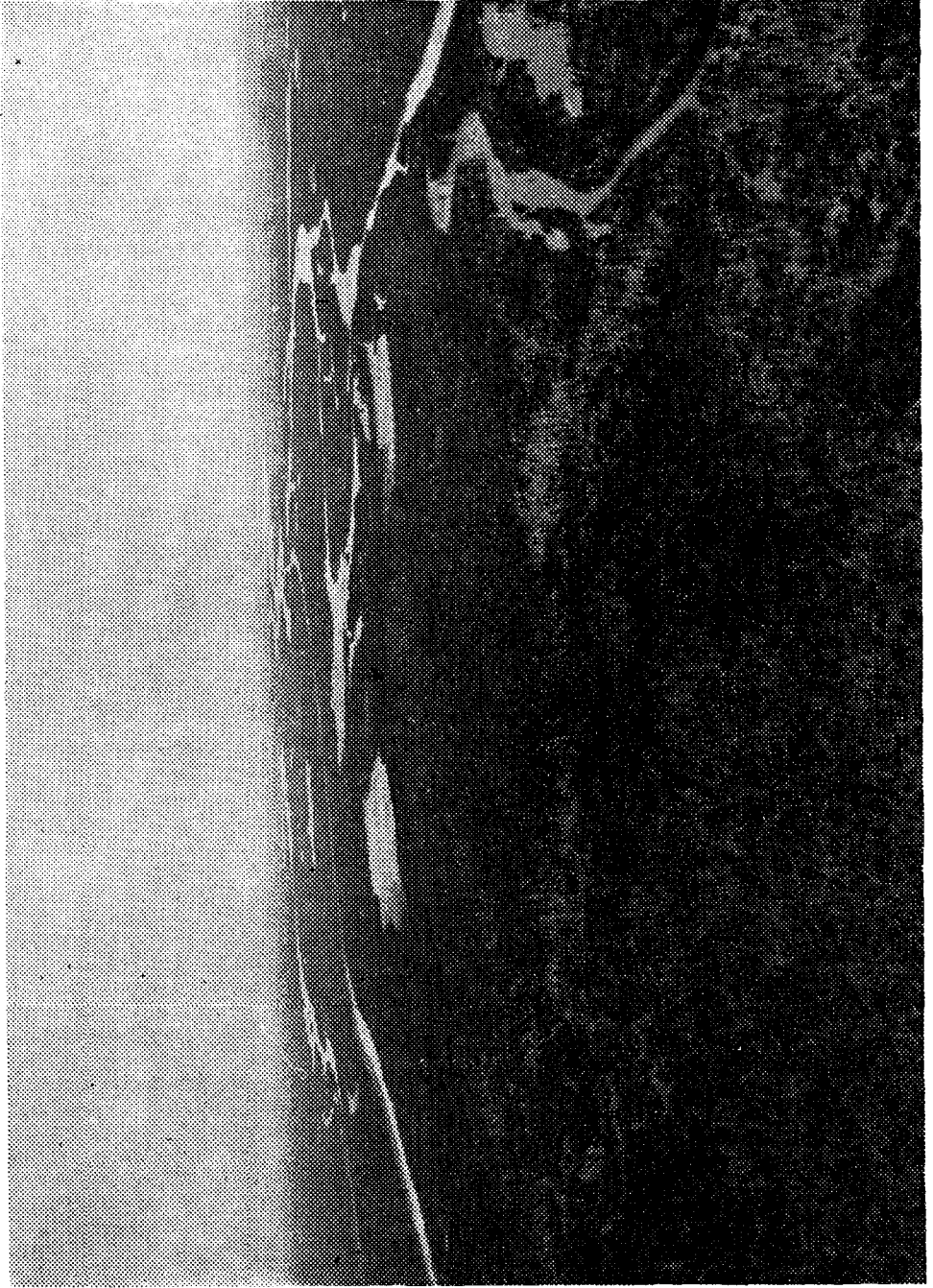


Figure 3. Typical view of the Atchafalaya Basin Floodway.

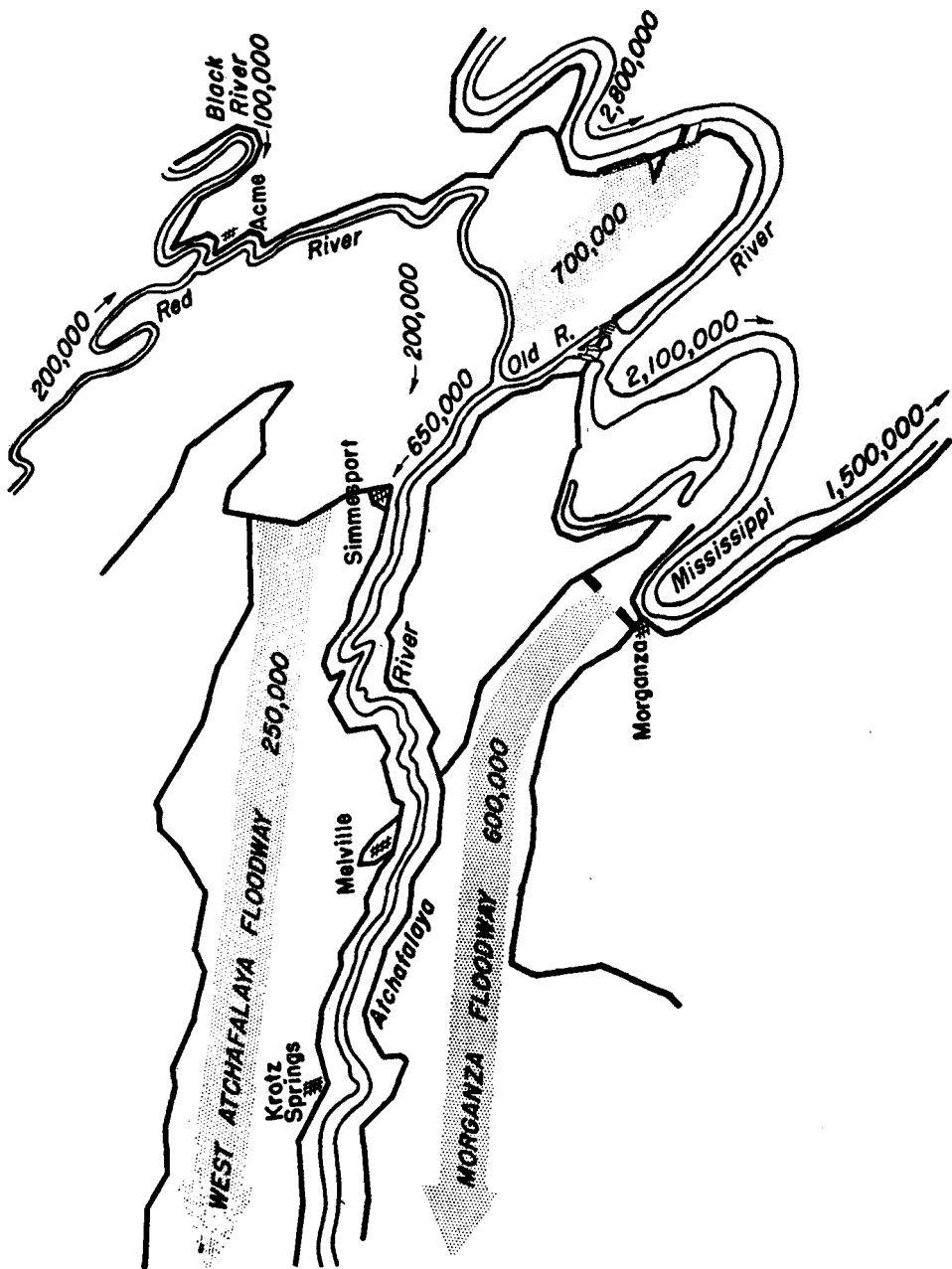


Figure 4. Distribution of project flood, latitude of Old River, in cubic feet per second.

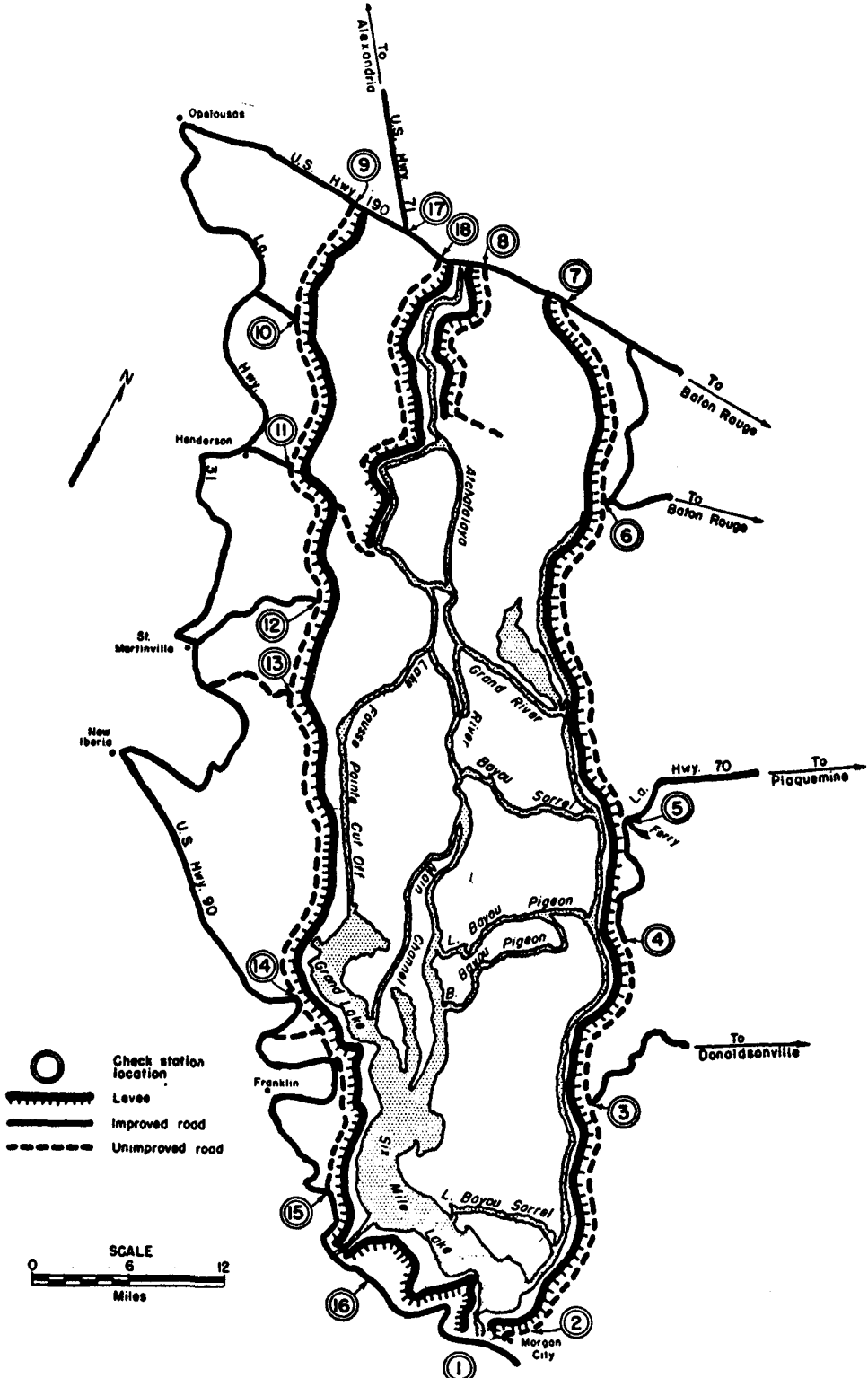


Figure 5. Atchafalaya Basin Floodway showing location of creel survey check station.



Figure 6. Crayfish drop nets.

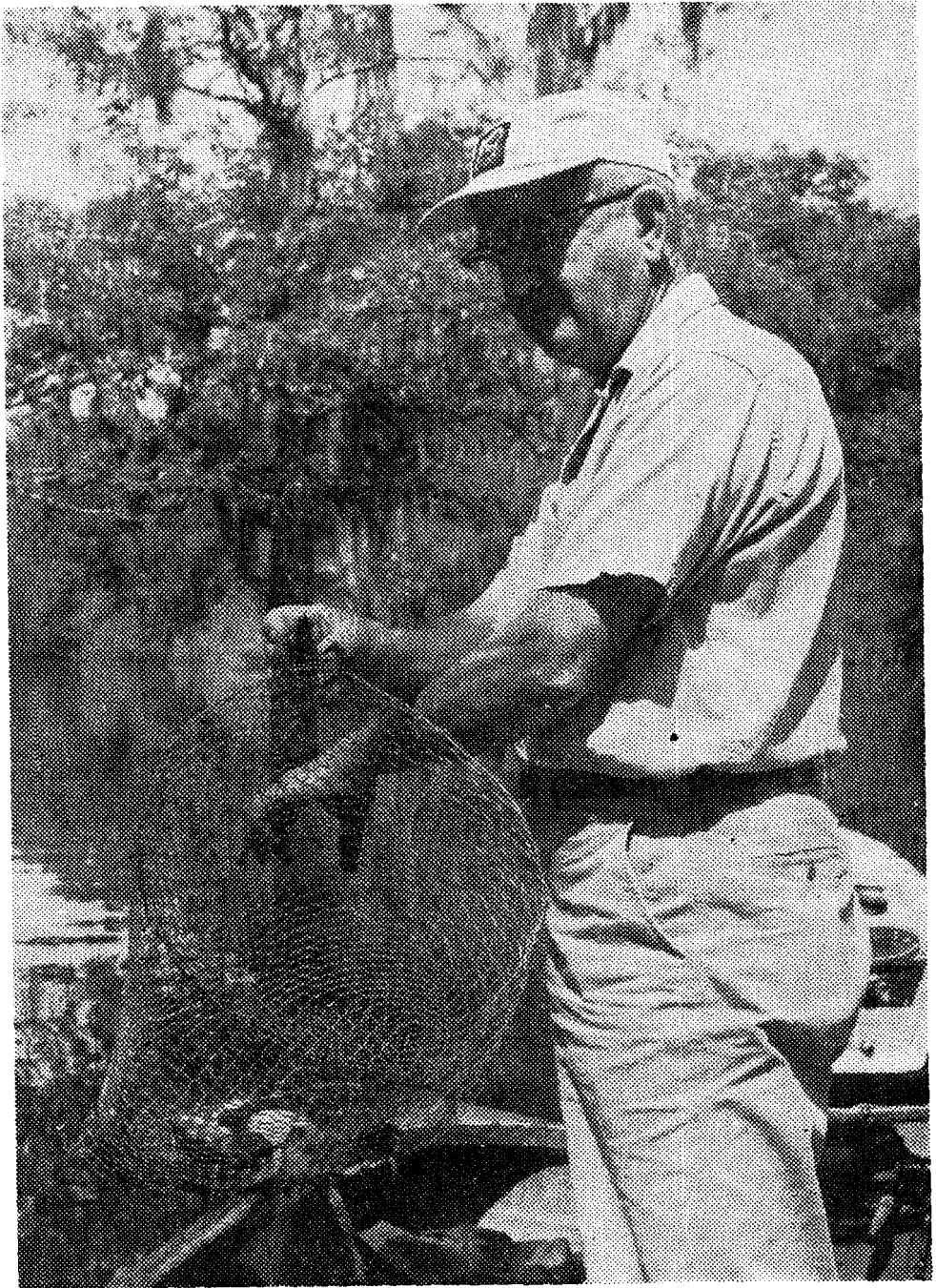


Figure 7. Crayfish trap.

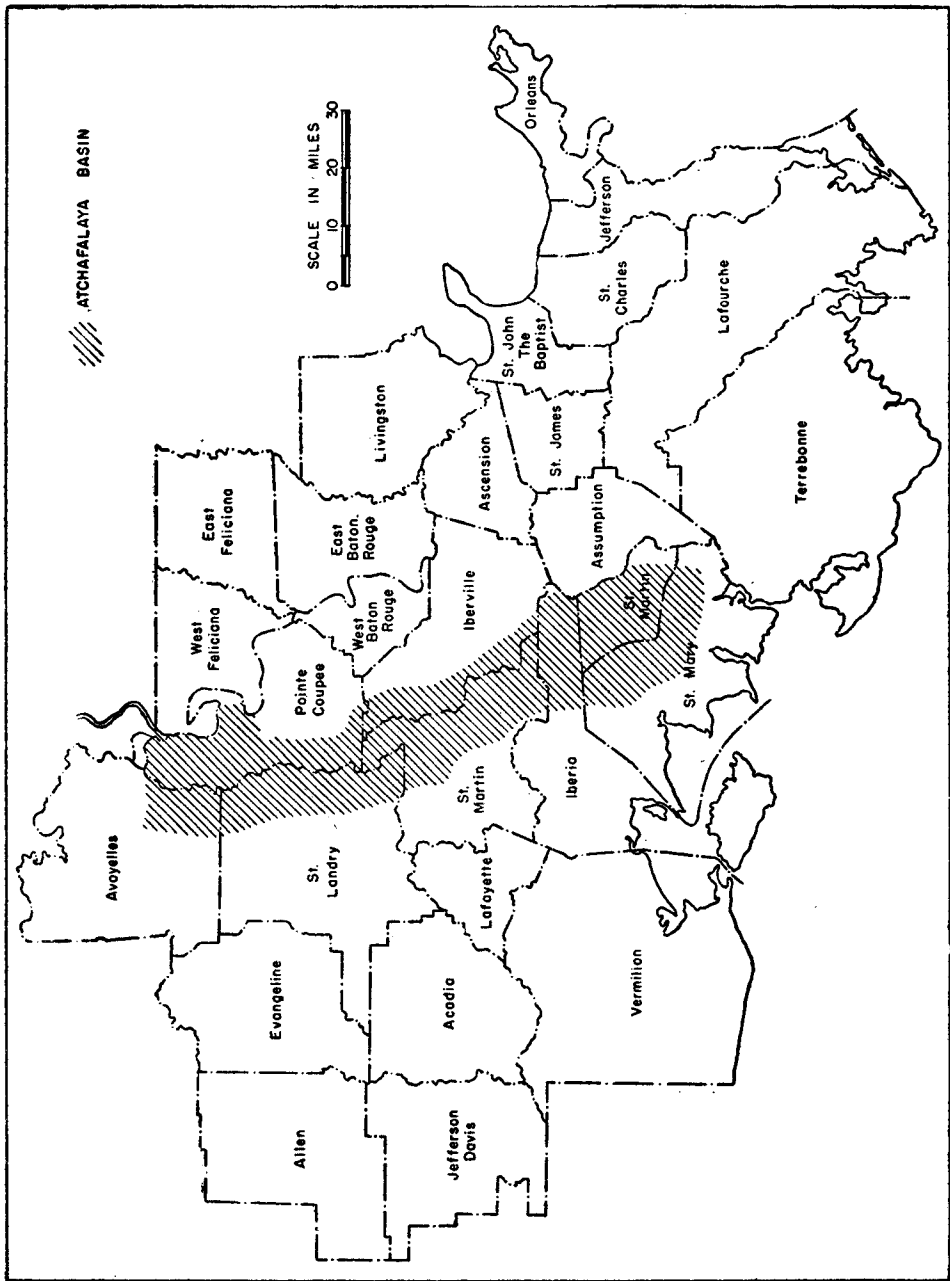


Figure 8. Map showing parishes in which the Atchafalaya Basin is located and the surrounding parishes.