

# COMMERCIAL FISH PRODUCTION IN ARKANSAS

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During the past few years, increased interest has been centered on the raising of salable fish. Many hatcheries have sprung up for the purpose of raising minnows on a part- or full-time basis. Several farmers have constructed ponds, stocked them and are selling bait minnows with profit. Rice farmers have stocked irrigation reservoirs, borrow pits and rice field areas with commercial food fish. Others have expressed a desire to raise food fish on flooded rice field areas on a crop rotation basis.

Continual inquiries are being made of technicians concerning the practicability and management problems concerned with raising commercial fish. Due to the increase in fishing waters in Arkansas, it appears that the raising of bait minnows should receive attention and encouragement. The raising of commercial food fish has been stimulated by an increase in the number of private, multiple purpose reservoirs and the need for producing a complementary cash crop on rice field areas. The propagation of buffalo fish, catfish and carp is being seriously undertaken. Considerable information needs to be available on the stocking, habits and harvestability of these fish.

This survey was conducted during the summer of 1953 by visiting 97 producers and recording data from personal inspection and interviews.

## TYPES OF FISH PRODUCED COMMERCIALY

The production of commercial fish can be divided into three groups: (1) propagation of bait minnows, (2) raising of commercial fish for food purposes, and (3) growing fish in a private reservoir where fishing privileges are sold. Only the first two groups were considered in this survey since they involve the direct sale of commercial fish.

In the propagation of bait minnows, the local demand determines the species produced in any area. In northern Arkansas, the fathead minnow, *Pimephales promelas*, Raf., is desired by both retailer and sportsman. Consequently, the fathead is the prevailing type raised in this region. The golden shiner, *Notemigonus crysoleucas*, Raf., is predominantly raised and used for bait in central and eastern Arkansas. A few goldfish, *Carassius auratus*, Lin., are grown and sold for ornamental purposes. Many goldfish are also raised for fish bait and the largest market for goldfish produced in this section is in west Tennessee and Mississippi. A few carp-goldfish hybrids, *Cyprinus carpio* × *Carassius auratus* are raised in central Arkansas but the market for these is in the southwestern part of the state and northern Mississippi. In the southern part of Arkansas, the golden shiner is primarily raised because it is demanded by the fishermen of that section.

Commercial food fish: buffalo, *Megastomatobus cyprinella*, Val., and *Ictiobus* sp., channel catfish, *Ictalurus lacustris*, Wal., and carp, *Cyprinus carpio*, Lin., have

been stocked in a few private reservoirs in east-central Arkansas. These impoundments consist of irrigation reservoirs, flooded areas for clearing timber, and rice field land in which the height of the outside levees have been raised to increase the water capacity. Rainbow trout, *Salmo gairdnerii*, are produced in a few hatcheries in the northwestern part of the state.

## STOCKING SYSTEMS

The majority of minnow growers stock their ponds in the spring with brood fish and raise a crop of young to salable size. Stocking ratios vary with the type of minnow and individual grower. For the golden shiner, the number stocked varied from 100 to 1,200, the average being about 250, per surface acre. The number of fatheads stocked were considerably higher. This number ran from 500 to 10,000, the average being about 1,200, per acre. Most of the smaller hatcheries that raise goldfish place brood stock in a pond similar to other minnow stocking. This stocking varied from 100 to 1,500, the average being about 200, per surface acre. Three of the larger hatcheries used the egg transfer method in which spawning mats are placed in brood ponds with selected brood stock and the mats with fertilized eggs are transferred to hatching and rearing ponds.

Commercial food fish have not been stocked in conformity with any specific plan. Much of the initial stock has necessarily been obtained from commercial fishermen on public waters or from fish salvage operations. Buffalo fish, of fingerling size, produced by one grower have been stocked in three reservoirs; additional larger buffalo, obtained from commercial fishermen, have also been added. This same practice has been followed with channel catfish. Indefinite numbers of carp have been stocked in a few reservoirs. These have been obtained from commercial fishermen and salvage crews. Rainbow trout are hatched from eggs on trays and placed in successive raceways as they grow larger.

## FISH PRODUCTION AND HARVEST

A list of 78 bait minnow growers and 19 commercial food fish raisers was obtained, and these individuals were interviewed for information concerning their operations. Fig. 1 shows the number of fish producing units and the total acreage devoted to fish production in each county. Commercial food fish producers are located in Lawrence, Jackson, Lonoke, Jefferson, and Arkansas counties. Trout hatcheries are located in Benton, Washington, and Searcy counties. Table 1 gives a summary of the approximate acreage in commercial fish production during 1952 and 1953.

Table 2 shows a summary of the numbers of fish harvested and the estimated gross income to producers in 1952. The values obtained were based on the prevailing wholesale prices.

## PREDATORS AND DISEASES ENCOUNTERED BY PRODUCERS

Practically every minnow grower listed the green sunfish as the main predator. These were considerably reduced in hatcheries with a controlled water supply. In the spring of 1953, two hatcheries had stocked small ponds with green sunfish in the hope that a profitable harvest might be obtained in the sale of trot-line bait. Other predators included crayfish, aquatic birds, frogs, snakes, turtles, and water beetles.



Fig. 1. Indicating the number of individual commercial fish producers in each County and the surface area, in acres, i.e., Lonoke County has 12 individual persons and 1,365 acres of water impounded for fish production.

Table 1. The number of acres of water devoted to commercial fish production during 1952 and 1953.

Season	Carp-goldfish	Fathead	Golden shiner	Goldfish	Foodfish	Rainbow trout	Total acres
1952		45.5	698.50	289.0	280.0	11.1	1,323.10
1953	140.0	48.0	785.75	422.0	2,557.0	11.1	3,963.85

Table 2. Approximate number of fish harvested and the estimated gross income to producers in 1952.

Fish harvested	Carp-goldfish	Fathead	Golden shiner	Goldfish	Foodfish	Rainbow trout	Total
Number		4,790,000	11,022,000	10,845,000		200,000	26,857,000
Value		\$57,480	\$165,000	\$162,675		\$150,000	\$535,485

The common fish-fungus disease, caused by *Saprolegnia* sp., has caused considerable loss to the producer. One grower, with a water area of 160 acres stocked with golden shiners, suffered an entire crop failure in 1952 as a result of

fungus epidemic. The anchor parasite, *Lernaea* sp., was given as a serious pest on goldfish. Other diseases mentioned of lesser significance were fin rot, grubs and intestinal protozoa.

## CAPITAL INVESTMENT

Investment (exclusive of land) in fish producing operations ranged from \$200 to \$75,000. Three producers leased farm ponds with no initial outlay for construction. The average cost for construction of a well constructed hatchery, having controlled water supply and proper drainage, was estimated at \$500 per acre pond.

Actual construction costs for impounded areas producing food fish were difficult to determine. Since these areas were rice fields in which the levees had been raised, irrigation reservoirs, or woodlands flooded for clearing timber, the original purpose generally was not that of raising fish. In most cases, the farmer owned and operated his own dirt moving equipment, and capital investment for such reservoirs could not be specifically determined.

## MANAGEMENT PRACTICES

Five hatcheries employed a full-time fisheries biologist. The duties of these biologists consisted of supervising the operational procedures, controlling diseases and trying new methods for increased production. Minnow production with many of the smaller operators was a part-time job and little attention was given to their ponds except during stocking and harvesting periods. As a result, their production quite often was low. Knowledge of proper management practices among many growers was found to be deficient. Lack of good management was apparent in many instances, and while a few persons were well informed, others had no apparent knowledge of, or solution to, the fish cultural problems that were encountered. The need for advance planning by fisheries biologists cannot be overemphasized during construction and continuing on into the actual fish cultural phases.

## DISCUSSION

Most of the commercial fish producers were cooperative and willing to discuss their operations. In turn, information and advice were given them, whenever possible, on problems relative to their operations. Many expressed gratification in realizing that the State Game and Fish Commission was interested in learning of their problems and attempting to analyze them. Only two bait minnow growers were reluctant to discuss their operations.

The raising of bait minnows can be a profitable business. One grower conservatively cited \$35,000 as his gross income in 1952. Another raiser with four acres in water grossed \$4,200 in 1952 from the harvest of minnows as a side line from his regular job. It appears that many farmers with stock ponds or larger impounded waters could very profitably utilize these areas in the production of this cash crop.

Competition between established private minnow raisers and stream trappers on public waters is rather keen. Growers contend that stream minnows are of inferior quality, transfer diseases and lower the market value in general for all

minnows. They also state that trapping and seining minnows from natural waters is causing a dangerous reduction of minnows in the streams and therefore the streams should be closed to the taking of bait minnows commercially.

The production of commercial food fish in impounded waters, at present, is on an experimental basis. Fifteen farmers in Lawrence, Jackson, Lonoke, Arkansas, and Jefferson counties have reservoirs stocked with rough fish and are planning to harvest these as soon as practical. Three of these farmers claim they have evidence of increased soil fertility from the presence of fish and are not directly concerned with their value as a cash crop. Seven of these fifteen farmers have flooded their land to clear timber and at the same time use it as a duck hunting area. Stocking and harvesting of fish has been of secondary importance. Five farmers have flooded rice growing areas for the direct purpose of growing and harvesting a crop of fish while the land is lying idle from rice production. One of these farmers was selling carp fingerlings as a bait minnow and another was selling other types for stocking purposes, during 1953.

It was learned that many farmers have been discussing the possibilities of raising commercial food fish in reservoirs, but are skeptical of its value until some results are evidenced. With present uncontrolled rice production and favorable prices, land is yielding unquestionable profit in raising rice. Currently, most rice farmers rotate rice with dry land crops such as soybeans and oats. However, more of this land may be flooded and stocked with commercial food fish on a crop rotation basis as time passes and satisfactory results are observed.

## SUMMARY AND CONCLUSIONS

1. A survey of commercial fish production in Arkansas was conducted in which 78 bait minnow growers and 19 commercial food-fish producers were interviewed to learn more concerning existing facilities, operations and production. Completed inventory sheets are available for each producer.

2. The minnows commonly grown for bait are the fathead, golden shiner and goldfish. The carp-goldfish hybrid, presently produced in three hatcheries, may become a desirable and suitable bait minnow. Local demand determines the minnow species raised.

3. Rainbow trout are raised in four hatcheries and are marketed by selling fishing privileges or sold directly to consumers. Carp, buffalo, and channel catfish have been stocked in fifteen reservoirs; however, there has been little harvest of these foodfish and only for restocking purposes.

4. An estimated 26,657,000 bait minnows were grown and harvested from private hatcheries in 1952, representing a market value of \$385,485. A harvest of 200,000 edible size rainbow trout was reported and an approximate value of \$150,000. The total gross annual income for 1952 from commercial fish producers is estimated at \$535,485.

5. Minnows, trapped or seined from public waters, compete with propagated minnows and tend to lower the market price. The production of bait minnows in private waters should be encouraged. This relieves the drain on public waters and directly benefits gamefish production by conserving valuable forage fish.

6. The chief predator encountered by commercial minnow growers is the green sunfish. Other pests include crayfish, frogs, aquatic birds, snakes, turtles, water beetles, backswimmers, fungus and the anchor parasite.

7. Capital investment in bait minnow operations ranged from \$200 to \$75,000. The costs for construction of ideal hatchery ponds averaged \$500 per acre pond.

8. Production of commercial food-fish, at present, is being conducted on an experimental basis by fifteen farmers in the rice growing areas of the state. It is expected that some of these water areas will be drained and the crop harvested in the fall of 1954.

9. Many of the larger impounded water areas have been flooded for the primary purpose of killing timber or serving as reservoirs for irrigation water. Commercial food-fish have then been stocked in these reservoirs in the hope that a profitable crop might be obtained.

10. Commercial fish species (buffalo and catfish) must be 16 inches long before they can be retained by commercial fishermen on the public waters. This means that private individuals must purchase initial stocks of 16 inches or more from the public waters or can purchase smaller fish from private fish producers to get initial brood stocks.

11. Several land owners have expressed an interest in raising commercial food-fish alternately with rice. The expansion of commercial food-fish raising appears to depend on the harvest obtained from waters now in production.

12. Lack of information and use of proper management principles was apparent in many cases. The need for advance planning by fisheries biologists during construction of impounded water areas and continuing on into the actual fish cultural stages cannot be overemphasized.