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THE AQUACULTURE INDUSTRY OF ARKANSAS IN 1979-1980

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ABSTRACT

A survey of previous fish farmer certificate holders in Arkansas was conducted during 1979-1980 using renewal questionnaires, telephone conversations, and personal contacts. This survey was compared with similar surveys from preceding years. Approximately 51.0% of 12,372 intensively farmed hectares in 1979-80 were devoted to bait fish production, while 22.9% were utilized in food fish production. Acreage in bait fish, food fish, and fingerling production decreased from 1979 to 1980; however, price increases during this time resulted in a higher total value of the industry.

INTRODUCTION

In 1968, Meyer et al. conducted one of the first surveys on the commercial production of fishes in Arkansas. Since then, the fish farming industry has shifted from a "new industry" type growth (Meyer et al., 1971 and Bailey et al., 1974) and currently fluctuates according to supply and demand (Bailey et al., 1978). Changes in the industry have been monitored periodically during the last 13 years as part of the Commercial Fisheries Industry Survey, partially funded as a Public Law 88-309 Project by the National Marine Fisheries Service.

Since Arkansas is located in the middle of the fish belt (Hulsey, 1965), changes in fish production values for the state should reflect national trends in the warm water production of fish. The current survey documents the changes in the industry from 1 July 1976 to 30 June 1980.

METHODS AND MATERIALS

Each year the Arkansas Game and Fish Commissions's Fiscal Division contacts previous fish farmer certificate holders by means of a renewal notice. In 1977, these notices also inquired about the production acreage of various fish species. Although answering the questions was not mandatory for certificate renewal, most applicants cooperated, listing the acreage of each fish species they planned to grow in 1979. A telephone survey was conducted during the summer of 1980 to verify the farmers' acreage estimates and to obtain further information on yields per acre and current market prices. When the farmer could not be contacted by phone, his 1979 projection was deemed valid and was used in calculating the total acreages in production.

An effort was made during this telephone survey to contact any applicant who had not responded to the renewal notice questions. When this attempt failed, the applicants were visited, when possible, by their district fisheries biologist. Fish farmers not contacted at all were not included in the survey. All values were obtained in English units, tabulated, and then converted to metric units. Yields per hectare and prices per kilogram represent weighted means calculated for those fish farmers reporting. Tables 2, 3, and 4 were modified after Henderson et al. (1978), Henderson and Wooldridge (1977) and Bailey et al. (1978), respectively.

RESULTS AND DISCUSSION

During 1979, 376 fish farms were licensed, 19 fewer farms than in 1978. Bait fishes were raised by 119 of the surveyed farmers, food fishes by 270 farmers, and fingerlings, ornamental exotics, and miscellaneous fishes by 50 farmers. Acreage and production values supplied by applicants are believed to be reasonably accurate by the authors.

Bait fish production accounts for 51.0% of the intensively farmed water in Arkansas (Table 1). Total area in bait fish production has been down since 1976-77 (Tables 3 and 4), except for an unusually large increase in 1977-78 (Table 3). The principle species raised for bait in order of importance continue to be the golden shiner *(Notemigonus crysoleucas)*, fathead minnow *(Pimephales promelas)*, and goldfish *(Carassius auratus)*. Production of Israeli carp *(Cyprinus carpio)*, the nearly scaleless variety of the common carp, was no longer intensively farmed for bait fish or vegetative control and was left out of the 1979-80 (Table 1) report.

Prices for the three major species of bait fishes have increased since 1976-77 as a result of inflationary pressures. The value of the bait fish industry has increased by 20.3% since 1976-77. The price

Table 1. Commercial fish production in Arkansas — 1 July 1979 to 30 June 1980.

	Hectare	Kg./ Hectare	Total Kg.	Price/ Kg.	Total Value
Bait Fishes					
Golden Shiner	9,672	426	7,832,796	$4.29	$17,151,919
Fathead Minnows	696	449	402,505	4.42	1,859,760
Goldfish	639	898	394,504	5.50	2,170,500
Total	7,955		3,629,809		$16,183,679
Food Fishes					
Catfishes	2,439	2,555	6,231,843	$1.43	$ 8,912,470
Buffalofish	264	1,123	409,260	.66	270,069
Buffalo (Polyculture with catfish)	167	391	222,726	1.19	264,600
Trout	8	6,835	45,450	4.95	225,000
Cage Reared Trout	---	---	6,585	5.30	35,068
Cage Reared Catfish	---	---	44,565	1.43	63,738
Tank and Raceway Trout	---	---	45,450	4.40	200,000
Extensive Farming[1]					
All Species	2,922	1,356	4,670,237	1.32	6,168,240
Pay Fishing (Intensive)					
Channel Catfish	196	602	117,908	1.43	168,673
Pay Fishing (Intensive)					
Trout	4	13,476	60,086	4.40	264,380
Pay Fishing (Non-Intensive)[1]					
All Species	800	---	---	---	2,600
Total Food Fish	6,802		11,847,829		$16,114,133
Ornamental Exotics	57	1,615	91,445	$8.80	843,000
Fingerlings and Miscellaneous					
Largemouth Bass	1	4,884[2]	12,200[3]	$1.38[4]	$ 17,000
Catfish (Fingerlings)	696	2,021	1,406,314	2.75	3,867,750
White Amur	83	674	49,086	6.60	324,000
Crayfish (Bait)	17	20,590[2]	245,990[3]	.03[4]	7,500
Total	782		1,455,400		$ 4,211,250
			281,990 Fish		
GRAND TOTAL	19,196		17,023,483 kg.		$37,743,744
			281,990 Fish		

1/ These totals should not be included when comparing intensive culture of 1980 to that of previous years.
2/ Fish/ha.
3/ Fish
4/ Price/Fish

used for goldfish was an average of the weighted means for feeder (aquaria) goldfish and trotline-sized goldfish, assuming an equal production ratio.

Food fishes were produced on 22.9% of the intensively farmed water in Arkansas (Table 1). Fish production was the primary concern for intensively farmed waters whereas it was of secondary importance in extensively farmed waters. Examples of the latter included private lakes, some free fishing lakes and irrigation reservoirs licensed as fish farms for various reasons and often only partially harvested. Food fishes were raised intensively and extensively on 43.6% of the total area devoted to fish farming in 1979-80. A wide species variety was present in extensively farmed ponds. Intensively farmed food fish species included the channel catfish (*Ictalurus punctatus*), blue catfish (*Ictalurus furcatus*), bigmouth buffalo (*Ictiobus cyprinellus*) and rainbow trout (*Salmo gairdneri*).

Intensive production of food fish has remained stable since 1976. The data collected (for 1980) agreed with data recorded in the U. S. Department of Agriculture's 1980 Aquaculture report.

Private cage culture operations that appeared so promising in 1975-76 (Bailey et al., 1978) have apparently suffered from mismanagement, financial problems and environmental conditions. While the weight of cage-produced trout has remained relatively stable since 1976-77 (Table 2, 3, & 4), it decreased 82% for 1979-80 (Table 1). The weight of cage-produced channel catfish decreased by 57.1% during 1978-79 and again during 1979-80 for a total of 67.2% from 1976-78 (Table 3 & 4).

Ornamental fish production increased 35.7% because one farmer switched from bait fish ponds to ornamentals. Catfish fingerling production varies from year to year as the farmers evaluate both their demands and the economic needs of future markets. Production for 1979-80 decreased 13.3%. Therefore, a possible decrease in food catfish may occur next year.

The production of white amur as a weed control agent rose when Missouri lifted its import ban. Increased production area offset a decrease in price per kilogram causing an overall increase in total crop

Table 2. Commercial fish production in Arkansas — 1 July 1978 to 30 June 1979.

	Hectare	Kg./ Hectare	Total Kg.	Price/ Kg.	Total Value
Bait Fishes					
Golden Shiner	7,340	357	2,623,380	$3.81	$ 9,991,593
Fathead Minnows	1,033	449	463,914	3.85	1,786,408
Goldfish	448	736	329,642	4.05	1,631,894
Israeli Carp	12	337	4,277	2.20	9,409
Totals	8,840		3,421,205		$13,413,185
Food Fishes					
Catfish	2,615	2,555	6,680,593	$1.43	$ 9,554,204
Buffalo	372	1,179	438,570	.59	260,537
Buffalo (Polyculture with Catfish)	697	410	244,691	1.18	290,723
Trout	8	5,989	46,480	4.40	205,732
Cage Trout	---	---	36,360	2.97	108,060
Cage Catfish	---	---	126,575	1.43	181,025
Raceway Trout	---	---	45,450	4.09	186,000
Extensive Farming[1]					
All Species	2,715	1,598	4,342,950	$1.32	5,733,287
Fee Fishing (Intensive)					
Channel Catfish	237	602	124,729	1.43	178,386
Fee Fishing (Intensive)					
Trout	4	13,364	48,877	$3.85	$ 187,425
Fee Fishing (Non-Intensive)[1]					
All Species	582	---	---	---	5,925
Totals	7,103		12,137,370		$16,883,293
Ornamentals	36	1,604	61,348	$2.85	$ 542,000
Fingerlings and Miscellaneous					
Largemouth Bass	1	6,884[2]	17,000[3]	1.00[4]	$ 17,000
Catfish	803	2,138	1,716,840	2.88	4,576,018
White Amur	20	674	13,509	7.70	147,060
White Amur and Silver Carp	16	1,123	16,180	6.50	110,400
Trout Fingerlings	---	---	1,364	6.50	9,000
Crayfish	12	20,500[2]	240,990[3]	.03[4]	7,560
Freshwater Shrimp	1	500	727	11.00	8,000
Totals	861		1,746,250 + 261,990 fish		$ 4,874,918
Grand Totals	16,040		17,375,891 kg. + 261,990 fish		$31,711,396

1/ These totals should not be included when comparing intensive culture of 1979-1979 to that of previous years.
2/ Fish/ha.
3/ Fish
4/ Price/fish

Table 3. Commercial fish production in Arkansas — 1 July 1977 to 30 June 1978.

	Hectare	Kg./ Hectare	Total Kg.	Price/ Kg.	Total Value
Bait Fishes					
Golden Shiners	3,469	331	3,770,784	$3.41	$12,866,006
Fathead Minnows	845	466	394,022	3.39	1,335,040
Goldfish	468	1,134	527,843	4.51	2,379,806
Israeli Carp	8	348	2,111	3.74	7,909
Totals	10,965		4,792,972		$16,488,796
Food Fishes					
Catfish	2,388	1,998	4,192,360	$1.50	$ 6,272,598
Buffalo	385	767	295,211	.44	129,907
Buffalo (Polyculture with Catfish)	72	225	16,180	.57	15,644
Cage and Raceway Trout	---	---	47,723	3.89	185,850
Cage Catfish	---	---	136,360	1.43	195,000
Totals	2,555		4,287,826		$ 6,798,799
Ornamentals	61	1,684	102,644	$8.80	$ 906,000
Fingerlings and Miscellaneous					
Largemouth Bass	4	9,884[1]	40,000[2]	$1.05[3]	$ 42,000
Channel Catfish	1,039	1,741	1,808,307	$2.66	4,814,469
White Amur	58	561	32,497	7.70	250,290
White Amur and Silver Carp Fingerling	22	1,123	24,543	$6.60	$ 162,000
Crayfish (Bait)	14	20,591[1]	283,327[2]	.03[3]	8,500
Totals	1,137		1,865,427 + 323,322 fish		$ 5,277,159
GRAND TOTALS	14,736		11,356,519 kg. + 323,322 fish		$29,590,753

1/ Fish/ha
2/ Fish
3/ Price/fish

Table 4. Commercial fish production in Arkansas — 1 July 1976 to 30 June 1977.

	Hectare	Kg./ Hectare	Total Kg.	Price/ Kg.	Total Value
Bait Fishes					
Golden Shiner	7,279	430	3,130,869	$3.52	$11,021,260
Fathead Minnows	926	337	311,969	3.56	1,111,060
Goldfish	344	633	218,180	3.48	760,400
Totals	8,549		3,660,998		$12,892,120
Food Fishes					
Channel Catfish	2,558	1,854	4,743,148	$1.32	$ 6,261,583
Blue Catfish	11	592	6,227	1.61	10,000
Buffalo	12	1,179	14,317	.57	8,190
Buffalo (Polyculture with Catfish)	---	410	55,131	.82	34,000
Trout	3	9,615	28,160	2.32	65,000
Cage Trout	---	---	36,562	2.04	74,400
Cage Catfish	---	---	294,380	1.32	388,000
Raceway Trout	---	---	46,506	2.11	98,600
Raceway Catfish	---	---	2,965	1.10	3,250
Extensive Farming					
All Species	3,414	1,586	5,485,815	1.19	6,517,500
Fee Fishing (Intensive)					
Channel Catfish	96	602	57,894	1.96	112,500
Fee Fishing (Intensive)					
Trout	3	13,364	37,354	$3.17	$ 118,900
Totals	6,121		10,867,220		$12,978,223
Ornamentals	38	1,990	74,402	$10.82	$ 811,000
Fingerlings and Miscellaneous					
	Hectare	Number/ Hectare	Total Number	Price/ Fish	Total Value
Largemouth Bass	1	9,884	12,000	$1.01	$ 11,640
Channel Catfish	349	84,291	29,404,100	.09	2,675,000
White Amur	117	1,448	170,000	1.21	204,000
Trout	---	---	50,000	.15	7,500
Totals	467		29,586,520		$ 2,899,140
GRAND TOTALS	15,175		14,593,120 kg. + 29,586,520 fish		$30,476,251

value of 38.1%. With a favorable market and increased production cost, the value of white amur will continue to rise.

One hectare of freshwater shrimp (*Macrobrachium rosenbergii*) was raised experimentally by a fish farmer in 1978-79. This species was not raised in 1979-80 due to market demand and production costs. The only other crustacean cultured in Arkansas was the red swamp crayfish (*Procambarus clarkii*), which was raised on a limited basis for bait.

The fish farming industry of Arknasas appears to be relatively stable and capable of absorbing mild fluctuations in various production values over an extended time period. Although the industry may be stable, the problems of the past 20 years still confront the beginning fish farmer. Bailey et al. (1978) listed these problems as "nutrition, diseases, construction cost, water management, marketing, crop land allocation, and the large initial investment capital required." The fact that many fish farmers are able to overcome these problems is evidenced by the $37.7 million 1979-80 total value of the industry in Arkansas.

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