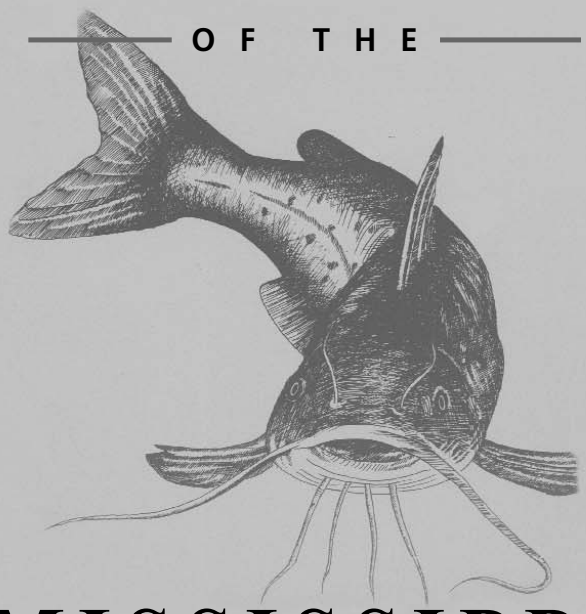
ECONOMIC IMPACT

OF THE



MISSISSIPPI FARM-RAISED CATFISH INDUSTRY

AT THE YEAR

2003

Mississippi State University Extension Service

Today, more freshwater aquaculture is found in the Mississippi Delta than in any other region of the U.S. It is vital that farmers, industry, researchers, and government work together to ensure the industry continues to thrive. This publication presents information about the U.S. farm-raised catfish industry and its impact on the economy of Mississippi. For more information, contact either Mr. Stuart Dean by telephone at (662) 325-2160 or e-mail at stuartd@ext.msstate.edu or Dr. Terrill Hanson at (662) 325-7988, e-mail at hanson@agecon.msstate.edu

Catfish Facts

•Mississippi farmers sold 381 million pounds of farm-raised catfish to processing plants in 2001. This was around 64 percent of the total farm-raised catfish processed in the U.S.

•There are more than 111,000 acres of catfish ponds in Mississippi. This is 177 square miles of ponds. If this were one pond, it would be a mile wide and stretch along I-20 from the Alabama-Mississippi border to the Mississippi River.

•Mississippi catfish were fed more than 950 million pounds of feed in 2001. This could be hauled in a train of 4,950 96-ton hopper cars or a caravan of 19,800 18-wheel 24-ton feed trucks. At least 4 acres of grain crops are needed to support one foodsize fish acre.

•As shown in Table 1, the Mississippi catfish industry employs more than 3,000 people on catfish farms, more than 3,600 workers in processing plants, and 330 in feed mills. Total payroll exceeds $102 million, and total industry investments exceed $600 million.

•The modern catfish industry originated in the Mississippi Delta in the late 1960's and early 1970's by farmers who were seeking an alternative to low-priced row crops on clay-based soils.

•Mississippi's farm-raised catfish industry is a model world-class commercial aquaculture industry that is profitable, sustainable, and environmentally sound.

Table 1. Direct Impact of the Catfish Industry in Mississippi.

Sector	Number of Jobs	Payroll $ (Millions)	Sector Revenues* $ (Millions)	Investments $ (Millions)
Feed	330	8	150	95
Farming	3,000	37	260	397
Processing	3,671	57	435	200
Total	7,001	102	845	642

*Includes payroll from payroll column. See Table 11 for details.

Economic Impact of the Mississippi Farm-Raised Catfish Industry at the Year 2003

Brief History of the Mississippi Catfish Industry

The modern Mississippi catfish industry had its beginnings in the Mississippi Delta in the 1960's when several farmers, looking for a way to diversify, decided to try to raise catfish. Fried catfish had traditionally been a favorite dish in the South. Catfish were harvested in lakes and rivers in the area by commercial fishermen and sold in local markets or sold by peddlers. In the South there was no need to educate consumers about catfish. Consumers already knew it was a good product. Although several species of catfish were abundant in the region, channel catfish was selected for farm production because of its desirable culture characteristics, including species hardiness and growth rate.

The catfish industry began to achieve commercial size in the 1970's. In 1973, there were 22,070 acres of catfish ponds in food fish production and 2,736 acres in fingerling production in Mississippi. In order to expand the industry, farmers realized other investments were needed. Processing plants would have to be built, and a marketing organization was needed to educate consumers and create a national demand for catfish. A supply of good quality, affordable feed and a centralized rendering facility were also needed.

Processing plants were built. Although large agribusiness firms have in the past owned some plants, the business model that has evolved is of farmer-owned processing plants and feed mills. Two of the factors that caused the large agribusiness firms to depart are the high level of capital and management resources required to profitably develop these businesses and the different structure of farmer-processor relationships as compared to other agribusiness commodities.

Feed mills were built to efficiently produce the high quality specialized feed needed for farm-raised catfish. A centralized rendering facility was also constructed to produce fishmeal and oil from the offal produced as by-products from the processing plants.

Nationwide advertising and promotional campaigns were developed and implemented by TCI (The Catfish Institute), a non-profit organization established in 1986 whose programs are funded by a voluntary $5.00 per ton of feed contribution by feed mills in Alabama, Arkansas, Louisiana, and Mississippi.

Location of Catfish Farms in the U.S.

In 2002, there were 1,249 farms in the U.S. that included catfish as a farm enterprise. These farms had a total of 196,590 acres of catfish ponds (see Table 2). Four states, Mississippi, Arkansas, Alabama, and Louisiana, accounted for more than 95 percent of the total catfish acreage in the U.S. and more than 95 percent of catfish sales at the farm level.

Mississippi catfish farms are, on the average, much larger than those in other states. When comparing average farm sales per acre of water, California has sales of $3,802 per acre, while Illinois had only $1,188 of sales per acre. Some of these sales differences can be explained by the make-up of the industry in each state. For example, in Mississippi there are roughly 89,400 acres of grow-out ponds, 15,200 acres of fingerling ponds, and 3,500 acres of broodstock ponds. The latter two categories do not produce any product for the processor or to the consumer. A lower percentage of acreage is dedicated to fingerling and broodstock production in other producing states than in Mississippi.

Many factors other than sales per acre affect farm profitability, one of which is the real estate tax rate. Taxes per acre for the top four catfish producing states range from $4.57 in Louisiana to $6.15 in Mississippi (see Table 2).

Table 2. U.S. Catfish Farm Statistics and Agricultural Taxes by State, 2001.							
	Total			Average Farm			
	No. of Farms	Acres	Sales $(000)	Acres	$Sales Per		Real Estate Taxes $/Acre[1]
					Farm	Acre	
Mississippi	395	111,500	260,852	282	652,130	2,339	6.15
Alabama	240	25,900	69,965	108	259,130	2,701	5.25
Arkansas	195	38,000	65,306	195	353,005	1,719	5.70
Louisiana	70	12,100	26,207	173	327,588	2,166	4.57
Kentucky	70	400	1,097	6	36,567	2,743	9.57
Georgia	50	1,220	2,577	24	42,950	2,112	10.98
Florida	45	880	1,327	20	34,921	1,508	11.83
California	42	2,200	8,365	52	170,714	3,802	24.71
Missouri	40	1,800	2,840	45	63,111	1,578	5.01
North Carolina	38	1,230	2,950	32	62,766	2,398	15.94
Texas	34	580	762	17	17,721	1,314	4.00
South Carolina	15	520	923	35	65,929	1,775	8.08
Illinois	15	260	309	17	19,313	1,188	20.60
U.S. total	1,249	196,590	443,480	157	347,283	2,256	

Source: Catfish Production Report, National Agricultural Statistics Service (NASS), Agricultural Statistics Board, USDA, Washington, D.C. Released February 7, 2002.
[1] Doane Marketwatch April 10, 2002, Allen Dever, Doane Economist (www.doane.com/marketwatch).

Location of Catfish Consumer Markets In the U.S.

Information collected by The Market Research Institute (MRI) for The Catfish Institute (TCI) indicated that Arkansas led the U.S. in per capita consumption of catfish, with 5.95 pounds in 1998 (see Table 3A), while Texans ate the greatest total pounds for any state. Mississippi was second, with 4.61 pounds per person per year. The Midwest region ranked second in consumption, attaining the national average of 1.04 pounds per capita (Table 3B). These numbers are based on a survey of 73 percent of the total market, scaled up to the total reported sales volume for the year.

Table 3A.
Top 5 States, Total and Per Capita Catfish Consumption, 1998.

Total Consumption			Per Capita Consumption	
Rank	State	Million Pounds	State	Pounds
1	Texas	58	Arkansas	5.95
2	Illinois	25	Mississippi	4.61
3	Tennessee	19	Tennessee	3.49
4	California	18	Louisiana	3.00
5	Florida	17	Texas	2.93

Table 3B.
Total and Per Capita Consumption by Region, 1998.

Region	Total Million Pounds	Pounds Per Capita
South Central	136	2.94
Midwest	66	1.04
South Atlantic	41	0.84
Mountain Pacific	29	0.48
Northeast	9	0.17
U.S.	281	1.04

Survey conducted for TCI by Marketing Research Institute of Pensacola, FL, 1998.

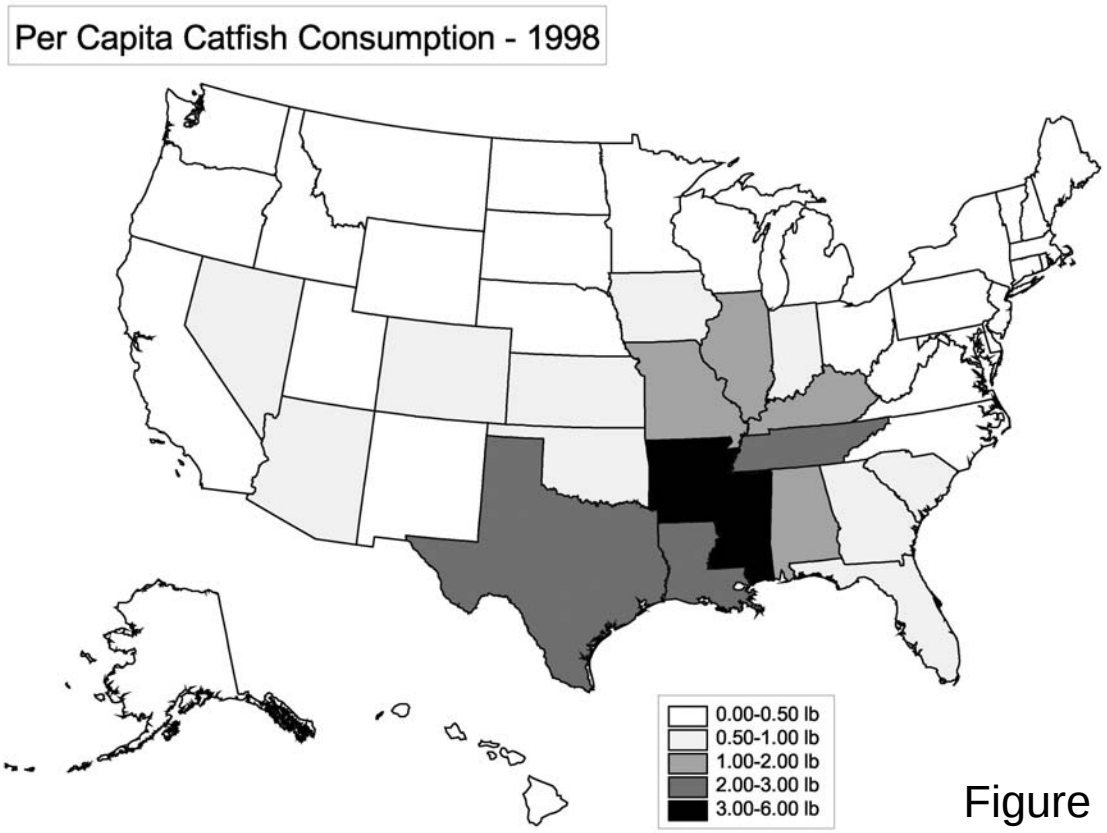


Figure 1

Mississippi's Catfish Industry

Catfish Acreage

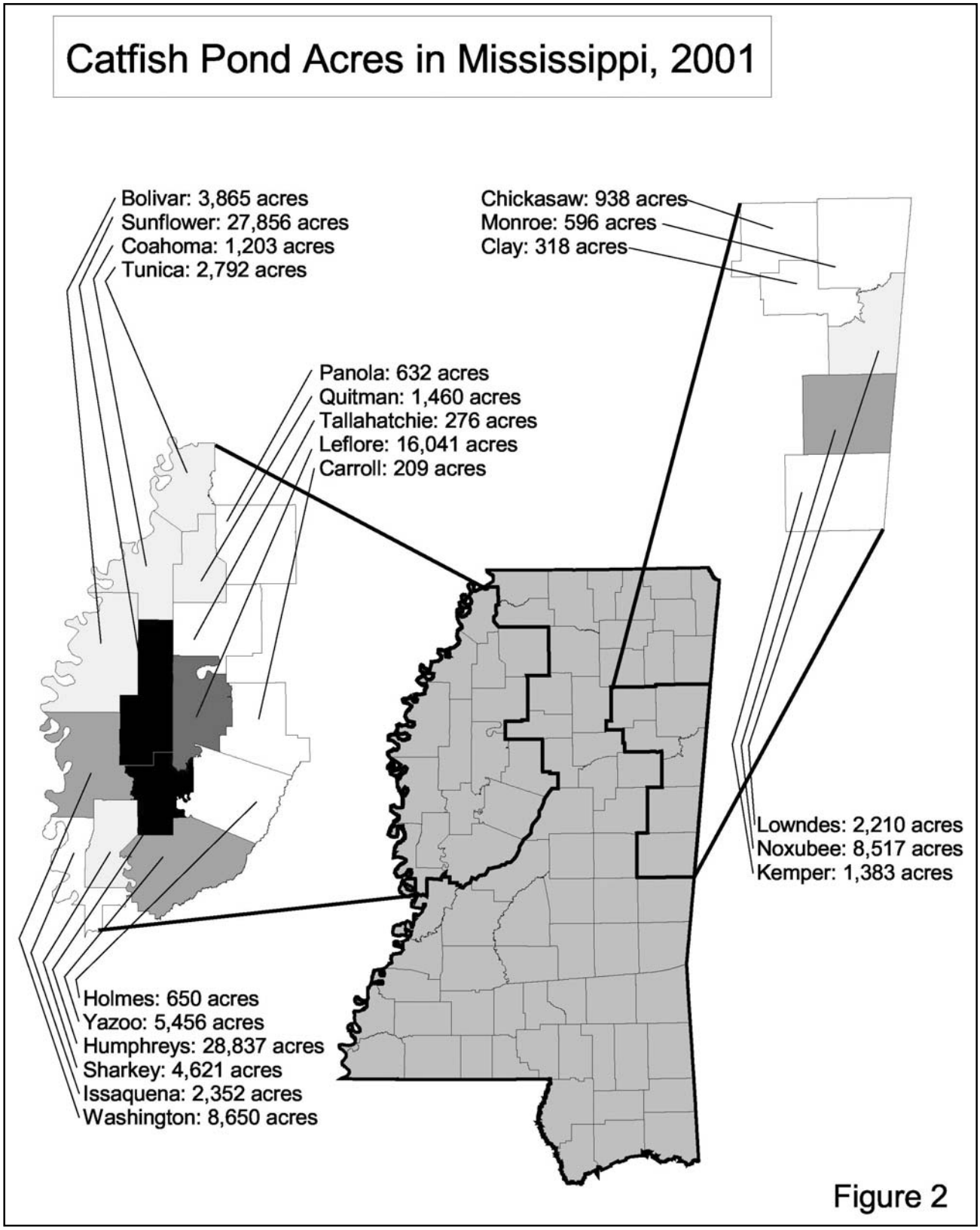
USDA's NASS (National Agricultural Statistics Service) collects detailed production and processing information on the farm-raised catfish industry. In 2001, it reported 111,500 water surface acres in Mississippi were used for the production of broodfish, foodfish, and fingerlings (see Table 4). Humphreys County had 28,700 acres of catfish ponds, followed closely by Sunflower County, with 27,400 acres. In east Mississippi, Noxubee County has the largest number of pond acres, at 5,200. To put this into perspective, Humphreys County contains 430 square miles, or 294,400 acres. This means the 28,700 acres of catfish ponds take up almost 10 percent of the total county land area. Ponds cover more than 6 percent of Sunflower County's 707 square miles.

Table 4. Comparison of Mississippi Farm-Raised Catfish Acreage in 1972 and 2001.

	in 1972 [1]	2001 [2]
District 10 – NW MS	**4,178**	**4,850**
District 40 – Mid-Delta		
Humphreys	5,015	28,700
Issaquena	0	1,800
Leflore	319	15,500
Sharkey	1,996	5,900
Sunflower	1,239	27,400
Washington	4,229	7,900
Yazoo	1,374	6,300
Subtotal	**14,172**	**93,500**
District 50 (Carroll, Holmes)	110	950
District 60 – East MS		
Chickasaw	27	790
Lowndes	158	2,000
Noxubee	7	5,200
Other Counties	487	3,710
Subtotal	**679**	**11,700**
Other Districts	320	500

[1] Source: Mississippi Fish Farming, June 1973. Information Sheet 607, Dan Gardner MCES-Stoneville.

[2] www.nass.usda.gov/ms/catfish_2000-2002.pdf Mississippi Agricultural Statistics Service.



County acreage for this figure was based on satellite image analysis conducted by Mississippi State University's Department of Agricultural Economics.

Agricultural Production Value

In 2001, the farm value and overall impact of the catfish industry in Mississippi relative to all other agricultural commodities was fourth behind poultry, forestry, and cotton and second only to poultry for protein meats (Table 5). These results were in spite of a 13 percent drop in catfish value from 2000 because of lower live weight prices.

Table 5.
Mississippi's 2001 Top Crop Values
(In millions of dollars)

1.	Poultry	1,659
2.	Forestry	1,120
3.	Cotton	439
4.	Catfish	260
5.	Cattle/calves	210
6.	Hogs	59

Source: MSU Agricultural Economics Department.

Location of Processing Plants, Feed Mills and Rendering Facility

Mississippi catfish processing plants are mainly located in the Delta, from Tunica to Yazoo County, and in Noxubee and Kemper counties in east Mississippi. Catfish feed mills are located in several of the same Mississippi counties near catfish farms. Although these processing plants and feed mills are located only in a few counties, their impact is felt in many adjoining counties and states. Table 6 identifies these facilities by area of the state, county, and type of operation. Figure 3 provides a map of their locations.

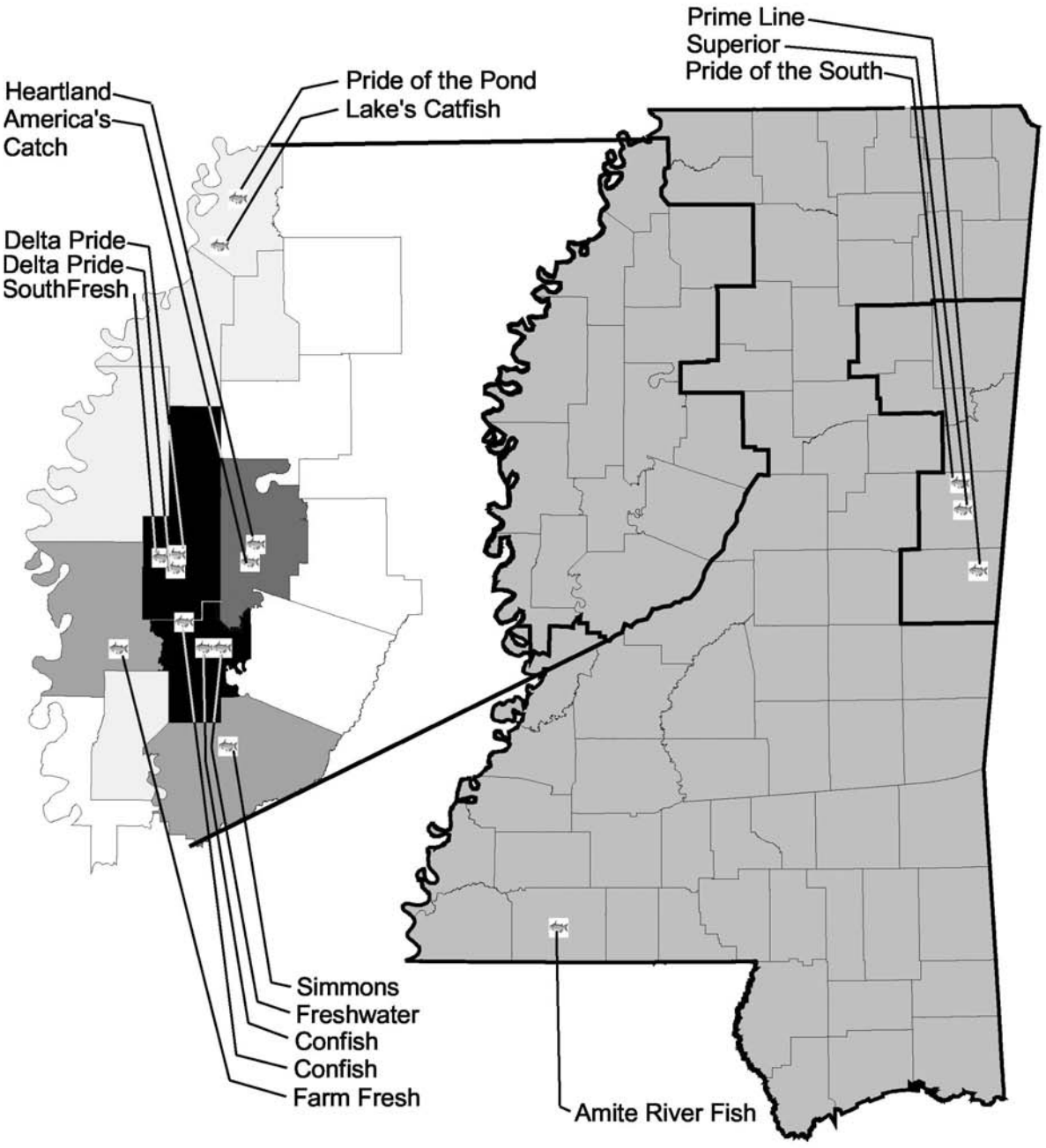
Table 6. Location of Processing Plants, Feed Mills, and Rendering Facility in Mississippi, 2002 (P = Processing Plant; FM = Feed Mill; R = Rendering Facility).

Area	Company	City	County	Type
Delta	Confish	Isola	Humphreys	P
	Confish	Belzoni	Humphreys	P
	Freshwater Farms	Belzoni	Humphreys	P
	Producer's Feed	Isola	Humphreys	FM
	America's Catch	Itta Bena	Leflore	P
	Heartland	Itta Bena	LeFlore	P
	Delta Pride	Indianola (2)	Sunflower	P
	SouthFresh	Indianola	Sunflower	P
	Delta Western	Indianola	Sunflower	FM
	Fishbelt Feeds	Moorhead	Sunflower	FM
	Protein Products	Sunflower	Sunflower	R
	Lakes Catfish	Dundee	Tunica	P
	Pride of the Pond	Tunica	Tunica	P
	Farm Fresh	Hollandale	Washington	P
	Agribrands/Cargill	Greenville	Washington	FM
	Simmons Catfish	Yazoo City	Yazoo	P
East MS	Prime Line	Scooba	Kemper	P
	Pride of the South	Brooksville	Noxubee	P
	Superior	Macon	Noxubee	P
	Land O'Lake Farmland Feed	Macon	Noxubee	FM
South MS	Amite River Fish	Liberty	Amite	P
	Land O'Lake Farmland Feed	Lumberton	Lamar	FM

Source: The Catfish Institute and personal communications

Figure 3

Location of Catfish Processing Plants in Mississippi



A Changing Industry

Mississippi's catfish industry has been developing for almost 40 years. The industry today is quite different from the industry in 1970. A few of the changes are discussed in this section.

Catfish Farming

Three of the most important developments in catfish farming over the last 25 years have been changes in the way low oxygen is managed through increased aeration on the farm, using salt to combat brown blood disease (methemoglobinenemia), and development of the multiple batch cropping system (personal communication, Dr. Craig Tucker, NWAC, Stoneville, MS). One impact of these and other developments has been farmers' ability to increase stocking density and harvest yields. In the early years of the catfish industry, ponds were stocked with fish to yield about 2,500 pounds of fish per acre annually. For 2001, the MSU Extension Service estimated food-sized catfish production per acre was 4,635 pounds (personal communication, Dr. Jim Steeby, MSU-Extension Service, Belzoni, MS).

Feed

The biggest variable input and expense in catfish production is feed. Catfish are fed a specially formulated feed that is nutritionally complete and provides all nutrients and energy necessary for catfish health and growth. In the early years of catfish farming, feed was purchased from large out-of-state feed companies such as Ralston Purina. Farmers were not satisfied with the quality or price of the feed, so they decided to build their own feed mills to produce feed specifically for the local catfish industry. In 1974, the first feed mill was built in Isola. Over the years, catfish rations have been reformulated many times. Farmers, feed mill operators, and researchers have worked together to develop cost-efficient and economic diets.

Catfish Processing

Over the last 10 years, the catfish processing sector has changed significantly. The processed product mix has gone from 46 percent to 61 percent fillets, and the portion of frozen product has increased from 57 percent to 63 percent, and many added value products have been developed. Many improvements in processing and operating technologies and procedures have resulted in capital resources' replacing a portion of the manual jobs. More will be said about processing later in the "Catfish Processing Expenditures" section of this publication.

Catfish Farming in East Mississippi

In the late 1980's and early 1990's, several farmers in east Mississippi began to experiment with catfish production. Neighbors to the east in west Alabama had already shown the Black Belt soil region was ideally suited for pond construction; they had more than 20,000 acres in catfish production. Unlike the Mississippi Delta, which has plenty of groundwater that can be pumped from shallow wells to fill ponds, east Mississippi catfish farmers must primarily rely on surface water to fill ponds. While many people were skeptical about the viability of catfish culture in east Mississippi, these farmers demonstrated that catfish could be successfully grown using surface water. As a result, a thriving catfish industry developed along the Mississippi-Alabama border, growing from less than 1,000 acres in 1990 to more than 11,700 acres in 2001. Three catfish processing plants and one feed mill presently support this area's catfish production.

Employment in the Catfish Industry

Many manufacturing plants in Mississippi have closed recently because they could not compete with factories in countries where labor rates are much lower. Mississippi has lost 27,000 manufacturing jobs in the past three years (Southern Rural Development Center, "Mississippi: A Sense of Urgency," April 2002). The growth of the Mississippi catfish industry has created jobs on catfish farms, processing plants, and feed mills, providing relatively stable agricultural employment in the Delta and east regions of Mississippi.

Employment statistics for workers covered by Mississippi Unemployment Insurance (UI) laws are shown in Table 7. These statistics exclude a significant number of farm workers who are not covered under the programs administered by the MESC (Mississippi Employment Security Commission). Employment figures do include activities within SIC 2048, Prepared Feeds and Feed Ingredients, that are not catfish related. Adjusted farm employment numbers were estimated using catfish enterprise budgets for hatchery and grow-out facilities. Feed mill employment adjustments were estimated after surveying management from each feed mill. In total, approximately 7,000 jobs are directly associated with the production and processing of catfish, with a total payroll exceeding $102 million.

Table 7. Mississippi Catfish Industry Unemployment Insurance Covering Employment and Wages, 2000 (with adjustments to derive direct total employment).

SIC Code	Description	Average Monthly Employment	Average Annual Wage	Total Sector Wages $ (000)	Adjusted [1] Employment	Adjusted [1] Total Wages $ (000)
0273	Catfish Farms	1,221	20,720	25,299	3,000	37,595
0921	Catfish Hatcheries	88	17,336	1,526	-------	-------
2048	Prepared Feeds and Feed Ingredients	623	28,908	18,010	330	8,012
2092	Catfish Processing Plants	3,671	15,461	56,757	3,671	56,757
Total		**5,603**		**101,592**	**7,001**	**102,364**

Source: MESC (Mississippi Employment Security Commission).
[1] Adjustments based on MSU Department of Agricultural Economic's catfish enterprise budgets and a survey of the catfish feed mill management in Mississippi.

In addition to the direct jobs covered above, many jobs are created in local businesses that support the catfish industry. In Mississippi, firms manufacture seine nets, harvest equipment, and aerators for use on farm and manufacture. Many sell chemicals and supplies to support farm operations. Local firms construct catfish ponds, and contract crews custom harvest ponds on smaller farms. Annual budgets for feed mills include major amounts for maintenance of equipment and transportation fleets. Various firms provide services and materials to construct, equip, and maintain processing plants. Several hundred truck drivers are employed hauling feed and feed ingredients, hauling live fish from ponds to processing plants, delivering ingredients and other supplies to processors and delivering processed fish throughout the country.

Because of the difficulty of estimating the impact for these numerous support roles, they have not been included in this publication's estimate of catfish industry employment.

Farm Employment

Estimating the total number of people who earn their living by working on catfish farms and hatcheries is not as simple as one would imagine. MESC tracks farm employees whose employers withhold payroll taxes and provide unemployment compensation insurance. Because these data are reported in compliance with federal laws, the information is considered very reliable. The farm proprietor is usually not included in MESC data. The farm owner does not earn a wage; he keeps what is left over after all expenses and payment of social security and income taxes. Also, unpaid family labor is not tracked in MESC data.

NASS estimated there were about 395 catfish farms in Mississippi, with 111,500 acres of ponds in 2001. Mississippi State University's Department of Agricultural Economics estimates about 52 hours of labor are required for each acre of pond operation annually. Thus, around 3,000 man-years of labor are used on all Mississippi catfish farms each year. Total wages paid to farm workers plus earnings that were attributable to the farm owners' management was about $38 million in 2001.

Seasonality of Jobs

Many jobs on catfish farms and in feed mills are seasonal. Increased catfish feed consumption and water quality monitoring in the spring to fall seasons result in increased catfish production and require full employment. The "feeding" season is from March until November, with the peak from June to September. In recent years, Mississippi catfish farmers have employed more seasonal laborers from Mexico and other Latin American countries during these high labor demand periods. Little statistical information is available on the employment of these seasonal laborers, but it seems to be increasing and beneficial to both farmer and hired workers. Anecdotal evidence suggests the Mexican farm and feed mill employees work for five to eight months a year and then return home in winter, when labor demand is low. The operator benefits because he employs people only when he needs them. This allows the seasonal aspects of the business to be handled efficiently and provides stable year-round employment for a core of permanent employees.

Industrial Employment

All aspects of the catfish industry provide job opportunities and skill development. The industry presents opportunities for the young people of Mississippi to pursue their careers. Engineers and mechanics are needed to design, install, and maintain the increasingly sophisticated and efficient feed mill and processing systems. Qualified food scientists and technicians are necessary to ensure product quality and safety and to pursue new product forms. Trained marketing and sales people are critical for expanding catfish distribution. People with skills in data processing, computers, accounting, and other areas are needed for administrative needs.

Catfish Farm Expenditures

Cash costs of producing farm-raised catfish in Mississippi are itemized in Table 8. By far the major cost is in feeding catfish. It is estimated that almost $141 million was spent on feed in 2001. Catfish feed has been a relatively low-priced ingredient in the last few years because of depressed soybean and corn prices but could increase as those commodity prices rebound. Labor wages and fingerling purchases were the second and third most costly items. Variable cost interest was next, but this can vary depending on the financial situation of the farm. Fuel is needed to run emergency tractor driven aerators, water pumps, back-up generators, and vehicles used on the farm. It has been estimated that more than $13 million was spent on gasoline and diesel fuel. Chemicals are needed to control aquatic plants and maintain good water quality, and electricity is needed to run fixed aerators. Catfish farmers spent more than $20 million on these items in 2001.

Farm bank prices for catfish were low in 2001 and 2002, ranging from $0.55 to $0.62 per pound. With production costs generally ranging from $0.65 to $0.70 per pound, farmers have been losing money in this period. However, it must be noted that not all of the variable and fixed cost estimates are cash costs; some are noncash costs. Some wages are made up of nonpaid family labor. Depreciation of equipment and machinery is another noncash replacement cost that represents the amount of equipment wear and tear for a year of operation and does not necessarily represent actual expenditures. Interest on land and pond construction loans may not be paid, since those with equity self-finance these investments.

Catfish farmers must purchase tractors, aerators, pumps, feed bins, trucks, and other equipment and supplies to run their farms, amounting to almost $17 million in new purchases annually. This is especially significant, since many businesses have started in Mississippi that manufacture specialized equipment for the catfish industry, such as aerators, nets, and feeding equipment. Also, these Mississippi manufacturers sell their equipment out of state to other fish farmers and related businesses. The "Catfish Journal Supplier Directory," published yearly, provides advertisements on a cross section of companies serving the industry.

Table 8. Estimated Catfish Farm Production Expenses in Mississippi, 2001. [1]

Variable Expense Items	Statewide Expenditures $ (000)	Percent of Each Expense to Total Variable Expenses
Feed	140,863	50%
Wages	37,595	13%
Interest on operating expenses	21,259	8%
Fingerlings/fry/stockers	20,379	7%
Fuel	13,529	5%
Chemicals	10,330	4%
Repairs/Maintenance	10,158	4%
Electricity	10,149	4%
Transport	9,061	3%
Overhead	3,398	1%
Miscellaneous	2,265	1%
Bird Management	725	0%
TOTAL	**294,712**	**100%**

[1] Developed by MSU's Department of Agricultural Economics.

Catfish Fingerlings

Approximately 20 catfish farmers, representing 18,700 water acres, in Mississippi have hatcheries specializing in breeding fish to produce catfish fingerlings and fry needed to stock grow-out ponds. Most Mississippi catfish farmers purchase fingerlings and fry from other farmers who specialize in breeding and hatching catfish. Most of the fingerlings and fry used in Mississippi are produced in the Delta or west Alabama regions. There are few fingerling producers in east Mississippi because of limited supplies of well water needed for the hatchery process. In 2001, sales of fingerlings and fry in Mississippi exceeded $16 million. Sales of larger stocker fish have been estimated at $4 million.

Purchases of Local Feed Ingredients

Much of the feed manufactured in Mississippi is used to feed food-sized catfish. There were 613,000 tons of catfish feed produced in Mississippi. This was 70 percent of the US production of 875,000 tons. Mississippi processed 381 million pounds of food-sized catfish, which was 64 percent of the U.S. catfish production of 597 million pounds. Assuming that feed rates are the same between states, 6 percent of the feed produced in Mississippi was sold in other states. The major ingredients for 28 percent and 32 percent protein catfish feed, manufactured in Mississippi, are corn (42 percent), soybean meal (50 percent), and fishmeal (8 percent). Using this formulation, feed ingredients used to produce 613,000 tons of feed are shown in Table 9.

Corn and soybeans are grown and processed in Mississippi. Catfish feed mill operators try to purchase as much locally grown corn as possible. This requires that most corn used for producing catfish feed be stored for a period of time. Since Mississippi corn is harvested in late August and early September, which is near the end of the period when catfish feeding is greatest, the corn must be stored until the following spring, when feed demand increases. However, this creates an opportunity for farmers to produce additional corn if storage capacity is built to supply catfish feed mill needs year round. Mississippi has traditionally been a corn deficit state because of its large poultry industry. As farmers look for alternatives to cotton and soybeans, corn planting may increase.

Soybeans are crushed to produce soy oil and soy meal. In Mississippi, a soybean crushing plant at Marks supplies some of the meal used in the catfish ration. The closing of two Mississippi crushing mills recently has forced feed mill operators to source more of their soybean meal from other states.

Fishmeal is an important ingredient. Much of the meal used in the Mississippi catfish feed ration is obtained from plants on the Mississippi Gulf Coast that produce menhaden meal. Mississippi fishermen are employed in catching the menhaden. The state's menhaden industry is centered in Pascagoula. The Gulf fishing fleet contains approximately 50 large vessels owned by fish protein processing firms.

Table 9. Estimated Raw Feed Ingredient Needs and Grain Acreage Used Per Year to Supply Mississippi Catfish Feed Mills in 2001.

Ingredient	Used	Cost	Total $'000	Acres Required (000)	Acres Harvested MS (000) [1]
Corn	9,195,000 bushels	$2.00 per bushel	$18,390	87	385
Soybean meal	306,500 tons	$180.00 per ton	$55,170	358	1,120
Menhaden meal	49,040 tons	$500.00 per ton	$24,520	---	---
Total			**$98,080**	**445**	**1,505**

[1] Source: USDA, MASS, Ag Report, October 12, 2002

Trucks and More Trucks

Fish are seined from ponds and hauled live to processing plants. The amount of fish that can be hauled varies by season; more fish can be hauled per load during cooler weather than in warmer weather. Typically, however, 20,000 pounds of fish can be hauled on an 18-wheel fish transport truck. In 2001, the 381 million pounds of catfish hauled to processors required the equivalent of 19,050 18-wheel truckloads. Approximately 200 million pounds of processed fish were sold in 2001. This represents about 4,000 trailer loads of product leaving the plant for distribution to customers.

Offal (skin, heads, fin, intestines, frames, and such) is the by-product of the catfish processing operation. Typically, more than half of the weight of the catfish becomes offal. The majority is trucked to a rendering facility for production of fishmeal and oil. There is some further processing to produce a pet food ingredient, along with sales of components for other applications. The major catfish rendering plant in the state is located in Sunflower, Mississippi. This plant handles between 4 to 5 million pounds of offal per week, which requires around 4,000 trailer loads of offal per year moving from processing plants to renderer. This roughly equates to 20,000 tons of fishmeal and 10,000 tons of fish oil per year.

Catfish Processing Expenditures

Sales of processed catfish in the United States were $669 million in 2001. Processed fish move within and between companies with locations in different states. It is estimated that sales from Mississippi processing plants were in proportion to the estimated processing capacity for the state as compared to the country. In 2001, approximately 65 percent of the total U.S. live weight processing capacity of around 800 million pounds was in Mississippi. Therefore, Mississippi catfish processing revenues are estimated at $435 million. Fish expenditures range from 58 percent to 62 percent of processor sales dollars and include additional purchases from out of state, Table 10.

The roughly $184 million remaining after fish purchases is spent on operating costs (payroll, packaging, utilities, supplies, maintenance, repair), marketing and distribution costs (product distribution, advertising, brokerage, other sales costs), and administrative costs (management and office expenditures, interest, replacement expenditures).

Table 10. Estimated Mississippi Processor Sales and Expenditures 2001.

	U.S	Mississippi	
	$ (Millions)	$(Millions)	% of Sales $
Processor Sales	669	435	100%
Expenditures and Profit			
Fish Purchases		251	58%
Net After Fish Purchases		184	42%

Table 11. Estimated Mississippi Catfish Industry Revenues 2001.

	Total $ (Millions)	**Incremental $ (Millions)**
Feed Sales (In-State)	141	141
Feed Sales (Out-of-State)	9	9
Fish Sales to Processors	240	99 (Excludes Feed Cost)
Fish Sales – (Out of State)	20	20
Processing Sales	435	184 (Excludes Fish Cost)
Total	**845**	**453**

Mississippi Catfish Industry Sales

Pulling together the revenues for the various Mississippi catfish industry sectors, described in prior sections of this publication, results in total estimated sales of $845 million for 2001, Table 11. A major portion of these revenues is spent within the state to purchase materials, equipment, and services. The incremental revenue category reflects the net sales, $453 million, from the entire Mississippi catfish industry, excluding feed and fish sales within the system.

Research and Extension

Because the industry is relatively young and still growing, problems related to production, processing, and marketing constantly arise. In mature agricultural industries, such as cotton and poultry, many of the research, development, and outreach activities occur in the private sector. However, the catfish industry presently relies on the research and extension efforts of the land grant universities and research efforts of the United States Department of Agriculture (USDA) to address critical issues.

The major catfish research group is located at the Thad Cochran National Warmwater Aquaculture Center (NWAC) at the Delta Branch Experiment Station of Mississippi State University (Stoneville, Mississippi). The cooperative programs of the USDA Agricultural Research Service, MSU Mississippi Agricultural and Forestry Experiment Station (MAFES), MSU Extension Service (MSU-ES), and MSU College of Veterinary Medicine serve as the base for catfish research and extension programs. Similar programs exist in Alabama, Arkansas, and Louisiana. More than 89 research scientists and support personnel are employed directly or indirectly at the NWAC facility, and their annual budget is more than $8 million. Another 15 professionals associated with MSU's main campus and regional centers devote a significant portion of their time to catfish industry issues.

The Future

Since 2000, the catfish industry has suffered because of low prices in the market place caused by the influx of imported fish, depressed prices for competing meats, and a weak economy. In the past, farmers who faced low prices for row crops considered catfish production as an alternative crop. However, with the current prices, most catfish farmers are facing less than breakeven conditions; thus, catfish farming is not now the alternate it once was.

Fish is proclaimed as being an essential part of a healthy diet. Farm-raised catfish is an environmentally friendly solution to over-fishing of the oceans. Catfish produced on farms provide a good quality product on a year-round basis. The answer to making the catfish industry profitable again seems to be expanding the consumer market for farm-raised catfish. Per capita consumption in Arkansas is almost 6 pounds and in Mississippi it is over 4 pounds (Table 3A). As a comparison, chicken consumption has almost doubled from 1970 to 2001. Chicken consumption per person was 27 pounds per year in 1970 on a boneless, trimmed basis compared to 54 pounds per year in 2001.

Table 12: Top 10 Fish and Shellfish Consumption in the U.S. (2001, Edible Meat Basis).

Species	Per Capita Lb/Yr.
Shrimp(27% from Aq.)	3.40
Tuna	2.90
Salmon (50% from Aq.)	2.02
Alaska Pollock	1.21
Catfish (100% from Aq.)	1.15
Cod	0.56
Clams	0.46
Crabs	0.44
Flatfish	0.39
Tilapia	0.35

Source: National Fisheries Institute, Inc. News Media, Seafood Top 10, www.nfi.org/news/topten.php Aq.= Aquaculture.

Annual per capita consumption of catfish in the U.S. was 1.08 pounds in 2000 and 1.15 in 2001, Table 12. Catfish consumption was more than 20 percent of the total U.S. fresh and frozen finfish per capita consumption and was the number one per capita finfish aquacultured species consumed, Table 13. Catfish is ranked third in per capita consumption among fresh and frozen finfish behind Alaskan pollock and salmon. When frozen block and slab components are removed from the fresh and frozen finfish category, farm-raised catfish is probably second in finfish per capita consumption after salmon.

Table 13. U.S. Annual Per Capita Consumption of Commercial Fish and Shellfish, 2001.

Category	Per Capita Lb./Yr.	
Fresh & Frozen Finfish		5.6
Including:		
Salmon (0.4 canned)	1.62	
Alaskan Pollock	1.21	
Farm-Raised Catfish	1.15	
Cod	0.56	
Flatfish	0.43	
Tilapia	0.35	
Fresh & Frozen Shellfish		4.6
Canned		4.2
Cured		0.3
TOTAL		**14.8**

Source: "Fisheries of the United States-2001", National Marine Fisheries Service (NMFS). Per capita consumption www.st.nmfs.gov/st1/fus/fus01/09-percapita2001.pdf

Conclusion

The Mississippi catfish industry, begun in the late 1960's and early 1970's, now employs approximately 7,000 direct employees with an annual payroll of more than $102 million. The farm value of catfish processed in Mississippi in 2001 was more than $260 million, while the value of products sold from the processing plants exceeded $435 million. Total investment in the catfish farm, feed mill, and processing infrastructures ranges from $600 to $700 million.

The catfish industry is important to Mississippi because it creates jobs and income for many people located in economically depressed areas of the state. In several Delta and east Mississippi counties, catfish has more economic and social impact than any other industry.

The catch of fish from the world's oceans seems to have reached a peak. As the demand for fish and seafood products increases, farm-raised fish or aquaculture products are increasing to fill that void. While many aquaculture species may actually put pressure on the ocean catch because of the amount of fish meal used in diet rations, the diet of U.S. farm-raised catfish has lower protein requirements than other cultured species such as salmon or trout. While present low catfish prices dampen the near-term outlook for the catfish industry, it is anticipated the industry will successfully adapt to this new and, changing long-run environment.

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