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Michigan Aquaculture Factsheet
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Michigan Aquaculture Fact Sheet

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Nationally, aquaculture was the fastest growing agricultural sector during the past decade, with a 265 percent increase in production from 1980 to 1990 (USDA, various years). Though less spectacular, significant growth has also occurred in Michigan's aquaculture industry. Growth in trout sales from 1988 to 1991 averaged 23 percent per year, and Michigan's rank for total value of trout sold rose from twelfth in the nation to seventh (USDA, various years). Though complete production figures on other species raised in Michigan are not available, industry representatives estimate the total value of 1991 production, including trout, at \$4.5 million.

This increase in production has yet to make a dent in the state's trade deficit of fish products, however. Household and restaurant consumption of fish in Michigan is estimated at 144 million pounds annually. The approximately 70 commercial aquaculture operations in the state, together with the commercial fish harvest from the Great Lakes, produce around 12 percent of the quantity consumed, giving Michigan an annual trade deficit of 127 million pounds of fish and seafood. In 1990, the national trade deficit in edible fish and seafood was \$2.4 billion.

These local and national trade deficits and rising fish and seafood consumption, combined with growing statewide interest in aquaculture as a developing industry and an opportunity for farm diversification, have led state agency and university personnel to take a closer look at Michigan aquaculture.

In 1990, the Agricultural Experiment Station at Michigan State University initiated a project titled "Economic Feasibility of Culturing Fish Species that offer Commercial Potential in Michigan." The goal of this project was to provide useful biological, economic and marketing information about aquaculture in

Michigan to fish growers and state policy makers. The first step in the project was to survey fish growers to gain an understanding of the current aquaculture industry in Michigan. Survey questions were designed to determine the major characteristics of the industry, such as species raised, production facilities used, specific enterprises involved, business size and age, water sources and constraints to development.

This report summarizes the information collected through that survey. In early 1991, questionnaires were sent to all people with 1990 Michigan game fish breeder's licenses. Of the 82 percent of businesses that responded, 42 percent were currently not in commercial fish production. Those people either: had a license "just in case" they might sell some fish (but didn't sell any); were no longer in production; were not yet in production; or had a fee-fishing operation and bought all catchable-size fish (they didn't actually produce fish themselves).

Business Types

Michigan aquacultural producers (fish growers) are engaged in at least 10 types of aquacultural activities (Table 1). For the most part, these activities are variations of game fish, food fish and fee-fishing enterprises. The majority of responding growers (68 percent) are engaged in multiple enterprises.

Thirty-eight percent of these growers also have other types of agricultural enterprises, including large livestock, crops and non-fruit trees (e.g., Christmas trees). Slightly less than half of the businesses operate year round; the rest operate seasonally (six to nine months).

An unpublished study conducted by Ohio State University in 1991 showed that 75 percent of Michigan

aquaculture businesses have single owners, 17 percent are operated as partnerships and only 8 percent are run as corporations (Geoff Brown, research assistant, Department of Agricultural Economics and Rural Sociology, Ohio State University, personal communication).

Species Raised

Michigan aquacultural producers raise at least 17 species, with rainbow trout, brook trout, brown trout, largemouth bass and bluegills the most common. Other species grown include crappie, catfish, minnows, muskellunge, northern pike, yellow perch, smallmouth bass, tadpoles and walleye. On the survey, growers were asked to write in the names of the species they raised. In some cases, the full name of each species was given (e.g., rainbow trout), and in other cases, just the name of the species "group" was given (e.g., "trout"). The percent of growers raising each species or species group is shown in Table 2.

The average number of species raised by each grower is two, though some growers raise as many as 12 species. At least one type of trout is grown by 73 percent of the aquacultural businesses, while 27 percent raise some type of bass. Over half (58 percent) of the farms raise only trout (35 percent raise only rainbow trout), 27 percent raise only non-trout species, and 15 percent of farms raise both trout and other species.

Fish raised for food are trout (all three species), yellow perch and catfish. Fish raised for fee-fishing are the three trouts, bass, bluegill, catfish, walleye and muskellunge. All of the species raised in Michigan are also sold as game fish (planting stock).

Business Size

The majority of aquaculture operations in Michigan are small. For more than half (54 percent) of the responding growers, their aquaculture business is not a major source of income, contributing 10 percent or less of their total family earnings. Only 15 percent of the growers receive greater than 75 percent of their total family income from aquaculture.

Three-fourths of the responding businesses had 1990 gross revenues of \$25,000 or less; only 6 percent grossed over \$150,000. These findings are consistent with those of the 1987 Census of Agriculture, which found that almost half (49 percent) of all farms in the United States and over half (53 percent) of all Michigan farms had 1987 sales of less than \$10,000 (USDC, 1990; USDC, 1989).

When asked how the size of their business would change in the next three years, 2 percent of the respondents replied that it would become smaller, 28 percent said that it would remain the same and 70 percent said that it would grow larger. When asked whether they wanted to increase the size of their aquaculture operation or their volume of sales, 82 percent of producers said yes.

Business Age

Commercial aquaculture began in Michigan more than 60 years ago. Though the number of operations has remained fairly constant over the past 20 years, the rate of turnover in individual businesses is high. Almost one-third (30 percent) of all aquaculture operators responding to the 1991 survey had begun within the previous 5 years. Of the businesses that were solely or primarily raising fish for food, almost two-thirds (62 percent) had begun within the previous 5 years.

Table 1. Percent of Michigan fish growers engaged in each type of aquacultural activity.

Aquacultural Activity	Percent of Growers
Game fish production only (produce fish for individuals or groups for stocking private waters)	13%
Food-size food fish production only (fish sold to retail stores or restaurants, or to fish wholesalers for later resale to retail stores or restaurants)	6%
Fingerling production only (produce fingerlings for sale to other producers)	4%
Fee-fishing operation only (produce fish for own fee-fishing ponds)	9%
Primarily game fish production (with one or more other types of aquacultural activity as well)	15%
Primarily food-size food fish production (with other aquacultural activities)	18%
Primarily fingerling production (with other aquacultural activities)	6%
Primarily a fee-fishing operation (with other aquacultural activities)	11%
Primarily a non-production aquacultural activity (but do produce fish as well)	2%
Relatively even mix of two to three types of aquacultural production activities	15%

Facilities

Ponds and raceways are the main facilities used by fish growers, though a few use cages as well. Almost all (98 percent) of the responding growers use at least one pond, and slightly more than half (57 percent) use at least one raceway (many growers use both). Of the respondents who raise only trout, 96 percent use ponds and 71 percent use raceways. Of the respondents who raise only non-trout species (cool-water and warm-water fish), 100 percent use ponds and only 31 percent use raceways. Ten percent of all respondents use some type of cages. The species raised in cages were listed as all three trout species, catfish, largemouth bass and "sunfish."

Water Sources

The primary water sources used are springs, flowing (artesian) wells, pump wells, streams and rainfall, with most growers using more than one source (Table 3). Energy costs can make pumped water very expensive. Of the growers who use water from pump wells, almost half (47 percent) obtain one-fourth or less of

their total water from this source. Rainfall, on the other hand, can be unreliable and usually provides insufficient quantities for a commercial operation. Of the businesses that use rainfall as a water source, 69 percent obtain one-fourth or less of their total water from this source.

Constraints to Growth

Growers who indicated that they wanted to increase the size of their operations or their volume of sales (82 percent) were asked what they felt to be the major constraints to expanding their businesses. They could write in whatever they wanted. Responses were quite varied, and a number of growers indicated more than one constraint (Table 4). The two greatest constraints to growth of current aquaculture operations in Michigan, as perceived by growers, are marketing problems and lack of capital, which were indicated by 24 percent and 18 percent of the responding growers, respectively. Insufficient water availability hampers 10 percent of the respondents, and lack of time and restrictive regulations were each indicated by 9 percent of those who answered.

Table 2. Percent of Michigan fish growers who raise each species or species "group" cultured in the state.

Species	Percent of Growers	Species	Percent of Growers
"Bass"	10%	Largemouth bass	17%
Black crappie	2%	"Minnows"	6%
Brook trout	23%	Muskellunge	2%
Bluegills	17%	Northern pike	2%
Brown trout	17%	"Perch"	6%
Bullheads	2%	Rainbow trout	56%
"Catfish"	8%	"Shiner minnows"	2%
Channel catfish	6%	Smallmouth bass	2%
"Crappie"	2%	Suckers	2%
Fathead minnows	8%	Tadpoles	2%
Golden trout	2%	"Trout"	17%
Golden shiners	2%	Walleye	6%
Hybrid bluegills	6%	Yellow perch	6%
Hybrid sunfish	2%		
Species "Group"	Percent of Growers	Species "Group"	Percent of Growers
Trout (rainbow + brook + brown + golden + "trout")	73%	Minnows (fatheads + golden shiners + suckers + "shiners" + "minnows")	15%
Bass (largemouth + smallmouth + "bass")	27%	Perch (yellow perch "perch")	13%
Catfish (channel catfish + "catfish")	15%	Hybrid bluegills + hybrid sunfish	8%

Table 3. Percent of Michigan fish growers using various water sources.

Water Source	Percent of Growers
Springs	59%
Flowing wells (artesian)	38%
Pump wells	36%
Streams	26%
Rainfall	30%

Note: Most growers use more than one water source.

Table 4. Major constraints to aquaculture growth as perceived by Michigan fish growers.

Constraints to Growth	Percent of Growers
Marketing problems	24%
Lack of capital	18%
Water availability	10%
Lack of time	9%
Restrictive regulations	9%
Personal health problems	7%
Lack of technical information	6%
Predators	4%
Cost of liability insurance (fee-fishing)	4%

Note: Other indicated constraints were each perceived by fewer than 2% of the responding growers.

Conclusion

In summary, Michigan aquacultural businesses can be characterized as small, mostly part-time operations with a high degree of diversity. Growers are engaged in several variations of game fish, food fish and fee-fishing enterprises, with rainbow, brook and brown trout, largemouth bass and bluegills the most common species grown. Ponds are the primary production facilities used to rear all species, with a number of trout growers using some type of raceway as well. A wide range of water sources is used. In recent years, the majority of new businesses entering the industry have been those producing food fish. Growers perceive a wide range of constraints to growth; the two most common are marketing problems and lack of capital.

Sources of Information

Extension Bulletins

To obtain any of these bulletins, contact your county Extension office or the Michigan State University Extension Bulletin Office (10B Agriculture Hall, Michigan State University, East Lansing, MI 48824).

E-1179 Great Lakes Fish Preparation

E-1180 Freshwater Fish Preservation

E-1323 Commercial Freezing of Freshwater Fish

E-1775 Making Plans for Commercial Fish Culture

E-1776 My Bluegills are Stunted, Help!

E-2016 Testing Contaminants - A Guide for Home and Farm

E-2028 Eating Great Lakes Fish

E-2409 Promoting Fee-fishing Operations as Tourist Attractions

E-2410 What Consumers Want: Advice for Food Fish Growers

E-2411 What Brokers, Wholesalers, Retailers and Restaurants Want: Advice for Food Fish Growers

E-2455 A Guide to Licenses and Permits for Aquaculture in Michigan

Other Related Readings

Chopak, C. J. (In press.) Marketing Michigan aquacultural products. Research Report 526, Volume 2. East Lansing, Mich.: Michigan State University Agricultural Experiment Station.

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USDA (U.S. Department of Agriculture). 1988-1992. Aquaculture situation and outlook report. Economic Research Service. Washington, D.C.: Government Printing Office.

_____. 1989-1992. Trout production. National Agricultural Statistics Service, Circular Aq 3. Washington, D.C.: Government Printing Office.

USDC (U.S. Department of Commerce). 1990. Agriculture atlas of the United States. Bureau of the Census, Report AC87-S-1. Washington, D.C.: Government Printing Office.

_____. 1989. Michigan: state and county data. Bureau of the Census, Report AC87-A-22. Washington, D.C.: Government Printing Office.

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