

# Aquaculture Enterprises: What Works in Oklahoma

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## A Brief history of Oklahoma Aquaculture 1970 -2002

In the 1970s, landowners were beginning to search for profitable alternatives to conventional crops on small parcels of land. Small-scale bait minnow production was facing severe competition from large Arkansas minnow farms, however, a few producers remained in business. Oklahoma also supported small fee-fishing enterprises and commercial catfish farmers selling their products to local limited markets. There were no large, wholesale outlets for catfish.

The years 1980 through 1988 were years of expansion for the Oklahoma fish-culture industry. Cole Grain Co. in Muskogee, Okla., produced high-quality catfish feeds for area producers. The company also raised fish and constructed a processing plant near Muskogee. Large-scale cage-culture operations were underway just over the state border in Mena, Ark. Large-scale net-pen catfish production experiments began in Lake Texoma. Representative Wes Watkins expressed interest in helping Oklahoma agriculture and was instrumental in bringing a fish processing plant to Holdenville, Okla. Farmers in the Holdenville area formed a cooperative association to promote aquaculture. Many farmers in the state were interested in raising fish. Interest was sufficient that a producers' organization named the Catfish Farmers of Oklahoma (CFO) was chartered in 1985.

By 1988 the aquaculture industry in Oklahoma began to contract. Farms in Mississippi and Arkansas were vertically integrating and expanding. Wholesale catfish prices dropped. Due to environmental, logistical and economic factors, delta farmers could produce more fish at a lower cost than Oklahoma producers. The result was a loss of

markets for state producers and processors. Cole Grain operations went out of business and the Holdenville processing plant was eventually sold to a consortium of Arkansas fish producers. No consistent outlet was left for wholesale catfish. Many producers stopped raising channel catfish. In 1993 CFO changed their name to the Oklahoma Aquaculture Association in an effort to be more inclusive and gain membership.

## Who Survived?

Although all but a few commercial catfish producers stopped production, many other fish farmers remained viable. They included: diversified fingerling producers, specialty producers of largemouth bass and other species, local food fish producers, pay lakes, and live haulers.

These producers were able to survive because they exploited niche markets not in direct competition with large-scale production. Some had large cash reserves that helped them overcome unprofitable years. Successful fish producers diversified and met local demand for their product.

## What Can Work Now?

Several aquaculture enterprises have a realistic potential to generate profit in Oklahoma. The list includes: Fingerling production for pond stocking, pay lakes, ornamental fish and plants, and small-scale food-fish production.

## Fingerling Production

Fingerling production is profitable because Oklahoma has more than 250, 000 acres of ponds. Most pond owners are interested in stocking fish for recreational fishing and home food production. Common pond stocking species are channel catfish, largemouth bass, bluegill and hybrid

## About Ken Williams

- Peace Corps Central African Empire Fisheries Extension
- 1982 Graduate school at OSU, M.S. in Fisheries
- 1986-1992 Langston University Cooperative Extension Program Fisheries Extension Specialist located at the Kerr Center for Sustainable Agriculture
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"I have conducted research and provided extension assistance in aquaculture and pond management during my tenure at

Langston University as well as aquatic and environmental education for youth. I am currently working primarily as a pond management specialist, advising clients about opportunities for sport fish management and home food fish production. I have written numerous fact sheets, articles and books on aquariums for the science classrooms and pond management.

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bluegill.

The basic requirements for a fingerling production enterprise are: water supply; multiple ponds 0.1 to 2 acres in size; transportation and delivery equipment; harvest equipment; holding tanks; and shed and hatchery facilities.

**Pay Lakes**

Pay lakes are becoming more common in Oklahoma because sportsmen are increasingly interested in trophy or other high-quality angling experiences. Pay lakes are sometimes part of a hunting lease operation. Some lakes are leased exclusively to sportsman's clubs or other corporate organizations. These lakes are managed to produce excellent angling for trophy species, specialty fish, or other aquatic species. Requirements for a successful pay lake enterprise include: a lake or large pond, a quality fishery, clean environment, scenic surroundings, controlled access, and strict fishing regulations.

An exclusive club may lease a high quality fishery for as much as \$20,000 per year. A weekend of fishing on a trophy bass lake in Texas can cost \$2,000 per weekend. Returns depend upon quality of the fishery, marketing, location and uniqueness of the enterprise.

**Niche Markets**

Markets also exist for food-sized sportfish such as largemouth bass, hybrid bluegill, trout and hybrid striped bass.

Koi carp and goldfish are high-value ornamental fish species that are successfully raised and marketed in Oklahoma.

**Local and Monthly Fish Sales**

Small-scale food-fish production can be profitable for producers. Sales are generated through local advertising and word of mouth. Fish are sold live to the consumer who brings a suitable hauling container to the sale site. Best sales are generated when fish are sold at a regular time and place. Langston University has had much success with a monthly fish sale held on campus. Farmers' markets or local feed stores are good locations for live food fish sales of channel catfish, grass carp and buffalo fish. Live food fish sales require use of a certified scale, itinerant business permit, sales tax permit, and liability insurance, as well as fish handling and hauling equipment.

Monthly sales of 1,000 pounds of fish require 12,000 to 15,000 pounds of yearly production. Producers need at least five acres of ponds to grow this quantity of fish.

**Based on sales of 1,000 lbs per month:**

Gross return \$1.00 per lb.	\$1,000
Cost of production \$0.63 per lb.	\$630
Net return	\$470

**Organic Fish Production?**

Although I know of no organic fish production enterprises in Oklahoma at this time; I believe there is an unmet demand and profitable opportunity for organic fish culture.

Discussed below are organic certification standards as they might apply to aquaculture and some possibilities for species to culture and production techniques. There are no aquaculture standards other than general livestock production standards at this time. However, from these rules we can begin to develop an organic enterprise that has the potential to gain certification.

**Certification Standards Applying to Aquaculture**

- Organic livestock must be fed 100% organic food.
- Synthetic hormones and antibiotics are disallowed.
- Synthetic parasiticides are disallowed.
- Animals for slaughter must be raised under organic management for the last third of gestation. It may be necessary due to this regulation to have a hatchery as an integral part of the operation or purchase fingerling fish from a certified organic fingerling producer. Currently, there are no certified organic fingerling producers in Oklahoma.
- All non-agricultural ingredients, synthetic or non-synthetic, must be included on the National List of Allowed Synthetic and Prohibited Non-Synthetic Substances.
- Producers must develop an organic production system plan that is agreed to by the producer and an accredited certifying agent.
- Any field or farm parcel from which harvested crops are intended to be sold, labeled or represented as organic, must meet the following criteria:
  - Have had no prohibited substances applied to it for a period of three years immediately preceding harvest.
  - Have distinct, defined boundaries and buffer zones such as runoff diversions to prevent the unintended application of a prohibited substance.
  - The water supply to the fish farm must be protected from contamination.
  - Wells would be easier to certify as organic than would reservoirs because in the case of reservoirs, the entire water shed of the reservoir would have to be controlled.
- The producer must maintain records sufficient to preserve the identity of all organically managed animals and edible and nonedible animal products produced on the farm.
- The producer must establish and maintain livestock living conditions which accommodate the health and

natural behavior of animals. This regulation could eliminate cage culture, raceway culture, and recirculating systems as possible organic fish production systems. A pond environment would most likely satisfy this regulation.

- The processor also must be certified as organic to maintain the integrity of the product to the consumer. Currently, I know of no organically certified fish processors in Oklahoma.

### **Suitable Species**

There are many possible fish species that can be raised organically. Factors to consider on species choice include the place of the fish in on the food chain. A species high on the food chain will require a high protein diet consisting in part of fish meal or live fish. Herbivorous fish could be raised on less expensive grains or forage. Market demand and market price also will determine which species can be organically raised and at the same time be cost effective. Organically grown trout – a fish high on the food chain -- are successfully marketed in the U.K. Channel catfish, buffalo, grass carp, hybrid bluegill, and tilapia are other likely candidates for organic fish culture.

### **Wild Caught Fish**

Wild caught fish are not likely to become candidates for organic certification. Their food sources are unknown, there is no proof that they have not consumed substances

dangerous to humans, and no documentation of production practices exists.

### **Organic Fish Production Systems**

Organic fish production could be based on commercially manufactured feeds, natural forages, or a combination of supplemental feed and forage.

Manufactured feed production would require a certified feed mill, organic grains, and natural vitamins. Fish meal is a necessary component of manufactured feed. There is a question as to whether fish meal currently produced from ocean harvest would be acceptable. Organic feed minus fish meal could be fed along with organically produced fathead minnows as a supplement to make up for fish meal deficiency. Channel catfish, hybrid bluegill, rainbow trout, and hybrid striped bass could be produced from a manufactured feed / forage fish production system.

Naturally based organic feeds might include minnows, algae, aquatic plants such as southern naiad or high protein hays such as alfalfa. Worms are often suggested but actually do not supply sufficient nutrition to be practicable in most circumstances. Grass carp and tilapia are two species that could be produced from a forage-based feed system.

Grow-out time from fingerling to market may be longer due to lower quality feeds likely to be used in an organic fish production system. Premium prices paid to the producer should reflect increased production expense.