

# Ohio Aquaculture Plan

**Ohio**

Department of  
Agriculture

Developed by  
Ohio Aquaculture Task Force  
2009





December 2010

When it comes to new trends and ideas in agriculture, aquaculture tops the list. Aquaculture holds a tremendous amount of promise to the future of our state and is a prime example of sustainable agriculture and what this administration is working toward in Ohio.

I am proud to present the Ohio Aquaculture Plan, which is the first step of many commissioned by the Ohio Department of Agriculture to support this growing industry and move it forward. This plan is the culmination of months of work by the Ohio Aquaculture Task Force, which I created two years ago to help develop this framework to direct and expand Ohio's aquaculture industry. This plan will be used as a guideline to prioritize legislation, initiatives and programs to maximize resources available to the industry.

As this plan is finalized, the department sees the merit in many of its recommendations and has begun implementing them. The department will continue to work in harmony with OSU South Centers in Piketon, OARDC, Hocking College and others. We are also committed to continuing to work with existing programs through USDA to reduce barriers for the aquaculture industry. This administration has high ambitions to support rural Ohio – and the aquaculture industry has our full support.

Sincerely,

Robert J. Boggs, Director  
Ohio Department of Agriculture



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## **Executive Summary**

The food and agriculture industry annually generates \$98 billion in Ohio and has been identified as the state's largest industry. The agricultural sector has been one of the few industries during the recession that has maintained economic stability. Aquaculture, also known as fish farming, is one of the fastest growing segments within the agricultural sector worldwide. The aquaculture industry in Ohio is in its beginning stages of growth relative to a more developed system of aquaculture production exhibited in the southern United States.

The Ohio Aquaculture Plan was developed to assist in the expansion of the aquaculture industry in Ohio. The Ohio Aquaculture Plan contains a roadmap for growth and identifies the roles of various stakeholders in the advancement of a sustainable aquaculture industry in Ohio. The plan calls for an investment of approximately \$1.9 million from a variety of sources to provide the foundation to develop aquaculture in Ohio.

Private sector investment has historically been more than public investment in aquaculture. However, variability in production factors, marketing risks and the high costs of entrance (pond construction and indoor facility setup) have contributed to the hesitancy of existing farmers and beginning farmers from entering into the aquaculture industry. A proactive public sector helps create an enabling environment that recognizes the role of the private sector as an efficient engine for growth for the industry, developing production innovations, and modifying marketing opportunities that will ultimately help expand Ohio's tax base.

Ohio has increased potential to become one of the leaders in U.S. aquaculture production. Ohio has the natural resource base (water availability), human capital (labor), proximity to the major consumer markets (East Coast, Midwest and Ohio's metropolitan cities) and competitive production advantages for specific species (i.e. bluegill, yellow perch and largemouth bass) to accomplish this goal.

There is public value in developing the aquaculture industry in Ohio. Growing seafood by our own producers adds to agricultural security, which continues to be a high priority in the state. Seafood is viewed as heart-healthy, high protein and low fat. Consumers are demanding more seafood, and the demand is also increasing for seasonal, locally harvested seafood. The ability to provide a product to meet consumer demand for

seafood that is high quality, safe, competitively priced, nutritious and produced in an environmentally sustainable manner is imperative.

Future success of the aquaculture industry is not limited to the producers of seafood. A multitude of supporting industries such as feed suppliers, processors, value-added product developers and equipment suppliers (tanks, pumps and nets) will share in the successful development of the industry over the next decade. Additionally, aquaculture development enhances economic opportunities in rural areas through job creation and improving the viability of small farms. Aquaculture can provide specialized products that are indigenous for Ohio producers for export and reduction in the U.S. trade deficit. Aquaculture production can also alleviate pressure on local capture fisheries.

The development of the aquaculture industry in Ohio will help expand consumer consumption of an Ohio-based product, expand economic opportunities within rural communities, help maintain environmental farm sustainability and provide a safe food product for all consumers to enjoy. The Ohio Aquaculture Plan was formulated as a comprehensive and coordinative industry effort to help launch this effort.

## **Introduction**

### *Global*

As predicted, world aquaculture has exploded rapidly and reportedly now provides fifty percent of all fish consumed. What used to come primarily from the capture fisheries, now is farm raised. In fact, the global catch of seafood has been flat or declining for decades, with three-quarters of fish stocks at or beyond the limits of sustainable fishing. The Food and Agriculture Organization (FAO) recently released information on the state of fish stocks: 52 percent of the commercial marine fish stocks it monitors are considered fully exploited, 19 percent overexploited, 8 percent depleted and 1 percent recovering from depletion.

The demand for seafood is also rising. Although seafood consumption per capita remained essentially unchanged at 16.9 kg: 8.5 kg from capture fisheries and 8.4 kg from aquaculture, population and standard of living growth is driving the demand. The developed world sees health benefits to eating fish while the developing world's growing middle class demands more animal protein, especially seafood. Without increased aquaculture, certain economists believe that fish prices will triple or quadruple by 2030.

### *National*

U.S. domestic aquaculture production is expanding and is expected to continue to grow as a source of fish, shellfish and mollusks. During the last two decades, the value of U.S. aquaculture production rose to nearly \$1.1 billion. Results of the 2007 Census of Agriculture (2009) indicated that sales of fish, shellfish and related products increased by 11.7 percent during the previous seven years.

The census showed that food fish—including catfish, perch, salmon, hybrid striped bass, tilapia and trout—accounted for 62 percent of all aquaculture sales in 2005. Ornamental fish, such as koi and tropical fish, each accounted for approximately 5 percent of sales. They were followed by baitfish at 4 percent and sport fish at 2 percent.

Mississippi led the nation in sales of aquaculture products, with nearly \$250 million dollars in 2005. Arkansas, Alabama and Louisiana were the other states with sales topping \$100 million. Louisiana had the largest number of aquaculture farms. The state's 873 farms were more than double the number in any other state. These tend to be very large producers, unlike the variety of large and small farms in Ohio. Currently, most facilities in Ohio are family owned and operated and raise fish for high-value markets.

Current domestic aquaculture production takes place mainly on land, in ponds and in coastal waters under state jurisdiction. Recent advances in offshore aquaculture technology have enabled several commercial finfish and shellfish operations to locate in more exposed, open-ocean sites in state waters in Hawaii and New Hampshire.

Preliminary production estimates by the National Oceanic and Atmospheric Administration (NOAA) indicate that domestic aquaculture production of all species could increase from about 0.5 million tons annually to 1.5 million tons annually by 2025. The additional production could include 760,000 tons from finfish aquaculture and 245,000 tons from shellfish production.

The United States has become a major market for the global aquaculture industry, resulting in an annual seafood trade deficit of over \$9 billion. U.S. imports of fish products in 2007 were valued at \$13.7 billion, \$0.3 billion more than in 2006. The quantity of fish imports was 5.3 billion pounds, a decrease of 53.8 million pounds imported in 2006.

Interest in aquacultural production is on the rise because restrictions on the wild harvest of many seafood species may diminish wild harvest seafood supplies.

## *Ohio*

Aquaculture is poised to expand rapidly in Ohio. Thirteen species of aquatic animals are currently raised for food, pond stocking, bait for fishing and as ornamental species. Ohio fish farmers reported \$6.6 million in sales for 2007. This is up from \$1.8 million in 1998 and \$3.2 million in 2005 (Census of Aquaculture), representing an annual sales growth rate of 8 percent. The largest volume of sales belonged to farms selling sportfish and gamefish with 75 farms reporting \$2,455,000 in sales. In 2008, there were a total of 272 aquaculture and baitfish dealer licenses purchased through the Ohio Division of Wildlife. People in possession of aquaculture permits also receive bait dealers and transportation permits if requested, so one farm may have multiple permits. Of the 272 permits issued, there were 207 aquaculture, 196 bait dealer and 124 transportation permits. In the North Central Region, Ohio currently ranks 3rd of 12 states for total sales of aquaculture products, up from 7th in 1998.

Ohio has abundant water and land resources for rearing a variety of species and an optimal climate and growing season for rearing high-value species. Major metropolitan areas such as Columbus, Cincinnati and Cleveland have large population bases and serve as major transportation hubs for regional and national markets. Interest in developing a variety of aquaculture operations for Ohio is continually increasing, but Ohio could better coordinate development and markets. Ohio will need to garner increased support from a variety of private and public agencies and institutions to significantly increase the development of this agricultural enterprise.

As for any agricultural commodity, markets are critical for success. Potential for Ohio aquaculture products appears promising in terms of proximity to major markets. Central Ohio is within 500 miles of nearly 75 percent of the U.S. population, providing considerable export potential for Ohio-grown aquatic products. Nearby large population centers can provide markets for Ohio-grown fish products. These include Columbus, Cleveland, Cincinnati, Dayton, Toledo-Detroit, Indianapolis and Pittsburgh. Easily within a one-day truck trip are the large metropolitan areas of Baltimore, Chicago, New York City, Philadelphia, St. Louis and Washington, D.C. Ohio has an advantage over

other Midwestern states in that as one proceeds westward, quick access to major population centers declines and costs of transport to ship to major eastern markets increases substantially. Ohio's transportation system offers excellent same-day shipment of time-sensitive materials, such as fish, because of easy access to the Federal Interstate Highway System, as well as access to at least seven airports with significant national and international cargo operations. Markets exist for Ohio-grown aquatic products, and the challenge is to increase the number and size of operations to meet the existing and growing demand. This is especially true in the market for foodfish. As consumption of seafood increases and supply from the wild decreases, this market must be supplied by aquaculture.

Expansion of aquaculture in Ohio can have significant economic impact on our state's economy. A rapidly expanding aquaculture industry requires concurrent expansion of related industries in order to succeed. Examples of related industries include fish feed production facilities, specialized trucking firms and additional fish processors. In aquaculture, it is generally agreed that gross farm gate sales can be multiplied by 7.5 to assess total economic impact resulting from the production of aquatic products. This means that in 2007, aquaculture had an estimated economic impact of \$49.5 million in Ohio.

Aquaculture can have a significant impact on Ohio's family farms and can allow more farmers to stay on the farm. Much of Ohio's current aquaculture production occurs in rural areas and on family farms. It has diversified and supplemented farm income for many small-farm operations. It also allows for the conversion of small swine and poultry operations to profitable aquaculture operations. Raising fish is environmentally friendly in that feed is processed more efficiently and has a smaller footprint per unit protein produced than any land-based animals. Aquaculture expansion can only have positive benefits for our rural communities.

Interest in developing aquaculture businesses in Ohio increases annually. Requests for information on starting aquaculture enterprises number in the thousands annually. Aquaculture is poised to expand rapidly in Ohio. We need to create the infrastructure and programs needed to assist potential aquaculture entrepreneurs in developing profitable operations.

Ohio aquaculture can continue to grow if Ohio makes a financial commitment to expanding aquaculture. We need to develop strategies and programs to enhance development or Ohio will be on the sidelines as agriculture's fastest growing segment expands in the U.S. Effort needs to focus on economic development, fish health, marketing and promotion, food safety, research and education. The Ohio Aquaculture Task Force (OATF) was convened to examine these needs and develop recommendations to foster expansion.

## **The Ohio Aquaculture Task Force (OATF)**

### *Need and Purpose*

The aquaculture industry in Ohio has expanded and is identified as a key agriculture industry in Ohio. While the industry has experienced growth in the past decade, impediments to future expansion still exist. The 2009 Ohio Aquaculture Task Force (OATF) was convened to identify key industry needs. The task force consisted of individuals representing the private sector, various academic programs and agricultural commodity groups as well as selected state and federal agencies. These participants either have aquaculture programs associated with them or have regulatory responsibility over specific aspects of aquaculture. The task force's purpose was to develop a framework directing and expanding Ohio's aquaculture industry through the development of key recommendations. These recommendations will be used to prioritize legislation, initiatives, and programs to maximize the resources available to Ohio aquaculture.

### *Core Participants*

Initial meetings of the OATF consisted of participants from the following core groups who shared a common desire to investigate the future potential of Ohio aquaculture and to determine what needed to be accomplished to achieve that:

- Ohio Department of Agriculture
- Ohio Aquaculture Association
- Fish Farmers of Ohio
- Hocking College
- United States Department of Agriculture
- Ohio Veterinary Medical Association
- Ohio Department of Natural Resources
- Ohio Environmental Protection Agency
- Ohio Farm Bureau Federation
- Ohio Sea Grant College Program
- Ohio Agricultural Research & Development Center
- OSU South Centers at Piketon
- OSU Extension

This listing reflects the diverse nature of OATF 2009, which served to provide valuable input on a wide array of subjects pertinent to developing aquaculture in Ohio.

# **Aquaculture Health, Food Safety and Marketing**

## **Key Recommendations:**

- Create a State Aquaculture Coordinator position within the Ohio Department of Agriculture.
- Provide support for the Ohio Department of Agriculture Animal Disease Diagnostic Laboratory.
- Maintain support for the Ohio Aquatic Animal Health Advisory Committee.

## *Current status*

Providing a consistent supply of high-quality product is one of the goals of the aquaculture industry in Ohio. To accomplish this, the industry must implement best management practices in the areas of fish production, health, product safety and marketing. In Ohio, the Ohio Department of Agriculture (ODA) has regulatory responsibility over aquatic animal health and food safety and possesses expertise in marketing Ohio products.

In an effort to develop a comprehensive approach to fish health management, Ohio has organized an Aquatic Animal Health Advisory Committee (AAHAC). This committee has driven the process of updating the state regulations regarding fish import, export, transportation and health. Additionally, ODA has upgraded their laboratories and trained staff to become the only fish diagnostic lab in Ohio.

Processing seafood is regulated by county health departments, ODA, Food and Drug Administration and USDA. Fish processing facilities in Ohio work closely with ODA to obtain permits and ensure optimal product quality and safety.

Most fish farmers individually market their products to a wide variety of outlets. The Fish Farmers of Ohio (FFO) is a recently developed association that works on implementing a cooperative marketing model. Marketing expertise will enable the aquaculture industry to capture larger markets including both domestic and international.

## *Identified needs*

Funding of a State Aquaculture Coordinator position within the ODA to promote communication and cooperation between aquaculture producers and state agencies (ODNR, OEPA, OSU, etc.), assist in development of new aquaculture operations, assist with marketing and promotion of aquaculture products, develop a voluntary quality assurance and best management practices programs for aquaculture farms.

Financial support for the ODA Animal Disease Diagnostic Laboratory to purchase equipment and hire personnel to provide diagnostic services for the industry and for ODA Division of Animal Industry to provide Ohio veterinarians with educational training sessions on aquaculture and aquaculture health issues.

Maintain support for the Aquatic Animal Health Advisory Committee.

# Aquaculture Business

## Key Recommendations:

- Develop a revolving loan program.
- Conduct a feasibility study for aquaculture in Ohio.
- Develop enterprise budgets for aquaculture facilities in Ohio.

## *Current Status*

Currently, there are limited resources available for providing aquaculture business planning for current and future culturists in Ohio. Developing business plans and enterprise budgets for proposed aquaculture operations are also hampered by the lack of dependable production data, both biological and economic. This is contrary to other agricultural operations, where hard, dependable data has been available for decades. The aquaculture industry, while the fastest growing segment of U.S. agriculture, is relatively young (especially in Ohio) and requires individuals and programs specific to aquaculture production and economic business planning if it is to reach its full potential.

There are currently a number of both state and federal loan programs available that can help finance new and expand current aquaculture operations. However, these loan programs are not well understood by many potential culturists and many individuals are intimidated by the procedures and policies associated with obtaining such assistance. Another obstacle to obtaining loan assistance is a lack of understanding of aquaculture by banking institutions. By not understanding aquaculture and its required economic inputs, banks are unable to assess risk level and therefore will not provide loans to potential culturists.

## *Identified needs*

Develop a revolving loan program to stimulate new entries into the aquaculture industry and aid in expansion of existing businesses.

Conduct a Feasibility Study to determine a good model for aquaculture expansion in Ohio.

Develop enterprise budgets for aquaculture facilities in Ohio by collecting “real-world” production data from aquaculture facilities.

# **Aquaculture Education**

## **Key Recommendations:**

- Continue to support and promote aquaculture education.
- Finalize the Ohio State University Aquaculture Extension “Triangle Plan.”
- Provide on-farm site consultation and training.

## *Current Status*

Aquaculture education can assist in the development of a larger, more productive industry, provide people with the necessary tools to develop an aquaculture enterprise and educate a future workforce that will provide important support for the aquaculture industry. The development of the aquaculture industry will benefit from adult, undergraduate and graduate programs designed to teach the increasingly technical aspects of the industry.

The aquaculture extension program in Ohio is based at the Ohio State University South Centers at Piquette with a satellite center in Bowling Green, Ohio. The program responds to hundreds of requests for information annually, organizes introductory and advanced workshops, consults with interested individuals, conducts applied research demonstrations, collaborates with farmers, teachers, extension agents, schools and colleges and works with fish farmer groups to assist in the development of the aquaculture industry in Ohio.

Hocking Technical College in Nelsonville, Ohio, recently initiated the only post-secondary aquaculture program (associate’s degree) in Ohio. Agricultural Technical Institute, in Wooster, Ohio, has also expressed an interest in developing an aquaculture program, though no action has been taken.

The Ohio State University School of Environment and Natural Resources (SENR) has had a specialization area in Fisheries Management and Aquaculture since 1989. Since this time, more than 300 students have participated in introductory aquaculture programs with 7 MSc and 11 Ph.D. students completing degrees related to aquaculture.

## *Identified Needs*

Continue to promote aquaculture education by supporting secondary education efforts at Ohio State University’s SENR and the Hocking College Aquaculture Program.

Finalize The Ohio State University “Triangle Plan” in which three aquaculture extension/research specialists stationed in Northwest (occupied), Northeast (vacant) and Southern Ohio (occupied) use a team approach to address the research, programming and educational needs for Ohio aquaculture.

Provide on-farm consultation and training to assist growers entering into the industry and established producers in enhancing their operations.

# Aquaculture Research

## Key Recommendations:

- Continue to support funding for applied and basic research.

## *Current Status*

Ohio has made great strides in developing the nationally and internationally recognized Ohio Aquaculture Research and Development Integration Program (OARDIP), headquartered at the OSU South Centers in Piketon, Ohio. With support from federal and other competitive grants, OARDIP has established several long-term research programs. Partnerships with departments within the OSU College of Food, Agriculture and Environmental Sciences have strengthened this effort.

The Ohio Genetic Improvement of Farmed-Fish Traits (O’GIFT) program is a long-term broodstock improvement program. The overall goal of the program is to create, through a long-term selective breeding approach, superior fish broodstocks with traits amenable to commercial-scale aquaculture in Ohio and the Midwest. The new AGBL is the first of its type in the Midwest and crucial to the success of the O’GIFT program.

The Bowling Green Aquaculture Center is housed at the Agricultural Incubator Foundation, north of Bowling Green, Ohio. The center’s main focus is to conduct research on the performance and economic efficiency of recirculating aquaculture systems (RAS) and evaluate the culture suitability of baitfish species for Ohio. Additionally, an aquaponics (rearing fish and plants in tandem) research system has been constructed to test the suitability of fish effluent water on the production of a variety of high-value vegetable plants and herbs.

The success of the OARDIP at OSU is in large part due to its strong foundation in both research and outreach. A pertinent research program must be accompanied by an effective extension program if the results are to be effectively transferred to and adopted by the industry. A website was developed that enables 24-hour access to information, e-mail list serves for quick dissemination of information, face-to-face and phone counseling and workshops designed to educate clients on how to incorporate our research-based information into their businesses

## *Identified Needs*

Continue to support funding for applied and basic research addressing identified needs of the industry at OSU and other institutions. Priority areas of research include, but are not limited to: genetic improvement of cultured fish species for production and disease resistance, development of standardized culture practices and management models to improve on-farm production and profitability, and aquaculture economics and marketing.

## Appropriations Synopsis

Identified Need	Responsibility	Estimate Annual Cost
State Aquaculture Coordinator	ODA* Industry	\$100,000
Animal Disease Diagnostic Lab	ODA* Industry USDA	\$250,000 (one time) \$100,000 (annual)
Ohio Aquatic Health Advisory Committee	ODA* OSU OVMA USDA ODNR Industry	\$5,000
Revolving loan program	ODA* ODOD USDA/FSA/Rural Dev Industry	\$250,000
Feasibility study for aquaculture in Ohio	ODA* Sea Grant OSU Hocking College Industry	\$50,000 (one time)
Enterprise budgets and database development for aquaculture facilities	ODA* OSU Industry Other Universities	\$50,000 (one time)
Hocking College Aquaculture Program Capital Improvement	Hocking* Industry	\$450,000 (one time)
Ohio State University "Triangle Plan" One staff person	OSU* Industry	\$100,000
Applied and basic research	OSU* Hocking Other Universities ODNR Sea Grant Industry	\$200,000
Total		\$1,500,000

### Funding Matrix for the Ohio Aquaculture Plan

<b>Entity</b>	<b>Identified Need</b>	<b>Annual Cost</b>	<b>Source of Funds</b>	<b>Initial Year Funding</b>
<b>Ohio Department of Agriculture</b>	Aquaculture Coordinator	\$100,000	ODA Budget 1st Year / Legislative Initiative	\$100,000
	Animal Disease Diagnostic Lab Equipment		Legislative Initiative	\$250,000
	Animal Disease Diagnostic Lab Personnel	\$100,000	Legislative Initiative	
	Ohio Aquatic Health Advisory Committee	\$5,000	Legislative Initiative	
	Feasibility Study		Legislature and Aquaculture Associations	\$35,000 \$15,000
	Enterprise Budget Development		Legislature and Aquaculture Associations	\$35,000 \$15,000
	Revolving Loan Program		Agriculture Venture Rural Rehabilitation	\$250,000 - 1 <sup>st</sup> Year \$250,000 - 2 <sup>nd</sup> Year
<b>ODA TOTAL</b>		<b>\$205,000</b>		<b>\$955,000</b>
<b>Hocking College</b>	Hocking College Infrastructure Improvements		Legislative Initiative Capital Budget	\$450,000
<b>HC TOTAL</b>				<b>\$450,000</b>
<b>Ohio State University</b>	OSU Extension Personnel	\$100,000	Legislative Initiative	
	OARDC Research	\$200,000	Legislative Initiative	
<b>OSU TOTAL</b>		<b>\$300,000</b>		
<b>COLUMN TOTALS</b>		<b>\$505,000</b>		<b>\$1,400,000</b>
<b>Sources of Funding</b>		<b>Annual Request</b>		<b>Initial Year Funding</b>
ODA				\$600,000
Ohio Legislature	1st Year	\$400,000	Biennial Budget	\$310,000
	Subsequent Years	\$500,000	Capital Budget	\$450,000
Aquaculture Associations				\$30,000



**Ohio**

Department of  
Agriculture



Ohio Aquaculture Research and  
Development Integration Program



**Ohio**

Environmental  
Protection Agency

