

**CIRCULATING COPY**  
**Sea Grant Depository**

**LOAN COPY, ONLY, ONLY**

**PROSPECTS FOR AQUACULTURE  
IN OHIO**

by **Charles E. Herdendorf, Ph.D.**  
and **Jeffrey M. Reutter, Ph.D.**

---

NATIONAL SEA GRANT DEPOSITORY  
PELL LIBRARY BUILDING  
URI, NARRAGANSETT BAY CAMPUS  
NARRAGANSETT, RI 02882

**OHIO SEA GRANT**  
**Technical Bulletin**  
**January 1981**  
**OHSU-TB-3-81**





**OSU**

The Ohio State University  
Ohio Cooperative Extension Service  
Ohio Department of Natural Resources

Sea Grant technical bulletins are published by the Ohio Sea Grant Program, partially supported through a grant from the National Sea Grant Program of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. These bulletins are designed to transmit research results of Sea Grant sponsored and related investigations to users of coastal and offshore resources.

Charles E. Herdendorf, Ohio Sea Grant Director  
Jeffrey M. Reuter, Associate Director and Advisory Service Coordinator  
William J. Napier, Assistant Director, ODNR  
Russell L. Scholl, ODW Coordinator, ODNR  
Fred L. Snyder, Area Extension Agent  
David O. Kelch, Area Extension Agent  
Frank R. Lichtkoppler, Area Extension Agent  
Margaret L. Holland, Communicator/Editor

PROSPECTS FOR AQUACULTURE  
IN OHIO

by

*Charles E. Herdendorf, Ph.D.  
Director, Ohio Sea Grant*

and

*Jeffrey M. Reutter, Ph.D.  
Associate Director, Ohio Sea Grant  
Center for Lake Erie Area Research  
The Ohio State University*

*January 1981*

OHSU-TB-3-81

TABLE OF CONTENTS

	<u>Page</u>
Introduction . . . . .	1
History of Aquaculture in Ohio . . . . .	1
Current Status of Ohio Aquaculture . . . . .	2
Prospects for Aquaculture . . . . .	3

TABLE

Table 1. Past and Present Ohio Fish Hatcheries . . . . .	5
--	---

## INTRODUCTION

Ohio has had a long history of fish culture dating back to the whitefish hatcheries of the late 1800's. This initial effort was an attempt to arrest the declining commercial stocks in Lake Erie. Today aquaculture in Ohio is directed towards the sportsman. The potential for greatly expanding this direction to meet the increasing numbers of recreational fishermen requires serious thinking about a plan for future aquaculture development in Ohio.

The purpose of this paper is to provide background information on the history, present status and prospects for the further development of aquaculture in Ohio. Initial thoughts on a plan to meet the identified needs and maximize the benefits to Ohio and the Great Lakes Region are also presented in the hope of generating discussion for further planning.

The sea grant programs within the Great Lakes Network have a history of aquacultural research and the capability, through their advisory services programs of identifying the needs of their state. Following initial discussions between the network programs, it became obvious that a coordinate Great Lakes aquaculture effort would maximize the utilization of each program's expertise to the benefit of each state.

## HISTORY OF AQUACULTURE IN OHIO

Early attempts at fish culturing in Ohio date back to the 1800's. When the major whitefish fishery in Lake Erie began to decline two hatcheries were opened at Put-in-Bay for the purpose of varying fingerlings. Attempts at restoring these stocks in the lake from hatchery raised fish failed as did later attempts to halt the decline of the walleye. At about this same time Ohio was laced with large canals. Each canal had a series of feeder lakes to provide flow for the waterway. Hatcheries were established along most of these canals to supply fish to stock the feeder lakes. Another early aquaculture enterprise consisted of carp rearing where corn-fed fish were produced for eastern markets. Many of these ponds were established along the south shore of Lake Erie where marshes had been diked to control the water level in the ponds.

One of the most durable early endeavors of fish culturing in Ohio is the trout farms which have been constructed at several cold-water springs in the western and northwestern part of the state. The most notable of these is located in Castalia in the "blue hole" region.

During the late 1800's and first half of the 1900's the state constructed at least ten hatcheries, seven of which are still operating, and the federal government built three, two of which they continue to operate (Table 1). The

primary purpose for all of these structures was to rear fingerlings for stocking state and federal lakes and reservoirs, primarily within Ohio. At least three major fish varying facilities were constructed during this period by private interests. These facilities supply sportsmen's clubs, private lake and pond owners, and to a minor degree, the restaurant trade.

In the last century many pond owners have experimented with small put-and-take fishing efforts and domestic food production. Despite these efforts, little interest has been demonstrated in the bait industry or in providing commercial food fish.

## CURRENT STATUS OF AQUACULTURE IN OHIO

### Introduction

Aquaculture has three purposes in Ohio: food production, production of fish for the sport fisheries (primarily stocking), and bait production. The largest producers are our two federal hatcheries, six state hatcheries and three major private facilities. Aquaculture for food production is done only by the private sector and then on a relatively small scale and only cold water species (trout).

Production within the state and federal hatcheries is done primarily for stocking purposes in lakes and reservoirs within the state. These stocking efforts utilize primarily warm or cool-water species and are an attempt to both supplement existing stocks and create new stocks in recently developed lakes and reservoirs. For the purpose of supplementing existing stocks, stocking programs in Lake Erie have been all but terminated. However, the state conducts a large stocking program of salmon and trout into the tributaries of the lake. This is a put-and-take fishing in that natural spawning is not anticipated. It has been very successful in producing quality fishing for a large group of shore fishermen.

### Research

Summarizing aquaculture research within Ohio is nearly impossible due to the diversity of groups conducting the work. The federal hatcheries and the state hatcheries each have research efforts and each of these groups contract part of their work to universities and Sea Grant. Private trout farms also conduct some research. From discussions with all three of the above groups it is obvious that even they question the quality of the research, in that it is often impossible to take enough ponds, troughs, tanks, etc. out of production and utilize them for research. Consequently, replication and definitive research suffer.

The following is a listing of some of the research we have been able to document. It is by no means a complete list, but serves as a basis for initial discussions. It should also be noted that much of this is unpublished due to its nature.

Disease. This research can be broken into two components, parasitological and non-parasitological (bacterial, viral, etc.). A wide diversity of parasites have been studied (pathology and life histories), but the majority of this work has been on adult fish populations in the wild. Bacteriological efforts other than trial-and-error evaluation of control measures, could not be documented at the time of the writing of this paper.

Hybridization. This is an on-going effort most recently by the state hatcheries working with saugeye (sauger X walleye) and tiger musky (musky X northern pike). This research includes efforts to determine production, mortality, growth, food habits, and catchability by anglers.

Stocking. This is often considered the point at which aquaculture ends and fisheries management begins. However, the Ohio Cooperative Fishery Unit has conducted some research to relate mortality rates to age at time of stocking and method of stocking (evaluation of stocking from airplanes). They have also evaluated the effectiveness of supplemental stocking in new reservoirs.

Production. All aquaculturists within Ohio have conducted production research of some type including varying feeding rates, temperature, pond fertilization, stocking densities, etc., and observing the effects upon growth, disease, cannibalism, mortality, parasitism, etc. This is probably the most valuable research but also that which has been the least well documented and communicated to other aquaculturists. It is primarily for this reason that aquaculture is still as much an art as a science. Better methods of technology transfer must be developed if aquaculture is to reach its potential in Ohio.

Structure. A modest amount of spawning and habitat structure research has been completed and is underway in Ohio. This work includes some preliminary evaluations of artificial structures upon which fish spawn, in addition to evaluations of spawning structure selection in the wild. Habitat selection is also being studied by defining the spawning requirements and spawning locations of fish in Lake Erie.

Mortality. Mortality was previously discussed in reference to its negative impact on production through cannibalism, disease, parasitism, etc. Natural mortality within Lake Erie and ways in which man affects it have also been studied. This includes the determination of larval densities throughout the Western and Central Basins of the lake and the effects of heavy industry on these densities--including entrainment mortality at water intakes.

#### PROSPECTS FOR AQUACULTURE IN OHIO

Presently only a small percentage of Ohio's seafood needs are met by aquaculture, as the bulk of food fish comes from the Great Lakes and the oceans. In a like manner, most of Ohio's bait needs come from out-of-state sources. However, within the state there are over 60,000 farm ponds, totaling 86,000 surface acres which are producing fish far below their capacity. These ponds have the potential to be utilized for aquacultural endeavors: food production, bait production and rearing of fish for stocking. Production of fish for stocking has long been a successful venture in Ohio, but attempts at aquaculture

for food and bait production have been modest within the state because of the lack of adequate technology transfer, production research and market development. A comprehensive plan for Ohio must address each of these deficiencies as they limit progress toward the state's aquacultural goals.

What are Ohio's aquacultural goals? They are presently undefined. A comprehensive plan must first establish these goals in terms of priorities, available resources and anticipated benefits. The plan should address institutional arrangements, incentives and research/technology transfer needs.

A preliminary analysis of available resources indicates that utilization of the high number of inland ponds warrants first attention. Furthermore, because the vast majority of these waters are farm ponds and farmers have stated an interest in aquaculture, a mechanism for technology transfer is available through Ohio Sea Grant working in conjunction with the Cooperative Extension Service. Presently, Ohio bait producers are meeting only 2.5% of the state's needs. Based on this market demand and probability for success, development of a bait industry in these ponds ranks high in priority.



TABLE 1  
PAST AND PRESENT OHIO FISH HATCHERIES

NAME/LOCATION	OPERATOR	HISTORICAL STOCKS	PRESENT STOCKS	PRESENT PRODUCTION	DATE CONSTRUCTION
Senecaville	Fed				
Hebron	Fed				
Akron	St				
Put-in-Bay		Whitefish Walleye	Coho Salmon		1914
London	St				
St. Mary's	St				
Xenia	St				
Kincaide	St				
Chagrin Falls	St			Closed	
Indian Lake	St			Closed	
Larimie	St			Closed	
Put-in-Bay	Fed			Closed (1940)	1895
Castalia	Pri	Trout	Trout		
Fenders	Pri		ALL Species (warm & cold)		
Besnik	Pri		Warm species		

## OHIO SEA GRANT AREA EXTENSION AGENTS

Fred Snyder  
Ohio Sea Grant Area Extension Agent  
Ohio Cooperative Extension Service  
Fremont Area Extension Center  
1401 Walter Avenue  
Fremont, Ohio 43420  
(419) 332-1594

Dave Kelch  
Ohio Sea Grant Area Extension Agent  
Ohio Cooperative Extension Service  
Lorain County Extension Center  
1575 Lowell Street  
Elyria, Ohio 44035  
(216) 322-0127  
(216) 233-5259

---

Frank Lichtkoppler  
Ohio Sea Grant Area Extension Agent  
Ohio Cooperative Extension Service  
Lake County Extension Office  
99 East Erie Street  
Painesville, Ohio 44077  
(216) 354-3554  
(216) 946-2829 ext. 205  
(216) 428-1194 ext. 205

This information is published in cooperation with the U.S. Department of Commerce National Oceanic and Atmospheric Administration Sea Grant Program and the U.S. Department of Agriculture, in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, George R. Gist, Acting Director of Cooperative Extension Service, The Ohio State University.

All educational programs and activities conducted by the Ohio Cooperative Extension Service are available to all potential clientele on a non-discriminatory basis without regard to race, color, national origin, sex, handicap or religious affiliation.