
EXTENSION¹

Progress Report for the Period
May 1, 1989 to August 31, 2003

NCRAC FUNDING LEVEL: \$521,552 (May 1, 1989 to August 31, 2003)

PARTICIPANTS:

| | | |
|-----------------------|---|------------------|
| Fred P. Binkowski | University of Wisconsin-Milwaukee | Wisconsin |
| James M. Ebeling | Ohio State University | Ohio |
| Robert D. Espeseth | University of Illinois | Illinois |
| Donald L. Garling | Michigan State University | Michigan |
| Jeffrey L. Gunderson | University of Minnesota-Duluth | Minnesota |
| F. Robert Henderson | Kansas State University | Kansas |
| Chester L. Hill | North Dakota State University | North Dakota |
| John N. Hochheimer | Ohio State University | Ohio |
| Paul B. Jarvis | North Dakota State University | North Dakota |
| Anne R. Kapuscinski | University of Minnesota | Minnesota |
| Terrence B. Kayes | University of Nebraska-Lincoln | Nebraska |
| David L. Klinkebiel | North Dakota State University | North Dakota |
| Ronald E. Kinnunen | Michigan State University | Michigan |
| Christopher C. Kohler | Southern Illinois University-Carbondale | Illinois |
| David J. Landkamer | University of Minnesota | Minnesota |
| Charles D. Lee | Kansas State University | Kansas |
| Frank R. Lichtkoppler | Ohio State University | Ohio |
| Joseph E. Morris | Iowa State University | Iowa |
| Kenneth E. Neils | Kansas State University | Kansas |
| Robert A. Pierce II | University of Missouri | Missouri |
| Shawn H. Sanders | North Dakota State University | North Dakota |
| Daniel A. Selock | Southern Illinois University-Carbondale | Illinois |
| John P. Slusher | University of Missouri | Missouri |
| Fred L. Snyder | Ohio State University | Ohio |
| Brian R. Stange | North Dakota State University | North Dakota |
| LaDon Swann | Purdue University | Indiana/Illinois |
| Laura G.Tiu | Ohio State University | Ohio |

¹ NCRAC has funded eight Extension projects. The first three were chaired by Donald L. Garling, the fourth project was chaired by Fred P. Binkowski and projects 5-8 chaired by Joseph E. Morris. A Project Component Termination Report for one of the objectives of the fifth Extension project is contained in the 1997-98 Annual Progress Report. The eighth project is a 2-year project that began September 1, 2001.

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PROJECT OBJECTIVES

- (1) Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.
- (2) Enhance the NCRAC extension network for aquaculture information transfer.
- (3) Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
- (4) Develop and implement aquaculture educational programs for the North Central Region (NCR).
- (5) Develop aquaculture materials for the NCR including extension fact sheets, bulletins, manuals/guides, and instructional video tapes.

ANTICIPATED BENEFITS

Members of the NCRAC Extension Work Group have promoted and advanced commercial aquaculture in a responsible fashion through an organized education/training outreach program. The primary benefits are:

- Increased public awareness through publications, short courses, and conferences regarding the potential of aquaculture as a viable agricultural enterprise in the NCR;
- Technology transfer to enhance current and future production methodologies for selected species, e.g., walleye, hybrid striped bass, yellow perch, salmonids, and sunfish through hands-on workshops and field demonstration projects;
- Improved lines of communication between interstate aquaculture extension specialists and associated industry contacts;
- Access to information by the aquaculture industry through 24-hour access to worldwide aquaculture information (i.e., photographs, slide sets, and publications); and

- An enhanced legal and socioeconomic atmosphere for aquaculture in the NCR.

PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

OBJECTIVE 1

Aquaculture Extension Work Group members have:

- Served as extension liaison, if not an active researcher, for every NCRAC-funded project.
- Assisted in developing, writing, and editing several culture manuals, e.g., Walleye Culture Manual, Sunfish Culture Guide, and Yellow Perch Culture Manual.
- Assisted with the planning, promotion, and implementation of taxa-specific workshops held throughout the region as well as other conferences and symposia.
- Provided the NCRAC Economics and Marketing Work Group with information relevant to that group's efforts to develop production budgets and expected revenues for the commercial production of food fish.
- Participated as Steering Committee members for a regional public forum regarding revision of the National Aquaculture Development Plan and three National Aquaculture Extension Workshops/Conferences.
- Served as writers and reviewers of several white papers for NCRAC.
- Served as Steering Committee members of state-specific aquaculture conferences as well as state aquaculture coordinating councils.

OBJECTIVE 2

The demand for aquaculture extension education programs cannot be met by the few specialists in the NCR (currently less than 3.0 full time equivalents). A NCRAC white paper on extension presents several strategies to address this concern.

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Networking of specialists and Cooperative Extension Service (CES)-designated contacts has maximized efficiency of education programs and minimized duplication. Individual state extension contacts often respond to 120+ annual calls from outside their respective state as well as interacting with colleagues with mutual concerns related to developing aquaculture activities. Many of these requests have been met by providing fact sheets, technical bulletins, bibliographies, maintenance of list servers, and detailed responses to both generalized and specialized questions. This extension network is critical to being able to match specific aquaculture questions with the best source of information, e.g., crawfish and leech information with Gunderson; yellow perch information with Garling, Binkowski, and Tiu; and sunfish information with Morris.

The Aquaculture Network Information Center (AquaNIC [<http://aquanic.org/>]) was established at Purdue University in 1994 through funds from USDA's Cooperative State Research, Education, and Extension Service and the Illinois-Indiana Sea Grant Program. AquaNIC hardware is housed in the Department of Animal Sciences at Purdue University and is coordinated by the Mississippi-Alabama Sea Grant Consortium, the Alabama Cooperative Extension System, and the Illinois-Indiana Sea Grant College Program.

AquaNIC was the first U.S. aquaculture Web site and is globally one of the most widely accessed and cited aquaculture Web sites. More than 1,000 individual, educational, commercial, and governmental Web sites link to AquaNIC as a source of online aquaculture information.

In the past year, the number of "hits" to the NCRAC Web site, newsletters, and publications was 79,005, 9,557, and 27,702, respectively.

To help prevent the spread of aquatic nuisance species (ANS) via cultured fish and baitfish, and to provide the industry with a tool to demonstrate to natural resource

Aquaculture handbooks have been developed and distributed to each NCRAC-designated aquaculture extension contact and selected CES and Sea Grant field staff member.

As with any organization, there have been changes in NCRAC extension personnel since the inception of the project. For instance, Landkamer was the primary aquaculture extension contact for Minnesota. In the intervening years, he was replaced by Kapuscinski and then by Gunderson. Two other individuals were replaced in 1994. In Kansas, Neils replaced Henderson and in Illinois, Kohler replaced Selock. Lee replaced Neils in Kansas in 1996. Hochheimer, who replaced Ebeling in Ohio, left Ohio State University; Tiu was appointed as the aquaculture extension specialist for Ohio in 1998. Sanders was appointed as the extension contact for North Dakota in 1998 replacing Klinkebiel. Upon Sanders resignation, Brian Stange followed and was replaced by Paul Jarvis in 1999. Chet Hill replaced Jarvis in 2002. Jerry Mills is now the appointed NCRAC Extension contact for South Dakota. As of 1999, Kayes is no longer with Nebraska Extension; to date no replacement has been designated. In 2000, Swann resigned from Purdue/Illinois Sea Grant; that position is currently open with Michael Plummer serving Illinois and Brian Miller serving Indiana in the interim.

OBJECTIVE 3

In-service training for CES and Sea Grant personnel and other landowner assistance personnel have been held in most of the states in the region. Training has been in the areas of basic aquaculture, species-specific technologies, e.g., yellow perch, and safe seafood handling including Hazard Analysis Critical Control Point (HACCP). Many of these individuals have, in turn, trained industry representatives in respective subject matter.

agencies that private fish culturists can provide a ANS-free product, the ANS-HACCP approach was developed by Gunderson and Kinnunen. Developed materials include

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a manual and video for use in the training sessions as well as a related poster for use in for retail outlets.

The National Association of County Agricultural Agents Annual Meeting and Professional Improvement Conference was held July 13-18, 2003 in Green Bay, Wisconsin. NCRAC extension contacts who participated in this workshop included Morris, Gunderson, and Kinnunen.

OBJECTIVE 4

A number of workshops, conferences, videos, field-site visits, hands-on training sessions, and other educational programs have been developed and implemented. There have been regional workshops on general aquaculture, fish diseases, HACCP training, fish nutrition, commercial recirculation systems, leach and baitfish culture, aquaculture business planning, crayfish culture, pond management, culture of specific taxa (yellow perch, hybrid striped bass, rainbow trout, hybrid walleye, and sunfish), and in-service training for high school vocational-agricultural teachers. Depending on the workshop, the number in attendance often exceeded 100.

Four North Central Regional Aquaculture Conferences have been held. The first in Kalamazoo, Michigan was held in March 1991; the second was held in February 1995 in Minneapolis, Minnesota; the third conference was held in Indianapolis, Indiana; and the fourth was held February 1999 in Columbia, Missouri. These regional meetings were attended by hundreds of individuals including persons from Canada.

On April 10, 1993, over 700 viewers from 35 states and Canada watched the first national interactive
In 2000, a workshop, entitled "Organic Aquaculture Standards Workshop," was developed and supported by Minnesota extension contacts. With support from the USDA's Agricultural Marketing Service, Packard Foundation, and the University of Minnesota's Extension Service, 43 national and international participants came together to address issues of concern regarding the

teleconference on aquaculture, "Investing in Freshwater Aquaculture," that was broadcast from Purdue University.

It was a televised satellite broadcast for potential fish farmers. The program consisted of 10 five- to seven-minute video tape segments that addressed production aspects of channel catfish, crayfish, rainbow trout, hybrid striped bass, tilapia, yellow perch, baitfish, and sportfish.

A Yellow Perch Producers' Forum was conducted in Hudson, Wisconsin on January 21-22, 2000. NCRAC extension contacts helped design the forum, the goals of which were to: (1) increase profitability and sustainability of existing perch producers, (2) increase cooperation between and among producers, researchers, and extension personnel, and (3) identify yellow perch research and extension needs. A summary of research and extension needs identified by the producers was compiled.

Kinnunen was instrumental in developing and compiling support for the "Environmental Strategies for Aquaculture Symposium." This two-day meeting took place during the 62nd Midwest Fish and Wildlife Conference in Minneapolis, Minnesota, December 3-6, 2000. The symposium provided a forum where industry, resource management agencies, and environmental/conservation organizations could discuss the scientific information available and/or needed to make reasoned decisions regarding aquaculture development. Several NCRAC state aquaculture extension contacts, i.e., Gunderson, Morris, Kinnunen, and Tiu, participated in the planning of or made presentations at this symposium.

National Organic Standards Board's organic aquaculture standards.

NCRAC extension contacts have served as editors for regional aquaculture newsletters as well as in-state aquaculture associations; served on state aquaculture advisory councils and state aquaculture task forces; and

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assisted in the planning and implementation of state aquaculture association meetings. Often the individual contact is the principal contact between the aquaculture industry and governmental/academic institutions.

In support of extension activities being funded through research projects, i.e., hybrid striped bass and sunfish research projects, extension specialists have completed fact sheets, book chapters, and videos. These extension materials, arising from the combined efforts of both extension specialists and researchers, will help to address many questions concerning aquaculture in the NCR.

In addition to the previously mentioned areas, NCRAC extension contacts have been instrumental in fostering the continued growth of the aquaculture industry in the region. For example, Pierce created the Cooperative Extension Aquaculture and Marketing Educational Program to facilitate the development and implementation of aquaculture educational programs in Missouri. Tiu has also worked to revitalize the Ohio Aquaculture Association (OAA). She has continued to coordinate monthly OAA board meetings and edit the OAA newsletter. Gunderson has worked to distribute information about the Environmental Assessment Tool for Land-based Aquaculture developed by Kapuscinski (University of Minnesota) under contract by the Great Lakes Fisheries Commission. This instrument has the ability to impact aquaculture in much of the NCR. Lee has worked with the Kansas Aquaculture Association to NCRAC extension contacts have been responsive to arising issues for the NCR aquaculture industry. For instance, the aquaculture industry is accused of being an important vector for the spread of exotic species like zebra mussels, Eurasian watermilfoil, round goby, and others because water and organisms are moved from one water body to another. Michigan and Minnesota extension contacts worked with other aquaculture and exotic species specialists from around the region to address this issue important to many fish farmers in the NCR, especially people raising fish for stocking or baitfish. To better identify the risks of spreading exotic species and to reduce

develop and fund a current directory of Kansas fish producers.

Many of the NCRAC extension contacts have worked with industry and governmental representatives to produce state aquaculture plans and improved governmental regulations. Binkowski has worked with the Wisconsin Department of Agriculture, Trade and Consumer Protection in the production of A Wisconsin Aquaculture Industry Profile Processor Survey 1998 and 1998 Wisconsin Aquaculture Directory. Binkowski has also worked with the State of Wisconsin as well as the Wisconsin Aquaculture Association to plan the establishment of the Northern Wisconsin Aquaculture Demonstration Facility in Ashland, Wisconsin.

All fish processors, including those who handle aquaculture products, are now required by law to process their fish following HACCP guidelines. Kinnunen has conducted numerous HACCP training workshops throughout the NCR. These workshops served to train fish processors on the principles of HACCP and to give them knowledge on how to develop and implement a HACCP plan for their specific facility. Kinnunen coordinated a three-day HACCP course at St. Croix Waters Fishery near Danbury, Wisconsin, one of the largest recirculation aquaculture systems in North America, in 2002.

those risks, a HACCP approach was used. Extension specialists in Illinois/Indiana, Michigan, Minnesota, and Ohio are participating in this project. The project is designed to identify critical control points and to develop guidelines for controlling the spread of exotic species while not overburdening the industry with unnecessary regulations.

In-service training of secondary teachers have taken place in a number of states. For instance, teachers in Iowa, Ohio, and Wisconsin have received instruction in

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aquaculture which they can use in their vocational agriculture courses.

Several states have on-site facilities that are used for extension programming. For instance, the facilities in Piketon, Ohio operated by Ohio State University are used to inform the public about aquaculture as well as foster grass root support for this agriculture enterprise. The aforementioned Northern Wisconsin Aquaculture Demonstration Facility has also been used in a similar fashion.

The National Catfish Information Database has proceeded with Swann serving on the planning committee as well as serving as a lead editor. The Aquaculture Business Plan Guide has been completed by Southern Illinois University-Carbondale staff.

The NCR is dotted with unused agriculture buildings harkening to the days when small farms could survive raising small numbers of hogs or chickens. One option that many are exploring is converting the buildings for aquaculture use. To help farmers further explore this option, a videoconference workshop was designed and produced to explore the pros and cons of converting existing agricultural buildings into fish culture facilities. This workshop, held November 16, 2002, in Lima, Ohio. In addition, numerous fact sheets, technical bulletins, and videos have been written or produced by various participants of the Extension Work Group. These are listed in the Appendix.

WORK PLANNED

Efforts will continue in regard to strengthening linkages between research and extension work groups as well as enhancing the network for aquaculture information transfer. Participants will also continue to provide in-service training for CES, Sea Grant, and other land owner assistance personnel.

was sponsored by NCRAC, Ohio State University, and the OAA, and was broadcast to several sites throughout the Midwest, including Illinois, Iowa, and Missouri.

Notebook materials from this workshop are available online at <http://southcenters.osu.edu/oa/>.

OBJECTIVE 5

Working interactively, Binkowski and Steve Yeo, at the University of Milwaukee Great Lakes WATER Institute, and Morris, the Associate Director of NCRAC, at Iowa State University, have prepared a draft publication entitled "Aquaculture Effluents and Waste By-Products: Potential Recovery and Beneficial Use in the North Central Region."

Final printing of this document is expected to be spring 2004.

The Yellow Perch Culture Guide is currently in review; Garling is supervising the final production of this document. Final publication is expected to be in 2004.

Kohler and Ryan Lane are currently finishing a CD for NCRAC concerning hybrid striped bass culture. The information on this CD is multifaceted in regard to the various culture phases of hybrid striped bass, i.e., egg through food-fish or pure parental brood stock.

Educational programs and materials will be developed and implemented. This includes final publication of the Yellow Perch Culture Guide.

Future HACCP workshops will be planned as needed in the NCR. Any additional workshops developed and hosted by state extension contacts will be advertised in surrounding states to take advantage of the NCRAC extension network and the individual expertise of Extension Work Group participants.

IMPACTS

- In-service training for CES and Sea Grant personnel has enabled those professionals to respond to initial,

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routine aquaculture questions from the general public.

- Development of aquaculture education programs for the NCR has provided “hands-on” opportunities for prospective and experienced producers. More than 6,000 individuals have attended workshops or conferences organized and delivered by the NCRAC Extension Work Group.
- Fact sheets, technical bulletins, and videos have served to inform a variety of clients about numerous aquaculture practices for the NCR. For instance, “Making Plans for Commercial Aquaculture in the North Central Region” is often used to provide clients with initial information about aquaculture, while species-specific publications on walleye, trout, and catfish have been used in numerous regional meetings and have been requested by clients from throughout the United States. Publications on organizational structure for aquaculture businesses, transportation of fish in bags, and others are beneficial to both new and established aquaculturists. It has been estimated that NCRAC publications were used to address approximately 15,000 client questions annually.
- NCRAC extension outreach activities have helped to foster a better understanding and awareness for the future development of aquaculture in the region.
- In Ohio, an organized OAA has allowed producers to have the forum necessary to encourage appropriate legislation necessary for the success of the aquaculture industry. Closer working relationships with the Ohio Department of Natural Resources resulted in the first electronic database of Aquaculture Permit Holders in Ohio. Two individuals who attended the Alternative Aquaculture

- AquaNIC has become an entry point for many people searching for aquaculture information on the Web. AquaNIC’s home page now averages more than 3,000 visits per month by people from more than 50 countries.
- Fish processors who have attended NCRAC-sponsored HACCP Training Workshops have learned the principles of HACCP with regards to its importance in insuring the production of a safe fishery product. HACCP Plans have now been implemented by workshop attendees who are now keeping records of their daily processing and Sanitation Standard Operating Procedures. About 200 fish processors and/or aquaculturists attended HACCP Training Workshops.
- Kinnunen and Gunderson have been leaders in the development of ANS-HACCP workshops and materials. Attendees to these workshops have included commercial culturists as well as cuturists with natural resource agencies. Many of these individuals have implemented many of the principles of ANS-HACCP into their operations.

Production workshop in Ohio have converted their barns and are now raising fish.

PUBLICATIONS, MANUSCRIPTS, WORKSHOPS, AND CONFERENCES

See the Appendix for a cumulative output for all NCRAC-funded Extension activities.

SUPPORT

| YEARS | NCRAC- USDA FUNDING | OTHER SUPPORT | | | | | TOTAL SUPPORT |
|---------|---------------------------|-----------------|----------|------------------|-------|-----------|------------------|
| | | UNIVER- SITY | INDUSTRY | OTHER FEDERAL | OTHER | TOTAL | |
| 1989-91 | \$107,610 | \$237,107 | | | | \$237,107 | \$344,717 |
| | | | | | | | |

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| 1991-93 | \$94,109 | \$152,952 | | | | \$152,952 | \$247,061 |
| 1993-95 | \$110,129 | \$198,099 | | \$250,000 | \$55,000 | \$503,099 | \$613,228 |
| 1995-97 | \$31,204 | \$149,325 | \$5,000 | \$84,000 | | \$238,325 | \$269,529 |
| 1997-99 | \$38,000 | \$110,559 | | | | \$110,559 | \$148,559 |
| 1999-01 | \$94,000 | \$108,124 | | | | \$108,124 | \$202,124 |
| 2001-03 | \$46,500 | \$99,702 | | | | \$99,702 | \$146,202 |
| TOTAL | \$521,552 | \$1,055,868 | \$5,000 | \$334,000 | \$55,000 | \$1,449,868 | \$1,971,420 |