

The
NCRAC
N e w s l e t t e r

— from the North Central Regional Aquaculture Center (NCRAC)

From the Director's Office

Welcome to the Spring 1998 issue of the North Central Regional Aquaculture Center (NCRAC) Newsletter. As in the past, people and projects have changed since the last newsletter. John Hochheimer, who was appointed to succeed Jim Ebeling as Ohio's aquaculture extension specialist, resigned his position in Fall 1997. We wish John well as he moves on to other challenges in his profession.

During the Annual Program Planning Meeting (February 20-22) in Ames, IA, the Board of Directors (BOD) approved projects for yellow perch and tilapia (scheduled to start in September 1998) as well as continued funding for the National Aquaculture New Animal Drug Application (NADA) Coordinator (Roz Schnick's position). The BOD also established funding priorities for the 1999 cycle. These priorities were based on needs identified by NCRAC's Industry Advisory Council (IAC). These included continued funding for the regional extension network (\$130,000), and development of 2-year projects for sunfish and walleye at \$225,000 and \$150,000, respectively. One day workshops to develop the

sunfish and walleye projects were held June 1 and 2 in Chicago, IL, (See accompanying story on page 6.) In addition, the Board approved funding for a strategic plan for the Center and monies for the development of "white papers" on tilapia and yellow perch culture.

Also at the last Annual Program Planning Meeting, the IAC elected Richard Ji as their chair and Myron Kloubec as their at-large BOD representative. Please join me in welcoming both Richard and Myron to the NCRAC Board of Directors.

Bill Taylor (Michigan State University) has been re-elected to another 2-year term as Chair of the NCRAC Board of Directors. Bill has done an admirable job as Chair at a time when there have been substantial changes in the Center's direction and participants.

In closing, please feel free to contact me or Joe Morris, the Associate Director at Iowa State University, if you need assistance, wish to make comments, or voice your concerns. We need to keep all lines of communication open for the continued growth and prosperity of the aquaculture

industry in the North Central Region. I would also like to encourage you to visit our web site at <http://ag.ansc.purdue.edu/aquanic/ncrac> for additional information about our Center and on-line access to almost all of our publications, including annual progress reports, fact sheets, technical bulletins, and newsletters.

Sincerely,

Ted Batterson
Director

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National News

FDA/ SEAFOOD INDUSTRY FOOD SAFETY INITIATIVE GOES INTO FULL EFFECT

The Clinton Administration announced that as of January 26, 1998, the seafood industry has initiated a new system of controls designed to enhance seafood safety. This industry-wide system, called Hazard Analysis and Critical Control Point (HACCP), is the culmination of 2 years of close cooperation among the Food and Drug Administration, the seafood industry and state health officials.

"Today we are taking another step to improve the safety of our nation's seafood by following a simple lesson — an ounce of prevention is worth a pound of cure," said Vice President Al Gore. "That's what HACCP does. It takes the best science and the best preventative controls to make our food supply the world's safest."

The implementation of this state-of-the-art approach to food safety is the latest step in the Administration's continuing commitment to guard the nation's food supply against sources of food-borne illnesses.

HACCP is a science-based system that requires processors to identify potential hazards that could cause food to be unsafe to eat, to establish and monitor targeted control points to minimize such

risks, and to keep records of the results. All seafood processors will continue to be monitored under FDA surveillance and inspection programs as well as state regulators. But with the new rules, HACCP monitoring records will enable inspectors to review the processor's performance over time, not just at the moment of inspection.

"The new seafood HACCP program enhances the safety of America's seafood supply — both from domestic and foreign sources," said Health and Human Services Secretary Donna E. Shalala. "Improving food safety is a high priority for this Administration, and adoption of HACCP for seafood is a major step. It also serves as a working model for future food industry and government cooperative ventures to more effectively safeguard the food supply."

HACCP safeguards apply to all (foreign and domestic-based) seafood processors marketing products in interstate commerce within the United States. This program does not directly apply to fishing vessels or transporters. Seafood processors must take

responsibility for the safe condition of incoming fish obtained from vessels and transporters. For example, if the supplier does not provide satisfactory information about the area where the fish were caught or handled, the HACCP rules strengthen the processor's position in refusing to accept the shipment.

"Consumers expect safe and wholesome seafood. Thanks to the extraordinary level of cooperation and commitment of both government and industry, an important milestone has been taken in optimizing the safety of America's seafood supply," said Michael A. Friedman, M.D., Lead Deputy FDA Commissioner.

Definitive seafood HACCP regulations were published December 18, 1995. Two years later the rules were placed into effect, which gave firms the time they needed to fully understand the new rules, evaluate their particular circumstances and to establish their HACCP plans. During the 2-year period, thousands of individuals including members of the seafood industry, FDA, state and local regulators, foreign regulatory

Continued on page 3

Annual calendar 1998

February

Board of Directors meeting to approve NCRAC's FY98 projects for funding; joint session of Industry Advisory Council and Technical Committee to align priorities for FY99.

May

USDA issues NCRAC's FY98 grant. Effective start date June 1.

Revisions of board approved FY98 projects due in NCRAC.

National News

Continued from page 2

officials, as well as representatives from academia joined in training sessions to facilitate implementation of the new rules.

Today's milestone reflects the first application of HACCP over such a wide component of the food supply. Similar rules for the meat and poultry industry, enforced by the U.S. Department of Agriculture's Food Safety and Inspection Service, become phase-in on January 26, 1998.

Many of the lessons learned from the seafood HACCP experience can be applied to enhancing the safety of other aspects of the food supply. Toward this end, FDA announced earlier this year its intent to establish HACCP for the fruit and vegetable juice industry and to publish an interim regulation requiring a warning statement on products that have not undergone a process to prevent or eliminate harmful bacteria.

New Executive Director named for NAA

Betsy Sheehan has been appointed to serve as executive director of the National Aquaculture Association (NAA). Betsy has been serving as the interim executive director since September 1997 and has been involved in the aquaculture industry since 1989. She has served on the board of directors of NAA, the Striped Bass Growers Association (SBGA), and the National Association of State Aquaculture Coordinators (MASAC), as well

as vice-president of the U.S. Chapter of the World Aquaculture Society and chairman of the Steering Committee for the Aquaculture '98 Conference. Betsy can be reached by phone 803/734-2151, fax 803/734-0325, email — betsy@sda.state.sc.us — or mail to the National Aquaculture Association, P.O. Box 11280, Columbia, SC 29211.

Source: NAA Close-up, March 1998

June

Workshops to develop FY99 project outlines.

August

USDA issues approval of FY98 plan of work; NCRAC issues subcontracts to participating institutions.

September

FY98 projects begin.

National News

Aquatic Animal Health Committee Convenes in Denver

CHARLES TOWN, WV – The first meeting of the Aquatic Animal Health Policy Development Committee (AAHPDC) was held November 16-17 in Denver, CO. Established by the National Association of State Aquaculture Coordinators (NASAC) and the National Aquaculture Association (NAA). The committee's objective was well-defined in the development of a mission statement – "Develop and promote a coherent national aquatic animal health management program that well serves commercial aquaculture interests."

The diversity of aquaculture was clearly shown by the variety of concerns expressed during the committee meeting. Chaired by Dr. Randy MacMillan of Clear Springs Foods, Inc., the committee is comprised of Dr. Bob Busch, Salmonid Breeders Association; Dr. Bob Goetz, Striped Bass Growers Association; Dr. Don Lightner, University of Arizona; Dr. Myron Kebus, Wisconsin Aquatic Veterinary Service; Roscoe Perham, AquaFuture Inc.; Dr. Roxanne Smolowitz, University of Pennsylvania; Dr. David Wise, Mississippi State University; and Dr. Roy Yanong, University of Florida.

"Ensuring the presence of a strong and reliable fish health program will be necessary in future years to establish and maintain both domestic and international trade," said Dr. MacMillan. "However, the diversity of aquaculture industries

in the United States makes a one-size-fits-all approach untenable for fish health management. The services needed for ornamental fish destined for the aquarium trade is very different from that of catfish or trout to be eaten domestically. Similarly, broodfish require different consideration than foodfish of the same species."

To focus and clarify the efforts of the committee, a strategy plan was developed during the meeting. Steps toward program development are as follows:

1. Maximize species group input through extensive information dissemination and feedback through committee members.
2. Review existing programs and define aquaculture needs.
3. Define specific federal or state actions needed to meet aquaculture industry needs.
4. Obtain consensus of major aquacultural organizations regarding government service or regulatory needs.
5. Develop strategy for national program implementation.
6. Execute strategy.

The Denver meeting was coordinated by NASAC members Tom Ellis of North Carolina and Jim Rubingh of Colorado. The committee is scheduled to reconvene in February at the Aquaculture '98 Conference in Las Vegas. The focus of the meeting will be to review OIE and APHIS programs and to establish a timeline for various committee actions.

Source: Gary Jensen e-mail, December 1997

Aquaculture Grows as Seafood Supply Source

Over the last decade, average per capita fish and seafood consumption has remained relatively flat, at around 15 pounds, roughly 2 to 3 pounds less than turkey consumption. However, over this time period, the source of seafood products has been shifting away from wild harvest and towards aquaculture. In 1997, U.S. production of processed catfish products was close to 1 pound per capita, imports of farm-raised shrimp were likely over 1 pound per capita, and the combination of farm-raised salmon, trout, tilapia, crawfish, and other aquaculture products probably added another pound. With about 20 percent of U.S. fish and seafood consumption now being farm-raised, aquaculture is becoming a recognized segment of the livestock complex, larger than veal, mutton, and lamb combined.

In 1998, a number of major trends are expected to affect the domestic aquaculture industry. First, there should be large supplies of competing meats, especially pork and chicken, available. Second, prices for catfish, the largest segment of the domestic aquaculture industry, are expected to increase as available supplies tighten. Third, with the devaluation of their currencies versus the dollar, the United States market should become more attractive to Asian seafood imports.

Source: Aquaculture Outlook LDP-AQS-7, March 1998

Regional News

Red Lake Chippewa, University of Wisconsin Forge Aquaculture Alliance

MADISON, WI – The Red Lake Band of Chippewa Indians and the University of Wisconsin System Aquaculture Institute in Milwaukee have signed an agreement to study the potential for raising yellow perch at an aquaculture facility to be built on the Red Lake Reservation in Minnesota.

A \$10,000 grant from the UW Sea Grant Institute and a matching \$10,000 from the Red Lake Band will cover the cost of constructing a commercial-scale Recirculating Aquaculture System (RAS) unit at the UW Aquaculture Institute, which will be used to train Red Lake fisheries personnel. An additional \$65,000 from Red Lake will fund the installation of a demonstration unit at Red Lake this winter, as well as commercial-scale system to be built in the near future.

This unique cooperative effort is designed to help revitalize the tribe's fisheries industry, boost the local economy, and offer a fish-farming model for other tribes and entrepreneurs to follow. If all goes according to schedule, the tribe could begin harvesting yellow perch in the fall of 1999.

"This may be good news for nearly 700 members of the Red Lake Band who have recently lost their only source of employment," said Dave Conner Red Lake tribal fisheries director. "The tribe has been fishing commercially on both Upper and Lower Red Lakes since 1917. It became so lucrative that a fish processing plant was built right here. But walleye stocks have shown significant signs of

over-exploitation recently, causing the Red Lakes Fisheries Association to voluntarily close down the commercial fishing season in 1997."

The Red Lake commercial fishery has a significant economic impact on the area, regularly pumping more than a million dollars annually into the local economy.

"The record 1992-93 perch harvest was worth several million dollars," said tribal fisheries biologist Pat Brown. "There historically has been a huge demand for Red Lake walleye and perch in this region. When the fishery closed, it didn't only hurt members on the reservation. The town of Bemidji relies heavily on the dollars that the commercial fishery brings in, as the band members go down there and do their shopping. So it's not just the reservation people that are being affected by this, but the whole local economy."

A 1-year moratorium on commercial fishing is unlikely to allow enough time for the fishery to recover. "Ten years might be more accurate," said Conner. "But the Red Lake Band wants to stay in the fish business. We have the trained work force, the market and the processing plant as well as the tradition, so we began exploring alternatives, such as aquaculture. When we first started noticing a decline in the fishery a couple of years ago, the Bureau of Indian Affairs recommended we contact Fred Binkowski at UW-Milwaukee.

Binkowski has been raising Red Lake perch broodstock at his Milwaukee laboratory since 1995.

"Under the new agreement, we will combine our knowledge of the

Red Lake perch biology with the Recirculating Aquaculture System (RAS) technology," said Binkowski, aquaculture director at the UW System's Wisconsin Aquatic Technology & Environmental Research Institute (WATER).

He explained the RAS unit involves raising fish in tanks, which requires extremely demanding standards of water quality and waste removal. Binkowski added that the RAS technology might prove to be the most efficient and cost-effective method of raising yellow perch in captivity.

"At our Milwaukee facility, the Red Lake personnel will learn the engineering aspects, the water quality aspects and then, perhaps most importantly, they'll be learning about the biology and intensive aquaculture of yellow perch," he said. "If all goes according to plan, we will then construct the commercial-sized operation at Red Lake and hopefully begin harvesting in the fall of 1999."

A successful RAS unit will help tribe members return to commercial fish production and will mean fish with the Red Lake label will once again grace the dinner tables of the north-central United States. Also, lessons learned through this project might open doors far others.

As the aquaculture specialist with UW Sea Grant Advisory Services, Binkowski also has done some work on whitefish aquaculture with the Leech Lake Band in Minnesota.

Source: University of Wisconsin Sea Grant news release, January 1998

Regional News

North Central Regional Aquaculture Center

NCRAC workshops on sunfish and walleye culture were recently held in Chicago, IL, on June 1-2, 1998. The problem statements and associated objectives are as follows.

PROBLEM STATEMENT: Sunfish

Several species within the family Centrarchidae are currently raised for food fish in the North Central Region, yet little information exists for aquaculturists. Current NCRAC sponsored research on sunfishes is directed at (1) development of a production manual, accompanying video(s), and other information necessary to demonstrate the technology for culturing centrarchids, (2) determination of major nutritional requirements for centrarchids comparing their growth performance using available commercial feeds in laboratory and field settings, and (3) determination of best feeding management strategies for culturing centrarchids in laboratory and field settings. Additional need exists to determine feeding trials for grow out of bluegill and F₁ hybrid bluegill (female green sunfish x male bluegill), pre-stocking grading strategies, and market potential of sunfish (bluegill and hybrid bluegill) obtained from a regional producer.

To address the problems that face commercial production of sunfish, which were identified by the Industry Advisory Council (IAC) of the NCRAC, a research project is to be undertaken.

Objectives of the project, in rank order by the IAC, are as follows. Up to \$25,000 has been earmarked for the marketing aspect (Objective 3) of this project.

OBJECTIVES

1. Field trials of bluegill and F₁ hybrid bluegill (female green sunfish x male bluegill) in commercial-size production facilities defined as ponds >0.04 ha (0.10 acre) and indoor recycle systems in the upper and lower portions of the North Central Region (three replicas). Commercial feeds to be used in both trials will be those identified in previous studies.
2. Grading strategies to enhance grow out in commercial systems to market size (340 g; 0.75lb.), including the culture potential of discards.
3. Market potential for alternate-size bluegill and hybrid bluegill (female green sunfish x male bluegill).

PROBLEM STATEMENT: Walleye

The walleye-sauger hybrid may have potential for commercial aquaculture in the North Central Region. Presently, commercial walleye aquaculture is mainly oriented to production of eggs, fry, and pond rearing of fingerlings for sale as game fish for stocking lakes. In spite of their high value as food fish, inadequate economic and technical information has limited private sector efforts to rear walleye to food-size. A sustained, collaborative, interdisciplinary effort has been underway since 1989 under the auspices of the NCRAC to

overcome constraints to commercial production of food fish sized walleye. This activity has included studies on reproductive biology and out-of-season spawning, pond management strategies, clam shrimp problems, etiology of non-inflation of the gas bladder of larval walleye, performance evaluation, and genetic studies on walleye stocks.

To address the problems that face commercial production of food-fish sized walleye, which were identified by the Industry Advisory Council (IAC) of NCRAC, a joint research and extension project is to be undertaken to the extent possible. Objectives of the project, in rank order by the IAC, are as follows. Up to \$25,000 has been earmarked for the marketing aspect (Objective 3) of this project.

OBJECTIVES

- 1a. Carry out commercial-scale field trials for rearing hybrid walleye fingerlings to food size (25.4 cm; 10 in minimum) in tanks.
- 1b. Carry out commercial-size field trials for rearing hybrid walleye fingerlings to food size (25.4 cm; 10 in minimum) in ponds (at least three ponds at each site) at sites in the upper and lower portions of the North Central Region.
2. Conduct producer training workshops on propagation of hybrid walleye.
3. Evaluate the market potential for various sizes of walleye and hybrid walleye fillets relative to prices and quantity for supermarket/consumers and restaurant/consumers.

Regional News

1996 Minnesota Private Aquaculture Industry Report

Minnesota Aquaculture Q&A

Where is aquaculture practiced in Minnesota?

Aquaculture is indeed practiced all over Minnesota. In fact, 34 Minnesota counties reported having at least one commercial aquaculture operation in 1996. That number is up from 31 in 1992.

There is perhaps only one generalization that can be made about where production of fish occurs in this state. Sport fish fingerlings, along with bait fish, are raised primarily in west-central Minnesota due to the abundance of the preferred extensive production system (natural ponds and lakes) in that region. Thirteen of 85 commercial operators (15%) reported most of their production in Ottertail County. The next highest frequency of operations by county were nearby Douglas, with 11

aquaculture businesses, followed by Stearns with eight, and Pope with five.

What types of water bodies do fish farmers use?

The majority of aquatic farmers utilize existing Minnesota ponds or lakes for production because they represent a cost-efficient container to grow sport fish fingerlings and bait fish on a seasonal basis. Minnesota commercial aquaculturists reported producing fish in approximately 1,091 natural ponds in 1996 (down from 1,200 in 1996). Those ponds/lakes totaled almost 53,000 acres for an average size per unit of around 48.5 acres.

There were 202 man-made lakes and ponds utilized by fish farmers in 1996 which totaled 566 acres (2.8 acres per pond). For the purposes of this analysis, man-made water bodies do not include gravel pits, tanks, or raceways. There were 264 tanks used in 1996 with a total capacity of 469,000 gallons, or an average of almost 1,800 gallons per tank. There were three gravel pits, and no raceways used for 1996 Minnesota commercial fish production.

How many people does the Minnesota aquaculture industry employ?

Including commercial and recreational operations, there were 174 paid employees who worked in Minnesota aquaculture production in 1996. Of those employees, 62 were reported as permanent full-time, 17 as permanent part-time, 41 as full-time seasonal, and 52 as part-time seasonal. Considering permanent part-time and seasonal full-time jobs as one half of a job

and part-time seasonal as one quarter of a job, the full time equivalency (FTE) in the aquaculture industry in 1996 would have been 104. The average number of full-time jobs per commercial operation would therefore be about 1.2.

Approximately 43% of the commercial fish farmers surveyed said they derive more than half of their personal income from their aquaculture business. The remaining 57% indicated they derive less than 50% of their personal income from aquaculture.

Source: Minnesota Department of Agriculture, Agricultural Utilization Research Institute and Minnesota Agricultural Statistics Service, September 1997

Cormorant Control

On March 4, 1998, the U.S. Fish and Wildlife Service published a final rule in the Federal Register allowing commercial aquaculture operations to take double-crested cormorants without a Federal migratory bird permit to protect aquaculture stocks. However, any required state permits must be obtained and state regulations must be followed. Lethal control activities can occur only after the FWS has certified that an aquaculture facility has a cormorant depredation problem and that lethal take is necessary to supplement non-lethal harassment.

Source: Federal Register



Regional News

Pond Construction at Purdue University

Eight experimental aquaculture ponds are being constructed at Purdue. This is the first phase of pond construction; a total of 36 ponds are planned. This new resource will allow evaluation of pond production and management strategies for Indiana.

The first set of ponds are 0.25 surface acres, with a depth of 6 feet, and an average depth of 4 feet. The ponds are typical aquaculture ponds and were designed by Rust Engineering, a sister company to Aquatic Control, Seymour. Plans are for twelve 0.25 acre ponds, followed by twelve 0.10 acre, then a set of twelve 0.25 acre crayfish ponds. The ponds are located immediately behind the Aquaculture Research Laboratory. Immediate plans for use of these ponds include evaluation of various diets fed to hybrid bluegill, a study funded by the North Central Regional Aquaculture Center (NCRAC), then yellow perch culture evaluations.

These ponds should serve as a focal point for aquacultural teaching, research and extension for Indiana. Students will have direct experience in pond production, which will compliment their indoor experiences. In addition there are several extension workshops on pond production strategies being planned for the site.

Source: Indiana Aquaculture Association, June 1997

Interactive Aquaculture

As the viability of aquaculture has become more widely recognized by the agriculture commu-

nity, more attention has been directed at educating the next generation of aquaculturists while they are still in high school. At present, aquaculture programs at the secondary level consist primarily of instruction in classrooms, which lack access to large-scale production facilities. Teachers therefore have had to use small tank systems or arrays of aquaria constructed in technical shops or unused school space. Two new CD-ROMs developed by Illinois-Indiana Sea Grant allow students to gain a more representative view of the field through the use of text, photos, and videos designed to familiarize them with the large-scale production techniques commonly used in commercial aquaculture. The programs also allow students to study at their own pace, which aids in the retention of the material learned.

"Getting Started in Freshwater Aquaculture" introduces future aquaculturists to the areas they must consider when embarking on such a career. It focuses on the aspects of biology, the water quality of production systems, marketing, and business planning.

The second CD-ROM, "Testing Dissolved Oxygen Using the Winkler Method," deals with water quality, one of the most fundamental areas of aquaculture. Although this CD-ROM is targeted primarily to secondary educators and students, new producers will also find it helpful.

For more information on these CDs, contact LaDon Swan, Illinois-Indiana Sea Grant aquaculture specialist at Purdue University, (765) 494-6264, or lswann@hub.ansc.purdue.edu

Source: Indiana Aquaculture Association, June 1997

Michigan Department of Agriculture Licenses First Aquaculture Facility

The Michigan Department of Agriculture (MDA) licensed the first aquaculture facility as a result of the Michigan Aquaculture Development Act. The Act now gives the MDA jurisdiction over aquaculture in Michigan. The Michigan Aquaculture Advisory Committee, whose efforts were led by Bob Baldwin, President of the Michigan Aquaculture Association, helped develop the frame work of the Act. In fact the Act was so well written that it won an award from the Michigan Bar Association for its clarity.

In a recent ceremony the MDA licensed Seafood Systems, Inc. of Okemos and aquaculture became the 121st agriculture commodity in Michigan. Russ Allen, President of Seafood Systems, brings to Michigan 20 years of experience creating shrimp farms in Ecuador, Belize, and other Latin American countries. Allen hopes to develop commercial shrimp production in Michigan. In 1994 the U.S. trade deficit in seafood amounted to more than \$3.5 billion, with shrimp accounting for more than \$2.6 billion.

Dan Wyant (MDA Director) strongly feels that the aquaculture industry has a future in Michigan. Russ Allen indicated that the passage of the Michigan Aquaculture Development Act made all the difference in encouraging entrepreneurs such as himself to get into the aquaculture business. Since the Act was passed, the MDA has hired Darwin Stith as the state aquaculture veterinarian in the Animal Industry Division.

Source: Commercial Fisheries Newslite, Vol. XVI, No.1, June 1997

Getting to Know ... Don Garling

Don Garling was first hooked by aquaculture when he was in high school. It was then that Garling began raising aquarium fish, which he sold locally. The hobby led him to study biology as an undergraduate and eventually to pursue a graduate study opportunity in aquaculture.

Aquaculture, one of the fastest growing areas of agriculture in the world, has kept Garling busy in the last 18 years at Michigan State University. According to Garling, aquaculture has dealt with two main topics, replacing fishmeal as a major ingredient in fish food and developing feeds that cause less pollution in the environment.

According to Garling, researchers in the North Central Region (NCR) are developing a list of dietary ingredients that a producer can take to the feed mill and customize a diet for their fish farms. In the past, feeding aquaculture animals has been a difficult job.

When buying feed for a fish farm, producers have two choices, according to Garling.

“You can buy something off the shelf, or you customize a diet using ingredients,” he said. “Different animals are raised in aquaculture, but there aren’t feeds to accommodate all of the different animals.”

However, research is helping to better define the dietary needs of different aquaculture species.



Don Garling
Michigan State University

“You can buy something off the shelf, or you customize a diet using ingredients. Different animals are raised in aquaculture, but there aren’t feeds to accommodate all of the different animals.”

-- Don Garling

At Michigan State, Garling receives many questions from the public related to water quality issues, lake management, or aquatic plant control. Increasingly, Garling fields questions from the

public asking how to start a fish farm.

In the last 20 years, Garling has noticed an increased interest in aquaculture among the general public and researchers.

“It’s one of the fastest growing areas of agriculture,” said Garling.

Although Garling has noticed an increase in interest in aquaculture in general, he has also noticed a dramatic growth in interest in aquaculture among NCR states.

“I think we’ve realized that we need to catch up with other areas of the country,” said Garling.

In the next 10-15 years, Garling anticipates that the interest in aquaculture will continue to grow and he predicts that larger entities, like co-ops, will form in the aquaculture market.

Recently, Garling’s work has paid off in the form of recognition. Last year Garling won two awards. The Michigan Aquaculture Association awarded Garling, along with colleagues John Hnath and Harry Westers, the Visionary Award. Garling was also honored with the Michigan Association of Extension Agents (MAEA) Specialist Citation.



Getting to Know ... Paul Brown

Paul Brown is one of the pioneers in the field of aquaculture nutrition. Brown, who has worked at Purdue University for the past 8 years, is one of a handful of nutritional experts who are leading research to produce alternative feeds from readily available Midwestern agricultural products. Fishmeal, which is over-fortified with nutrients, has been a staple in the aquaculture industry. In the past, fishmeal shortages have caused production costs to skyrocket and Brown predicts that another fishmeal shortage is coming soon.

"It's a question of when we'll have a fishmeal shortage, not 'if,'" said Brown.

Formulating diets from plant feedstuffs has presented challenges. Determining the nutritional requirements for species in the North Central Region (NCR) is the main difficulty.

Brown has also found that it is difficult to advise producers on the types of feed they should use.

"Producers shouldn't buy feed with the lowest cost per pound of feed," said Brown. "They should buy feed with the lowest cost per pound of fish produced."

When it comes to fish feed, cheaper isn't always better.

"Some of the more inexpensive feeds may be of inferior quality," said Brown. "The more expensive brands may produce better weight gains."

One major environmental concern of fish producers is



Paul Brown
Purdue University

"It's a question of when we'll have a fishmeal shortage, not 'if.' The quicker we get away from fishmeal the better."

-- Paul Brown

phosphorous in the water. Phosphorous, which is a limiting nutrient, can become a form of pollution if excessive amounts

enter the water supply. Commonly used as a fertilizer in gardens and fields, phosphorous causes a chain reaction that stimulates the entire food chain, according to Brown. Excessive phosphorus may lead to algal blooms which can cause fish kills.

Brown offers a simple philosophy on fertilizer use.

"A little fertilizer is good. Too much is a bad thing," Brown said.

Eventually, Brown hopes to work with colleagues to develop diet formulations for producers.

"We want an entire list of ingredients that a producer can take directly to his local feed mill," said Brown.

Using plant and feedstuffs to feed fish has short- and long-term advantages and disadvantages. Presently, feed prices are a result of the mark-up of feed mills, according to Brown. In the Midwest, those mark-up prices are quite expensive. However, if fish producers formed a co-op to bypass the existing feed mills, they would improve their production costs. Using local feed mills would also greatly reduce transportation costs.

In the future, Brown has no doubt about the result of producers switching to readily available products.

"In the long-term they'll save a ton of money," said Brown. "The quicker we get away from fishmeal the better."

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Aquaculture Activities

August

**American Fisheries Society
Annual Trade Show**, August
23-26, 1998, Hartford, CT.
Contact: American Fisheries
Society at 5410 Grosvenor Lane,
Suite 110, Bethesda, MD 20814.

Coastal Zone Canada 1998,
August 30-September 3,
Victoria, British Columbia.
Coastal Communities in the 21st
Century, Sharing Our Knowl-
edge. Contact: (250) 721-8746,
FAX: (250) 721-8774.

September

**Third International Symposium
on Aquatic Animal Health**,
August 30-September 3, 1998,
Renaissance Harborplace Hotel,
Baltimore, MD. Contact: Sympo-
sium office, Division of Compara-
tive Medicine, Johns Hopkins
University School of Medicine,
720 Rutland Avenue, Baltimore,
MD, 21205, (410) 955-3273, FAX:
(410) 550-5068, or email:
wellfish@welch-
link.welch.jhu.edu.

November

Fish Expo Seattle, November 19-
21, 1998, Washington State
Convention & Trade Center,
Seattle, WA. Contact Molly or
Malanie at (207) 842-5508.
Diversified Expositions, PO Box
7437, Portland, ME 04112-7437.

February 1999

**North Central Aquaculture
Conference**, February, 24-25,
1999, Columbia, MO. Contact
Chuck Hicks at (573) 526-6666.

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