

NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT
--

Chairperson: Joseph E. Morris, Iowa State University

Industry Advisory Council Liaison: Harry Westers, Rives Junction, Michigan

Funding Request: \$48,000

Duration: 2 Years (September 1, 2001 - August 31, 2003)

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 (CES), Sea Grant Advisory Service, and other landowner assistance personnel.
4. Develop and implement aquaculture educational programs and materials for the North Central Region (NCR).

Proposed Budgets:

Institution	Principal Investigator(s)	Objective(s)	Year 1	Year 2	Total
University of Wisconsin-Milwaukee	Fred P. Binkowski	1-3	\$1,500	\$1,500	\$3,000
Michigan State University	Donald L. Garling	1 & 2	\$1,500	\$1,500	\$3,000
University of Minnesota-Duluth	Jeffrey L. Gunderson	1-3	\$1,500	\$1,500	\$3,000
North Dakota State University	Paul B. Jarvis	1-3	\$1,500	\$1,500	\$3,000
Michigan State University	Ronald E. Kinnunen	1-3	\$1,500	\$1,500	\$3,000
Kansas State University	Charles D. Lee	1 & 2	\$1,500	\$1,500	\$3,000
Iowa State University	Joseph E. Morris	1-4	\$9,500	\$6,000	\$15,500
University of Missouri-Columbia	Robert A. Pierce II	1 & 2	\$1,500	\$1,500	\$3,000
Ohio State University	Laura G. Tiu	1-4	\$7,000	\$1,500	\$8,500
Purdue University	Unnamed	2	\$1,500	\$1,500	\$3,000
Totals			\$28,500	\$19,500	\$48,000

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JUSTIFICATION

The Food and Agriculture Organization (FAO) of the United Nations estimates that more than 24% of the total animal protein in human diets is comprised of fish or shellfish products. In countries where livestock and poultry husbandry are not well developed, fish comprise up to 50% of the total animal protein consumed by humans.

In 1996 the National Marine Fisheries Service reported that world fishery production was 121 million metric tons (MT) (NMFS 1998). This equates to 13 kg per capita consumption of edible and non-edible fishery products. World fish harvests have risen significantly over the last two decades, increasing over 77%. If this trend continues it will result in a serious shortfall of fishery products in this century due to limited availability of many commercially caught species, e.g., haddock and cod.

A potential strategy to balance the shortfall is food production through aquaculture technology. Based on FAO's most recent data, 28% of the world's fish products are produced through aquaculture (FAO 1998). On a global basis aquaculture production has risen dramatically over the last decade. In 1987, aquaculture produced 13.5 million MT of fishery products whereas in 1996 this increased to 34.1 million MT (New 1999). Given the current and future state of the capture fisheries, experts indicate that aquaculture technology would need to double by the year 2010 if the world's consumption of fishery products is to be maintained at 13 kg per person (FAO 1995). Currently, U.S. aquaculture produces 1.5% of the world's aquacultural production (FAO 1998).

The increase in the world population and the subsequent increased demand for fish products has caused fish prices to increase significantly. For example, since 1967 the price for fish products has risen faster than any other commodity in the United States. Almost all the channel catfish and rainbow trout consumed in the U.S. are produced through aquaculture. Catfish sales were valued at \$351 million and trout sales in the U.S. equaled \$72 million in 1995 (Harvey 1996). Total sales value of all aquaculture produced seafood products in the U.S. in 1990 was \$760 million, which represents a growth rate of 265% between 1980 and 1990.

As Americans became more health conscious, the demand for fisheries production increased; per capita consumption in the U.S. has grown from 5.7 kg in 1980 to 6.6 kg in 1997 (NMFS 1998). Aquaculture has proceeded to capture a larger percentage of the seafood market at the expense of the commercial harvests. It is estimated that aquaculture could supply approximately 25% of all the seafood consumed in the U.S. (Harvey 1994).

The U.S. imported over \$14.5 billion of seafood products (edible and nonedible) in 1997 versus \$9.4 billion exported for a trade deficit of \$5.1 billion (NMFS 1998). A healthy U.S. aquaculture industry would reduce the need to import fish products and help improve the U.S. trade imbalance, a fact increasingly recognized in Washington. Given the high demand for fishery products, the premium value of aquaculture products, and the vast quantity of water resources in the North Central Region (NCR), a viable aquaculture industry utilizing these resources would have a substantial economic impact on the region and the entire United States. This region has approximately 25% of the country's population but produces less than 1% of the fish consumed.

Aquaculture-related business in the NCR has increased dramatically in the past several years and is on the verge of making a leap forward. This is evident in the interest in and the requests for information channeled through the U.S. Department of Agriculture (USDA) and the NCRAC Extension Work Group, CES, and Sea Grant/Marine Advisory Extension networks. Interest in aquaculture is also evident in the increased activity of small, privately owned farm ponds, backyard hatcheries, fee-fishing operations and, in some cases, more creative attempts to utilize the multiple strategy production concept, which includes domestic animals, plants, and finfish.

Aquaculture resource conditions in the NCR are ideally suited for both coldwater and coolwater species, e.g., ciscos, hybrid striped bass, northern pike, salmon, trout, walleye, whitefish, and yellow perch, all of which are marketable. While some states in this region, e.g., Kansas and Missouri, have established

channel catfish operations similar to the southern states, it is necessary to consider coolwater and coldwater species as alternatives due to regional climatic conditions. It is expected that indoor recirculating systems will become more popular once they are proven to be economically feasible.

Aquaculture can be the catalyst for new industries and enhance the competitiveness of regional businesses while maintaining the quality of living to which regional residents have become accustomed. Over the next 10 years aquacultural production in the region will come to equal, if not surpass, the wild production of fish utilized for human consumption. Undoubtedly, commercial fishing will be strictly regulated by quotas and out-competed by recreational fishing, thus reducing the amount of fish for retail sales. Consequently, seafood products will become more dependent on aquaculture.

For the NCR to capitalize on potential aquaculture opportunities, new directions and technologies should be explored. The best hopes for expansion lie with regionally popular species. Successful aquaculture endeavors elsewhere have developed within the context of pre-existing, functioning markets with relatively high prices. Opportunities for competitive regional aquaculture for food purposes are expected to increase.

Recreational fisheries and tourism provide another avenue of opportunity for aquaculture development. Public agencies envision a greater role for private fish farms and aquaculture facilities operated partly or fully by private groups in meeting the needs for stocking that have traditionally been satisfied by public hatcheries. Bait production and fee-based recreational fishing near population centers also provide opportunities for regional aquaculture expansion.

An essential mechanism for the transfer of aquacultural technology to practicing fish farmers requires an effective communication bridge between university researchers and the public. This is one of the primary goals of the NCRAC Extension Work Group.

With the expected growth of the regional aquaculture industry, a new demand and broader market for all kinds of technical information and aquacultural services has evolved. As novices enter aquaculture, they seek guidance from knowledgeable and experienced persons, commonly from CES and Sea Grant agents as well as natural resource agencies.

Hundreds of inquiries by persons interested in the potential of regional species for aquaculture are referred to NCRAC extension contacts each year. Persons requesting information have diverse backgrounds with interests that include operating small plastic pools for backyard aquaculture, advice on small ponds which they own, bait dealers with ponds, seafood dealers, restaurant owners interested in producing fresh fish on their own, representatives of Native American groups interested in starting self-contained aquaculture operations on tribal lands, and even aquacultural consultants representing serious entrepreneurs with financial backing.

This need for advice is also clearly evident by the high level of public participation that occurred during previous aquaculture lecture/seminar series presented by NCRAC extension specialists. Most participants expressed a need for more readily available specific advice on aquaculture above and beyond that available in short lecture sessions. Some individuals suggested the need for a regional "clearing house" of information, for reading lists of pertinent literature, audiovisuals, problem solving workshops, and for specific hands-on training.

RELATED CURRENT AND PREVIOUS WORK

The NCRAC Extension Project is designed to assess and meet the information needs of the various clientele groups through cooperative and coordinated regional educational programming. A network of Sea Grant and CES-designated contacts has been established to help maximize efficiency of education programs in the 12-state NCR. However, many of these contacts are part-time on aquaculture and need additional resources to meet the growing demands of the aquaculture industry.

In spite of the limited number of aquaculture full-time equivalent positions (less than four) in this region, substantial progress on the previously described objectives has been made. In 1992, multiple extension

liaisons evolved for several research projects, e.g., economics, hybrid striped bass, walleye, and yellow perch. This increased number of extension liaisons has helped to improve the information transfer from research work groups to the public. Extension liaisons have also assisted with the planning, promotion, and implementation of the hybrid striped bass, walleye, and yellow perch workshops held throughout the region. These workshops have included "hands-on" experiences, e.g., walleye, and formal presentations, e.g., hybrid striped bass, as well as forum sessions whereby producers share their experience with other producers as well as extension specialists. They have also provided the NCRAC Economics and Marketing Work Group with information relevant to that group's efforts to develop cost of production budgets and expected revenues for the commercial production of food-sized hybrid striped bass, walleye, and yellow perch in the NCR.

The Aquaculture Network Information Center (AquaNIC, <http://aquanic.org/>) was established at Purdue University (Purdue) in 1994 through funds from the 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 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. AquaNIC houses greater than 8,000 files with more than three million files downloaded in 1999-2000 from more than 90 countries. An online aquaculture course has also been developed (<http://ag.ansc.purdue.edu/courses/aaq448/index.htm>).

Several fact sheets and bulletins have been completed and are available to the public both in hard copy and on the Web. In part, these publications have the following topics: (1) walleye fingerling culture, (2) salt usage, (3) starting an aquaculture operation, (4) overview of aquaculture, (5) aquaculture as a business enterprise, (6) survey of salmonid producers, (7) channel catfish culture, (8) niche marketing, and (9) plankton management for fish culture ponds. The use of these publications has helped to supplement individual states' publications in this region. In 1994 a survey was undertaken to determine the use of NCRAC extension publications in the region. It was estimated that approximately 15,000 client questions are addressed annually by these publications; publications related to basic aquaculture topics were most often used. Aquaculture handbooks have also been developed and distributed to each NCRAC-designated aquaculture extension specialist and selected CES and Sea Grant field staff.

There have been workshops on general aquaculture, fish diseases, commercial recirculation systems, aquaculture business planning, crayfish culture, pond management, yellow perch and hybrid striped bass culture, rainbow trout production, in-service training for high school vocational-agricultural teachers, polyploid induction in sunfish, and organic aquaculture standards held in the region. These workshops have often been conducted using a combination of regional extension specialists and researchers as well as industry representatives. The Walleye Culture Manual has progressed to the point where two Walleye Culture Workshops were held in 1996. Gunderson, University of Minnesota-Duluth (UMD); Kinnunen, Michigan State University (MSU); and Morris, Iowa State University (ISU) have been active on the planning committee; Summerfelt (ISU) has been the leader for both the walleye culture manual and workshops. This 415-page manual is now available to the public for a nominal cost; it has 17 chapters and 46 case studies.

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 in February 1997, and the fourth was held in Columbia, Missouri in February 1999. These regional meetings were attended by hundreds of individuals including persons from Canada.

In addition to the previously mentioned areas, several NCRAC extension contacts have been instrumental in fostering the continued growth of the aquaculture industry in the region. For example, Pierce has 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). Tiu has continued to coordinate monthly OAA board

meetings and edit the OAA newsletter. Many NCRAC extension contacts have also worked with industry and governmental representatives to produce state aquaculture plans and improve governmental regulations. It is this interaction by extension contacts that the NCRAC Board of Directors wanted to support when they voted to increase funding support for NCRAC extension contacts in 1999, which continues through this proposal. The end result will be increased interaction between NCRAC extension contacts and their respective state aquaculture associations.

Beginning in 1992, some NCRAC research projects included objectives related to outreach activities related to that particular project. Activities listed in this proposal are not part of those research projects.

ANTICIPATED BENEFITS

There are several user groups that need to be served. First are the existing aquaculture industry members who need relevant information on new techniques and technologies in aquaculture as well as upcoming concerns related to changing state and federal regulations. A second user group is a large number of individuals interested in aquaculture as a means of agriculture diversification. This group often requires an enormous amount of time to educate and can benefit most from the electronic media. The last group is the middle and high schools teachers who often use extension materials in their classrooms. These groups will be served by the NCRAC Extension Work Group; this group will continue and expand its efforts to promote and advance 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., hybrid striped bass, salmonids, sunfish, walleye, and yellow perch; improved lines of communication between interstate aquaculture extension specialists and associated industry contacts; and an enhanced legal and socioeconomic atmosphere for aquaculture in the NCR. The development of aquaculture education programs for the NCR has provided "hands-on" opportunities for prospective and experienced producers. Approximately 5,000 individuals have attended workshops or conferences organized and delivered by the NCRAC Extension Work Group. Clientele attending regional workshops have gained information related to aquaculture development strategies in other areas of the country and acquired information which was of direct use to their own enterprises. Education programs also created situations where problems encountered by producers were expressed to extension personnel who later relayed them to researchers at NCRAC work group meetings for possible solutions through the research effort.

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. In a 1994 survey, NCRAC extension contacts estimated that NCRAC publications were used to address approximately 15,000 client questions annually.

AquaNIC houses over 8,000 electronic publications, images, slide sets, videos, and directories used by more than 60,000 stakeholders per year from 89 countries. The positive impact to the international aquaculture community is realized through accessibility to aquaculture information 24 hours per day and seven days per week. No longer are our audiences limited to obtaining information during normal business hours.

- ▶ Current and prospective producers use our Web sites as a source of reference (i.e., species and systems pages, Regional Aquaculture Center publications, directories, calendar of events).
- ▶ Employers will benefit from an increased pool of applicants for job openings.
- ▶ Customers seeking jobs will benefit from increased exposure by posting their résumés online.

- ▶ CES and Sea Grant educators will benefit from increased access to electronic media (i.e., photographs, slide sets, and publications) essential to developing outreach programs.
- ▶ All customers will benefit from the "gateway" or "portal" services provided by AquaNIC through decreased time searching for information (i.e., companies, universities involved in aquaculture, CES, and Sea Grant contacts, federal agencies, and other Web links to aquaculture information).

OBJECTIVES

1. Strengthen linkages between the 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 (CES), Sea Grant Advisory Service, and other land-owner assistance personnel.
4. Develop and implement aquaculture educational programs and materials for the North Central Region (NCR).

PROCEDURES

Strengthen Linkages (Objective 1)

At least one Extension Work Group member has been assigned to each research group. Multiple extension liaisons have been assigned to some research groups with the goal of increasing the amount of information coming out of research projects. Extension liaisons are responsible for interacting with researchers in developing possible extension products based on outcomes of these projects as well as assisting in writing research projects' annual and termination reports.

Research Work Group	Extension Liaison(s)	State(s)
Economics/Marketing	Donald L. Garling Laura G. Tiu*	MI OH
Wastes/Effluents	Fred P. Binkowski*	WI
Hybrid Striped Bass	Joseph E. Morris* Laura G. Tiu	IA OH
Salmonids	Ronald E. Kinnunen*	MI
Sunfish	Joseph E. Morris*	IA
Tilapia	Joseph E. Morris*	ND
Walleye	Ronald E. Kinnunen* Jeffrey L. Gunderson	MI MN
Yellow Perch	Fred P. Binkowski Donald L. Garling*	WI MI

*Lead Extension Liaison

Enhance Extension Network (Objective 2)

At least one contact person has been designated by CES for each NCR state, an extension contact directory has been developed and kept current, and a mechanism for sharing materials produced by individual states has been established. Liaisons with state and federal agencies, and with state aquaculture organizations, have been made to identify industry needs. With the continued shortages in aquaculture extension personnel, this network has been critical to the ability of individual extension contacts to respond to information requests from their clients. In fact, many of these contacts often respond on a regular basis to client inquiries outside of their specific state. These activities will be continued.

AquaNIC Support (\$11,000 - Morris, ISU)

Swann (Auburn University) established AquaNIC in 1994. Since AquaNIC has been online, it has become the premier Web site for aquaculture information. Each year, more than 60,000 people from 89 countries have chosen to use AquaNIC as an alternative or in addition to traditional means of obtaining information. As a gateway to electronic resources in aquaculture, AquaNIC has increased the timeliness and variety of information available to outreach educators, governmental agencies, and individual users while more effectively utilizing existing personnel resources. AquaNIC can be accessed anytime and, therefore, does not face the challenges associated with office hours, time zones, or weekends.

During the 1997-98 fiscal year several new features were added to AquaNIC. Microsoft's Front Page 98, with installed Unix extensions, allows creating and editing of documents much easier. The overall use of a common "theme" allows the site to maintain a consistent look and feel for the users.

A real time multi-user chat server from "Volano" has facilitated easy online meetings. Two organized chats have been sponsored with respondents from various areas of the country to allow rapid exchange of thoughts and ideas between the "experts" and invited participants. In addition to the organized chats, three open, unmonitored chat rooms are available to the users of AquaNIC without any restriction as to their usage. Logs of chat sessions maybe be pasted into word processor documents and distributed to participants.

A streaming media server from Real Networks was installed. The exciting thing regarding streaming media is the user no longer has to wait for a single large file to be downloaded to their computer prior to being viewed. Streaming media is constantly being downloaded to keep the buffer full and begins to be viewed immediately after the initial buffer has filled. This is a significant improvement for the users of multimedia, as a lot of the "dead" time is lost. This technology works with both audio and video materials, either alone or combined. Another use of the streaming server is "live broadcasts" over the Internet. Users simply click on a URL and are able to view the broadcast in real time. The user could tune in for the entire broadcast, or view as their schedule permits. Streaming video will expand the capabilities of AquaNIC by enhancing the ability of extension contacts to provide online instruction to the aquaculture industry.

NCRAC's directories, annual reports, and publications are posted to the NCRAC Web site. AquaNIC's support from NCRAC has been essential to any success experienced. The Mississippi-Alabama Sea Grant Consortium through NOAA will now provide annual support to AquaNIC. Morris will arrange for funds to be transferred to Purdue for support.

Provide In-service Training (Objective 3)

As time and finances allow, additional in-service training programs will be conducted in the NCR. Although limited moneys are available for this objective, individuals in the NCRAC Extension Work Group expect to participate in future workshops hosted in the region. In 2001-02, members of the NCRAC Extension Work Group will utilize the NCRAC Extension White Paper in the implementation of future extension programming.

Develop and Implement Aquaculture Education Programs and Materials (Objective 4)

Identification Guide of Invertebrates for Fish Culturists CD (\$3,400 - Morris, ISU)

Since the publication of the publication "Plankton Management for Fish Culture Ponds" (NCRAC Technical Bulletin #114), fish culturists have requested a guide by which they are better able to identify important invertebrates as they manage their larval fish ponds. Using information garnered from over five years of research by Morris on plankton management for fish culture ponds, the funds being requested will support a 0.25 FTE of a graduate student appointment to use pictures previously obtained by Morris' staff, construct a practical guide for invertebrates using pictures and text, and place the entire document on a CD. This CD will then be made available to the aquaculture community. Categories for this CD include: cladocerans, copepods, rotifers, and numerous benthos, including dipteran larvae. The review process will consist of soliciting comments from fish culturists in the NCR.

Alternative Aquaculture Production Workshop (\$5,500 - Tiu, OSU)

Regional conferences are one way to deal with the limited extension effort in the NCR. One way to do this is to utilize new technologies, like video-conferencing. Video conferencing can bring together diverse audiences and expose them to national experts at a fraction of the cost of traditional workshops.

Several aquaculture topics are relevant throughout the region, one of which is the use of alternate production systems to rear alternative species. Discussions will revolve around using refurbished agriculture buildings, small ponds, strip pits, cages, and hatcheries to raise various species including, in part, non-traditional species, e.g., freshwater shrimp, largemouth bass, sunfish, walleye, and baitfish as well as the more traditional species, e.g., trout.

This video conference will originate in Ohio at the OSU Centers at Piketon; it will be broadcast to five other locations in the NCR. These locations will be selected based upon their ability to provide compatible video-conferencing technology. Other NCRAC personnel will be recruited to facilitate the other sites. The first conference would be scheduled for November 2001 with a second conference in November 2002. Experts from around the country will be brought to the conference via video technology to eliminate the need for travel by these busy professionals.

Facilities Available: The Piketon Research and Extension Center has a T1 line with interactive voice/video PictureTel technology. The Center also has various other educational technology: slide projectors with cordless ability, overhead projectors, video projection ability, two styles of satellite technology, audio system in a large room and two other meeting rooms.

Industry Relevance: Extension and outreach are the primary means of disseminating research results to producers and others interested in aquaculture. In the NCR, there is a very limited number of extension personnel who are available to provide the information and training desired by the industry. By using new technology, conferences can be broadcast over a wide viewing area greatly diminishing travel expenses for speakers and conference attendees.

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PROJECT LEADERS

<u>State</u>	<u>Name</u>	<u>Institution</u>
Illinois/Indiana	Unnamed	Purdue University
Iowa	Joseph E. Morris	Iowa State University
Kansas	Charles D. Lee	Kansas State University
Michigan	Donald L. Garling Ronald E. Kinnunen	Michigan State University Michigan State University
Minnesota	Jeffrey L. Gunderson	University of Minnesota-Duluth
Missouri	Robert A. Pierce II	University of Missouri-Columbia
North Dakota	Paul B. Jarvis	North Dakota State University
Ohio	Laura G. Tiu	Ohio State University
Wisconsin	Fred P. Binkowski	University of Wisconsin-Milwaukee

PARTICIPATING INSTITUTIONS AND PRINCIPAL INVESTIGATORS

University of Wisconsin-Milwaukee (UW-Milwaukee)

Fred P. Binkowski

Michigan State University (MSU)

Donald L. Garling

University of Minnesota-Duluth (UMD)

Jeffrey L. Gunderson

North Dakota State University (NDSU)

Paul B. Jarvis

Michigan State University (MSU)

Ronald E. Kinnunen

Kansas State University (KSU)

Charles D. Lee

Iowa State University (ISU)

Joseph E. Morris

University of Missouri-Columbia (UMC)

Robert A. Pierce II

Ohio State University (OSU)

Laura G. Tiu

Purdue University (Purdue)

Unnamed

PROPOSED ACTIVITIES FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - b. Assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Yellow Perch Work Group.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Wisconsin to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Wisconsin.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.

BUDGET

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Fred P. Binkowski			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B)				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies				
F. Travel				
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$500), Postage (\$500), Photocopying (\$500)			\$1,500	
J. Total Direct Costs (C through I)			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K)			\$1,500	
M. Other				
N. Total Amount of This Request			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 2: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Fred P. Binkowski			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies				
F. Travel				
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$500), Postage (\$500), Photocopying (\$500)			\$1,500	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Objectives 1-3

I. All Other Direct Costs. Annual costs: telephone (\$500), postage (\$500), and photocopying (\$500).

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Garling)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Yellow Perch Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Economics Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Yellow Perch and Economics Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.

BUDGET

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 1: Objectives 1 & 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Donald L. Garling			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages			CSREES FUNDED WORK MONTHS	
1. No. of Senior Personnel			Calendar	Academic
a. ___ (Co)-PI(s)/PD(s)			Summer	
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →			\$0	
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$250	
F. Travel			\$1,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$14,785		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 2: Objectives 1 & 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Donald L. Garling			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS		\$	
a. ___ (Co)-PI(s)/PD(s) b. ___ Senior Associates	Calendar	Academic		
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$250	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$14,383		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Garling)

Objectives 1 and 2

- E. Materials and Supplies.** General office supplies such as paper and toner - Year 1: \$150; Year 2: \$100.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Michigan Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).
- I. All Other Direct Costs.** Annual costs: telephone (\$100), postage (\$50), and photocopying (\$100).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as a member of the Walleye Work Group.
 - b. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Minnesota to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Minnesota.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.

BUDGET

ORGANIZATION AND ADDRESS Minnesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			USDA AWARD NO. Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Jeffrey L. Gunderson			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS		\$	
a. ___ (Co-)PI(s)/PD(s) b. ___ Senior Associates	Calendar	Academic		
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$250	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$1,915		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Minnesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			USDA AWARD NO. Year 2: Objectives 1-3		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Jeffrey L. Gunderson			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			CSREES FUNDED WORK MONTHS		
1. No. of Senior Personnel			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$250		
F. Travel			\$1,000		
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250		
J. Total Direct Costs (C through I) →			\$1,500		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$1,500		
M. Other →					
N. Total Amount of This Request →			\$1,500	\$	
O. Cost Sharing (If Required Provide Details)		\$1,915			

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Objectives 1-3

- E. Materials and Supplies.** Annual costs: general office supplies such as paper and toner (\$250).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Minnesota Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).
- I. All Other Direct Costs.** Annual costs: telephone (\$100), postage (\$50), and photocopying (\$100).

PROPOSED ACTIVITIES FOR NORTH DAKOTA STATE UNIVERSITY

(Jarvis)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Economics and Marketing Research Work Group and Extension Work Group.
 - b. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in North Dakota.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Develop and implement aquaculture education programs and materials for the NCR.
 - a. Provide a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in North Dakota and the region.

BUDGET

ORGANIZATION AND ADDRESS Carrington Research Extension Center North Dakota State University Carrington, ND 58421			USDA AWARD NO. Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Paul B. Jarvis			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			
	Calendar	Academic		
a. ___ (Co-)PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$350	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$75), Postage (\$50), Photocopying (\$25)			\$150	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		
NOTE: Signatures required only for Revised Budget			This is Revision No. →	
NAME AND TITLE (Type or print)		SIGNATURE		DATE
Principal Investigator/Project Director				
Authorized Organizational Representative				

BUDGET

ORGANIZATION AND ADDRESS Carrington Research Extension Center North Dakota State University Carrington, ND 58421			USDA AWARD NO. Year 2: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Paul B. Jarvis			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS		\$	
	Calendar	Academic		
a. ___ (Co)-PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$350	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$75), Postage (\$50), Photocopying (\$25)			\$150	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR NORTH DAKOTA STATE UNIVERSITY

(Jarvis)

Objectives 1-3

- E. Materials and Supplies.** Annual costs: general office supplies such as paper and toner (\$350).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the North Dakota Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).
- I. All Other Direct Costs.** Annual costs: telephone (\$75), postage (\$50), and photocopying (\$25).

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Salmonid Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Walleye Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Attend Annual Great Lakes Fish Disease Control Committee meetings as NCRAC representative.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - f. Compile aquaculture extension information for use by Great Lakes Sea Grant agents and CES personnel.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.

BUDGET

ORGANIZATION AND ADDRESS Michigan State University - Upper Peninsula 702 Chippewa Square Marquette, MI 49855-4811			USDA AWARD NO. Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Ronald E. Kinnunen			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS		\$	
	Calendar	Academic		
a. ___ (Co-)PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$100	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,400	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$13,000		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Michigan State University - Upper Peninsula 702 Chippewa Square Marquette, MI 49855-4811			USDA AWARD NO. Year 2: Objectives 1-3		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Ronald E. Kinnunen			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			CSREES FUNDED WORK MONTHS		
1. No. of Senior Personnel			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$100		
F. Travel			\$1,400		
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)					
J. Total Direct Costs (C through I) →			\$1,500		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$1,500		
M. Other →					
N. Total Amount of This Request →			\$1,500	\$	
O. Cost Sharing (If Required Provide Details)		\$13,200			

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Objectives 1-3

- E. Materials and Supplies.** Annual costs: general office supplies such as paper and toner (\$100).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Michigan Aquaculture Association at a destination to be determined by the aquaculture association (\$500); a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500); and a 1-day meeting of the Great Lakes Fish Disease Control Committee as NCRAC representative at a destination to be determined (\$400).

PROPOSED ACTIVITIES FOR KANSAS STATE UNIVERSITY

(Lee)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Kansas.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			USDA AWARD NO. Year 1: Objectives 1 & 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Charles D. Lee			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS		\$	
	Calendar	Academic		
a. ___ (Co)-PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$500	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			USDA AWARD NO. Year 2: Objectives 1 & 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Charles D. Lee			FUNDS REQUESTED by PROPOSER		
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS		
			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies				\$500	
F. Travel				\$1,000	
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)					
J. Total Direct Costs (C through I) →				\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →				\$1,500	
M. Other →					
N. Total Amount of This Request →				\$1,500	\$
O. Cost Sharing (If Required Provide Details)			\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR KANSAS STATE UNIVERSITY

(Lee)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies such as paper, pens, and toner (\$500).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Kansas Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).

PROPOSED ACTIVITIES FOR IOWA STATE UNIVERSITY

(Morris)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Sunfish Work Groups and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Hybrid Striped Bass Work Groups and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Sunfish, Hybrid Striped Bass, and Walleye Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Iowa for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Iowa.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - f. AquaNIC and NCRAC Web Site support furnished to Purdue.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.
4. Develop and implement aquaculture education programs and materials for the NCR.
 - a. Produce a Invertebrate Identification Guide CD.

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Ecology Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 1: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Joseph E. Morris			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			CSREES FUNDED WORK MONTHS		
1. No. of Senior Personnel			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. <u>1</u> Graduate Students					\$3,200
d. <u>2</u> Prebaccalaureate Students					\$4,800
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					\$8,000
B. Fringe Benefits (If charged as Direct Costs)					\$200
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					\$8,200
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies					\$300
F. Travel					\$1,000
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)					
J. Total Direct Costs (C through I) →					\$9,500
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →					\$9,500
M. Other →					
N. Total Amount of This Request →					\$9,500
O. Cost Sharing (If Required Provide Details)					
NOTE: Signatures required only for Revised Budget			This is Revision No. →		
NAME AND TITLE (Type or print)		SIGNATURE		DATE	
Principal Investigator/Project Director					
Authorized Organizational Representative					

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Ecology Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 2: Objectives 1-4					
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		FUNDS REQUESTED by PROPOSER		FUNDS APPROVED BY CSREES (If Different)
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Joseph E. Morris								
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS					
			Calendar	Academic	Summer			
a. ___ (Co)-PI(s)/PD(s)								
b. ___ Senior Associates								
2. No. of Other Personnel (Non-Faculty)								
a. ___ Research Associates-Postdoctorates								
b. ___ Other Professional								
c. ___ Graduate Students								
d. <u>2</u> Prebaccalaureate Students						\$4,800		
e. ___ Secretarial-Clerical								
f. ___ Technical, Shop and Other								
Total Salaries and Wages →						\$4,800		
B. Fringe Benefits (If charged as Direct Costs)								
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$4,800		
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)								
E. Materials and Supplies						\$300		
F. Travel						\$900		
1. Domestic (Including Canada)								
2. Foreign (List destination and amount for each trip.)								
G. Publication Costs/Page Charges								
H. Computer (ADPE) Costs								
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)								
J. Total Direct Costs (C through I) →						\$6,000		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)								
L. Total Direct and Indirect Costs (J plus K) →						\$6,000		
M. Other →								
N. Total Amount of This Request →						\$6,000	\$	
O. Cost Sharing (If Required Provide Details)								
NOTE: Signatures required only for Revised Budget			This is Revision No. →					
NAME AND TITLE (Type or print)		SIGNATURE		DATE				
Principal Investigator/Project Director								
Authorized Organizational Representative								

BUDGET EXPLANATION FOR IOWA STATE UNIVERSITY

(Morris)

Objectives 1-4

- A. Salaries and Wages.** Year 1: Graduate student labor - \$3,200 for 0.25 FTE for 4 months for assistance in the development of CD; \$4,800 for student help for AquaNIC; Year 2: \$4,800 for student help for AquaNIC.
- B. Fringe Benefits.** Year 1: Graduate student labor - \$200 for 4 months.
- E. Materials and Supplies.** Annual costs: general office supplies such as paper, pens, and toner (\$100); software upgrade in support of AquaNIC (\$200).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Iowa Aquaculture Association at a destination to be determined by the aquaculture association (\$500 for year 1 and \$400 for year 2); transportation, lodging, and meal expenses for Purdue staff to travel for consultations regarding AquaNIC operations (\$500).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Missouri to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Missouri.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.

BUDGET

ORGANIZATION AND ADDRESS School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			USDA AWARD NO. Year 1: Objectives 1 & 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Robert A. Pierce II			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			
	Calendar	Academic		
a. ___ (Co)-PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$500	
F. Travel 1. Domestic (Including Canada) 2. Foreign (List destination and amount for each trip.)			\$1,000	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$2,950		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			USDA AWARD NO. Year 2: Objectives 1 & 2		
			Duration Proposed Months: <u>12</u> FUNDS REQUESTED by PROPOSER	Duration Awarded Months: _____ FUNDS APPROVED BY CSREES (If Different)	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Robert A. Pierce II					
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS				\$
	Calendar	Academic	Summer		
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$500		
F. Travel			\$1,000		
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)					
J. Total Direct Costs (C through I) →			\$1,500		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$1,500		
M. Other →					
N. Total Amount of This Request →			\$1,500		\$
O. Cost Sharing (If Required Provide Details)		\$5,900			
NOTE: Signatures required only for Revised Budget			This is Revision No. →		
NAME AND TITLE (Type or print)		SIGNATURE		DATE	
Principal Investigator/Project Director					
Authorized Organizational Representative					

BUDGET EXPLANATION FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies such as paper and toner (\$500).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Missouri Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).

PROPOSED ACTIVITIES FOR OHIO STATE UNIVERSITY

(Tiu)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Economics and Marketing Research Work Group and Extension Work Group.
 - b. Serving as an extension liaison between NCRAC Hybrid Striped Bass Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Providing 15 copies of aquaculture extension related materials produced in Ohio to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Ohio.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.
4. Develop and implement aquaculture education programs and materials for the NCR.
 - a. Provide a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Ohio and the region.
 - b. Conduct workshop entitled "Alternative Aquaculture."

BUDGET

ORGANIZATION AND ADDRESS Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			USDA AWARD NO. Year 1: Objectives 1-4	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Laura G. Tiu			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$3,200	
F. Travel			\$3,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$350), Postage (\$200), Shipping (\$50), Photocopying (\$200)			\$800	
J. Total Direct Costs (C through I) →			\$7,000	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$7,000	
M. Other →				
N. Total Amount of This Request →			\$7,000	\$
O. Cost Sharing (If Required Provide Details)		\$2,378		
NOTE: Signatures required only for Revised Budget			This is Revision No. →	
NAME AND TITLE (Type or print)		SIGNATURE		DATE
Principal Investigator/Project Director				
Authorized Organizational Representative				

BUDGET

ORGANIZATION AND ADDRESS Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			USDA AWARD NO. Year 2: Objectives 1-4	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Laura G. Tiu			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$500	
F. Travel			\$500	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$250), Postage (\$100), Shipping (\$50), Photocopying (\$100)			\$500	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$2,378		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET EXPLANATION FOR OHIO STATE UNIVERSITY

(Tiu)

Objectives 1-4

E. Materials and Supplies. Year 1: Video conferencing expenses, costs associated with hosting and subsequent down linking to receiving sites (estimated at \$3,000), general office supplies, such as paper and toner (\$200). Year 2: general office supplies (\$500).

F. Travel. Year 1: Transportation, lodging, and meal expenses for four speakers' to originating site of conference (\$2,500), transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Ohio Aquaculture Association at a destination to be determined by the aquaculture association (\$500). Year 2: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Ohio Aquaculture Association at a destination to be determined by the aquaculture association (\$500).

I. All Other Direct Costs. Year 1: telephone (\$350), postage (\$200), shipping (\$50), photocopying (\$200). Year 2: telephone (\$250), postage (\$100), shipping (\$50), and photocopying (\$100).

PROPOSED ACTIVITIES FOR PURDUE UNIVERSITY

(Unnamed)

Major Actions for Each Objective

2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Providing 15 copies of aquaculture extension related materials produced in Nebraska to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Illinois and Indiana.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.

BUDGET

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 1: Objective 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed			FUNDS REQUESTED BY PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →			\$0	
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$500	
F. Travel			\$1,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)		\$		

NOTE: Signatures required only for Revised Budget This is Revision No. →

NAME AND TITLE (Type or print)	SIGNATURE	DATE
Principal Investigator/Project Director		
Authorized Organizational Representative		

BUDGET

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 2: Objective 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed			FUNDS REQUESTED BY PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages			CSREES FUNDED WORK MONTHS	
1. No. of Senior Personnel			Calendar	Academic
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →			\$0	\$
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$500	
F. Travel			\$1,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	\$
O. Cost Sharing (If Required Provide Details)			\$	
NOTE: Signatures required only for Revised Budget			This is Revision No. →	
NAME AND TITLE (Type or print)		SIGNATURE		DATE
Principal Investigator/Project Director				
Authorized Organizational Representative				

BUDGET EXPLANATION FOR PURDUE UNIVERSITY

(Unnamed)

Objective 2

- E. Materials and Supplies.** Annual costs: general office supplies such as paper, pens, and toner (\$500).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Illinois/Indiana Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).

BUDGET SUMMARY FOR EACH PARTICIPATING INSTITUTION

Year 1

	UW-Mil.	MSU	UMD	NDSU	KSU	ISU	UMC	OSU	Purdue	TOTALS
Salaries and Wages	\$0	\$0	\$0	\$0	\$0	\$8,000	\$0	\$0	\$0	\$8,000
Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$200	\$0	\$0	\$0	\$200
Total Salaries, Wages, and Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$8,200	\$0	\$0	\$0	\$8,200
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$350	\$250	\$350	\$500	\$300	\$500	\$3,200	\$500	\$5,950
Travel	\$0	\$2,400	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$3,000	\$1,000	\$11,400
All Other Direct Costs	\$1,500	\$250	\$250	\$150	\$0	\$0	\$0	\$800	\$0	\$2,950
TOTAL PROJECT COSTS	\$1,500	\$3,000	\$1,500	\$1,500	\$1,500	\$9,500	\$1,500	\$7,000	\$1,500	\$28,500

Year 2

	UW-Milw	MSU	UMD	NDSU	KSU	ISU	UMC	OSU	Purdue	TOTALS
Salaries and Wages	\$0	\$0	\$0	\$0	\$0	\$4,800	\$0	\$0	\$0	\$4,800
Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Salaries, Wages, and Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$4,800	\$0	\$0	\$0	\$4,800
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$350	\$250	\$350	\$500	\$300	\$500	\$500	\$500	\$3,250
Travel	\$0	\$2,400	\$1,000	\$1,000	\$1,000	\$900	\$1,000	\$500	\$1,000	\$8,800
All Other Direct Costs	\$1,500	\$250	\$250	\$150	\$0	\$0	\$0	\$500	\$0	\$2,650
TOTAL PROJECT COSTS	\$1,500	\$3,000	\$1,500	\$1,500	\$1,500	\$6,000	\$1,500	\$1,500	\$1,500	\$19,500

RESOURCE COMMITMENT FROM INSTITUTIONS¹

Year 1

Participant	Source of Match and/or Cost Sharing*				Total
	University	Industry	Federal	Other	
Michigan State University	\$27,785				\$27,785
University of Minnesota-Duluth	\$1,915				\$1,915
Iowa State University	\$13,205				\$13,205
University of Missouri-Columbia	\$2,950				\$2,950
Auburn University	\$1,430				\$1,430
Ohio State University	\$1,896				\$1,896
Totals	\$49,181				\$49,181

Year 2

Participant	Source of Match and/or Cost Sharing*				Total
	University	Industry	Federal	Other	
Michigan State University	\$27,583				\$27,583
University of Minnesota-Duluth	\$1,915				\$1,915
Iowa State University	\$13,280				\$13,280
University of Missouri-Columbia	\$5,900				\$5,900
Auburn University	\$1,430				\$1,430
Ohio State University	\$413				\$413
Totals	\$50,521				\$50,521

¹Because cost sharing is not a legal requirement, universities are not required to provide or maintain documentation of such a commitment.

SCHEDULE FOR COMPLETION OF OBJECTIVES

Objective 1: Initiated in Year 1 and completed in Year 2.

Objective 2: Initiated in Year 1 and completed in Year 2.

Objective 3: Initiated in Year 1 and completed in Year 2.

Objective 4: Initiated in Year 1 and completed in Year 2.

LIST OF PRINCIPAL INVESTIGATORS

Fred P. Binkowski, University of Wisconsin-Milwaukee

Donald L. Garling, Michigan State University

Jeffrey L. Gunderson, University of Minnesota-Duluth

Paul B. Jarvis, North Dakota State University

Ronald E. Kinnunen, Michigan State University

Charles D. Lee, Kansas State University

Joseph E. Morris, Iowa State University

Robert A. Pierce II, University of Missouri-Columbia

Laura G. Tiu, Ohio State University

Unnamed, Purdue University

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EDUCATION

B.S. University of Wisconsin-Milwaukee, 1971, Zoology
M.S. University of Wisconsin-Milwaukee, 1974, Zoology (Fisheries Biology)

POSITIONS

Director (1993-present), Aquaculture Center, University of Wisconsin System, UWS/UWM Great Lakes WATER Institute
Senior Scientist (1991-present), Associate Scientist (1987-1990), Senior Fisheries Biologist (1984-1986), Associate Fisheries Biologist (1981-1983), and Assistant Fisheries Biologist (1978-1980), Center for Great Lakes Studies, University of Wisconsin Great Lakes Research Facility
Research Specialist (Fisheries)(1975-1978), Department of Zoology, University of Wisconsin-Milwaukee

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
World Aquaculture Society

SELECTED PUBLICATIONS

- Letcher, B.H., J.A. Rice, L.B. Crowder, and F.P. Binkowski. 1996. Size-dependent effects of continuous and intermittent feeding on starvation time and mass loss in starving yellow perch larvae and juveniles. *Transactions of the American Fisheries Society* 125:14-26.
- Binkowski, F.P., and L.G. Rudstam. 1994. The maximum daily ration of Great Lakes bloater. *Transactions of the American Fisheries Society* 123:335-343.
- Rudstam, L.G., F.P. Binkowski, and M.A. Miller. 1994. A bioenergetics model for analysis of food consumption patterns by bloater in Lake Michigan. *Transactions of the American Fisheries Society* 123:344-357.
- Binkowski, F.P., J.J. Sedmark, and S.O. Jolly. 1993. An evaluation of *Pfaffia* yeast as a pigment source for salmonids. *Aquaculture Magazine*, March/April:1-4.
- Miller, T., L. Crowder, J. Rice, and F.P. Binkowski. 1992. Body size and the ontogeny of the functional response in fishes. *Canadian Journal of Fisheries and Aquatic Sciences* 49:805-812.
- Somer, C.V., F.P. Binkowski, M.A. Schalk, and J.M. Bartos. 1986. Stress factors that can affect studies of drug metabolism in fish. *Veterinary and Human Toxicology* 28 (Supplement 1):45-54.
- Binkowski, F.P., and S.I. Doroshov, editors. 1985. *Proceedings of North American sturgeons: biology and aquaculture potential*. Kluwer Academic Publications, Dordrecht, Netherlands.

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EDUCATION

B.S. University of Dayton, 1970, Biological Sciences
M.S. Eastern Kentucky University, 1972, Biological Sciences
Ph.D. Mississippi State University, 1975, Zoology–Fisheries Option

POSITIONS

Professor (1990-present), Associate Professor (1985-1990), and Assistant Professor (1980-1985),
Department of Fisheries and Wildlife, Michigan State University
Aquaculture and Fisheries Extension Specialist (1985-present), Department of Fisheries and Wildlife,
Michigan State University
Assistant Professor of Fisheries Science (1976-1980), Department of Fisheries and Wildlife Sciences,
Virginia Polytechnic Institute and State University

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society, Fish Culture and Fisheries Educators Sections
Comparative Nutrition Society
World Aquaculture Society

SELECTED PUBLICATIONS

- Garling, D.L. Submitted. Fee fishing pond management. Sunfish manual. NCRAC Culture Series, NCRAC Publications Office, Iowa State University, Ames.
- Garling, D.L. Submitted. Whirling disease. NCRAC Fact Sheet Series, NCRAC Publications Office, Iowa State University, Ames.
- Garling, D., P. Wilbert, A. Westmaas, S. Miller, R. Sheehan, P. Wills, and J. Paret. Submitted. Production of polyploid sunfishes. Sunfish manual. NCRAC Culture Series, NCRAC Publications Office, Iowa State University, Ames.
- Sampson, T., and D. Garling. Submitted. Common parasites of sunfish. Sunfish manual. NCRAC Culture Series, NCRAC Publications Office, Iowa State University, Ames.
- Ramseyer, L.J., and D.L. Garling. Submitted. Fish nutrition and aquaculture waste management. NCRAC Fact Sheet Series, NCRAC Publications Office, Iowa State University, Ames.
- Riche, M., and D. Garling. Submitted. Collecting and submitting fish samples for disease diagnosis. Sunfish manual. NCRAC Culture Series, NCRAC Publications Office, Iowa State University, Ames.
- Riche, M., and D. Garling. Submitted. Diseases: calculating chemical treatment rates. Sunfish manual. NCRAC Culture Series, NCRAC Publications Office, Iowa State University, Ames.
- Cain, K., and D. Garling. 1993. Trout culture in the North Central Region. NCRAC Fact Sheet Series #108, NCRAC Publications Office, Iowa State University, Ames.
- Garling, D.L. 1992. Making plans for commercial aquaculture in the North Central Region. NCRAC Fact Sheet Series #101, NCRAC Publications Office, Iowa State University, Ames.

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EDUCATION

B.S. University of Wisconsin-Stevens Point, 1975, Biology
M.S. University of Wisconsin-Stevens Point, 1978, Natural Resources

POSITIONS

Associate Director, Fisheries/Aquaculture Educator and Professor (1998-present), and
Fisheries/Aquaculture Educator (1979-1998), University of Minnesota Sea Grant Extension
Fishery Specialist/Fishery Biologist (1978-1979), Missouri Conservation Department

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society (Minnesota Chapter: President 1991-1992)
International Association of Astacology (current Board member)
Sea Grant Advisor Service Association (Great Lakes Network)

SELECTED PUBLICATIONS

Gunderson, J.L., and R. Kinnunen. 2001. ANS-HACCP: aquatic nuisance species–Hazard Analysis and
Critical Control Point training curriculum. Minnesota Sea Grant Publication MN SG-F11.

Gunderson, J.L., and P. Tucker. 2000. A white paper on the status and needs of baitfish aquaculture in the
North Central Region. NCRAC, Michigan State University, East Lansing.

Gunderson, J., M. Klepinger, C. Bronte, and J.E. Marsden. 1998. Overview of the international ruffe
symposium on Eurasian ruffe (*Gymnocephalus cernuus*) biology, impacts, and control. *Journal of
Great Lakes Research* 24(2):165-169.

Brown, P., and J. Gunderson, editors. 1997. Culture potential of selected crayfishes in the North Central
Region. NCRAC Technical Report Series #112, NCRAC Publications Office, Iowa State University,
Ames.

Gunderson, J., P. Gaeden, and T. Hertz. 1996. Case study: walleye fingerling culture in undrainable,
natural ponds. Pages 157-160 *in* R.C. Summerfelt, editor. Walleye culture manual. NCRAC Culture
Series #101, NCRAC Publications Office, Iowa State University, Ames.

Gunderson, J., C. Richards, and M. McDonald. 1996. Soft crayfish production by eyestalk ablation: can it
be profitable. Pages 567-576 *in* W. Momont, editor. Freshwater Crayfish XI. International Association
of Astacology.

Gunderson, J. 1996. Three-state exotic species boater survey: what do boaters know and do they care?
Pages 24-26 *in* Proceedings of five regional citizen education workshops on lake management 1994-
1995. U.S. EPA Region 5 Citizen Education Grant.

Richards, C., J. Gunderson, P. Tucker, and M. McDonald. 1995. Crayfish and baitfish culture in wild rice
paddies. Technical Report No. NRRI/TR-95/39.

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EDUCATION

B.S. Dickinson State University, 1997, Biology

POSITIONS

Aquaculture Specialist (1990-present), North Dakota State University
Technician (1994-1997), Dickinson State University, Dickinson, North Dakota
Data Collector (1992-1993), University of Idaho
Technician (1990), North Dakota Game and Fish, Bismark
Worker (1989-1990), Dawson Community College, Glendive, Montana

SELECTED PUBLICATIONS

Jarvis, P., and S. Sanders. 1999. Development and enhancement of tilapia feed using soybean meal.
North Dakota State University, CREC, NAC, Carrington, North Dakota.

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EDUCATION

B.S. Michigan State University, 1976, Fisheries Biology and Management
M.S. Michigan State University, 1979, Fisheries Biology and Management
Ph.D. Michigan Technological University, 1997, Biological Sciences

POSITIONS

Michigan Sea Grant Extension Agent (1981-present), Upper Peninsula, Michigan State University
Acting Alger County Extension Director (1988-1989), Michigan State University Cooperative Extension Service
Fisheries Pathologist (1981), Rangen Research Laboratory, Hagerman, Idaho
Fisheries Biologist (1979-1980), U.S. Fish and Wildlife Service, Leetown, West Virginia

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Alliance for Marine Remote Sensing
American Fisheries Society (Sections: Fish Health, Salmonid)
Michigan Association of Extension Agents
National Association of Extension Agents
Sea Grant Advisory Service Association

SELECTED PUBLICATIONS

- Gunderson, J.L., and R.E. Kinnunen, editors. 2001. ANS-HACCP: aquatic nuisance species–Hazard Analysis and Critical Control Point training curriculum. Michigan Sea Grant Publication MSG-00-400.
- Kinnunen, R.E. 2000. A white paper on the status and needs of salmonid aquaculture in the North Central Region. NCRAC, Michigan State University, East Lansing.
- Hoff, M.H., R.E. Kinnunen, and H. Quinlan. 1999. Variation in year-class strengths in coregonids. A report to the Lake Superior Technical Committee and Lake Superior Committee.
- Kinnunen, R.E., editor. 1992-present. Commercial fisheries newslines, quarterly newsletters for commercial fishermen and the aquaculture industry. Michigan Sea Grant Extension.
- Kinnunen, R.E. 1996. Walleye fingerling culture in undrainable ponds. Pages 135-145 *in* R.C. Summerfelt, editor. Walleye culture manual. NCRAC Culture Series #101, NCRAC Publications Office, Iowa State University, Ames.
- Burton, T.M., M.J. O'Malley, and R.E. Kinnunen. 1992. Shakey Lakes association strives for solution to aquatic weed problem. Michigan Riparian, November 1992:7-9 and 22.
- Kinnunen, R.E. 1992. North Central Region 1990 salmonid egg and fingerling purchases, production, and sales. NCRAC Technical Bulletin Series #103. NCRAC Publications Office, Iowa State University, Ames.
- Kinnunen, R.E., and H.E. Johnson. 1986. Pathology of sea lamprey inflicted wounds on rainbow trout. Technical Report No. 48. Great Lakes Fishery Commission, Ann Arbor, Michigan.
- Kinnunen, R.E., and H.E. Johnson. 1985. Impact of sea lamprey parasitism on the blood features and hemopoietic tissues of rainbow trout. Technical Report No. 46. Great Lakes Fishery Commission, Ann

Arbor, Michigan.

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EDUCATION

B.S. Kansas State University, 1975, Fisheries and Wildlife Biology
M.S. Kansas State University, 1988, Animal Sciences and Industry

POSITIONS

Extension Specialist-Wildlife (1995-present), Kansas State University
Agricultural Liaison Biologist (1989-1995), Kansas Department of Wildlife and Parks
Extension Assistant (1986-1989), Kansas State University

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Kansas Chapter of the Society for Range Management
Kansas Chapter of the Wildlife Society
Society for Range Management
The Wildlife Society

SELECTED PUBLICATIONS

- Lee, C.D. 1998. Deer damage control options. Kansas State University and Cooperative Extension Service (C-728).
- Lee, C.D., and R.J. Johnson. 1997. Wildlife habitat evaluation handbook-participant's manual. Kansas State University Cooperative Extension Service (MF 2266).
- Hall, D., R.J. Johnson, and C.D. Lee 1997. Wildlife habitat evaluation handbook-leader's guide. Kansas State University Cooperative Extension Service (MF 2265).
- Weins, J.R., C.S. Guy, and C.D. Lee. 1997. Streambank revetment. Kansas State University Agricultural Experiment Station and Cooperative Extension Service (MF 2294).
- Lee, C.D., P.S. Gipson, M.L. Burenheide, J.F. Kamler, J.E. Kretzer, D.J. Martin, C.C. Perchellet, C.M. Willemsen, and J. Weins. 1997. Experimental rodent control strategies at the Beef Cattle Research Center, Kansas State University. Pages 117-123 *in* C.D. Lee and S.E. Hygnstrom, editors. Thirteenth Great Plains Wildlife Damage Control Workshop Proceedings. Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan.
- Lee, C.D., P.S. Gipson, B. Hlavachick, and T. Berger. 1997. Explanations for recent range expansions by wild hogs into midwestern states. Pages 148-150 *in* C.D. Lee and S.E. Hygnstrom, editors. Thirteenth Great Plains Wildlife Damage Control Workshop Proceedings. Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan.

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EDUCATION

B.S. Iowa State University, 1979, Fisheries and Wildlife Biology
M.S. Texas A&M University, 1982, Wildlife and Fisheries Sciences
Ph.D. Mississippi State University, 1988, Fisheries and Wildlife

POSITIONS

Fisheries and Aquaculture Specialist/Associate Professor (1995-present), Specialist/Assistant Professor (1988-present), Department of Animal Ecology, Iowa State University and Associate Director, North Central Regional Aquaculture Center (1990-present)
Graduate Research Assistant (1986-1988), Mississippi State University
Aquaculture Manager (1982-1986), Stiles Farm Foundation
Graduate Research Assistant (1981-1982), and Research Technician I (1980-1981), Texas A&M University
Fisheries Biologist Aide (1979), Indiana Department of Natural Resources

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society: Iowa Chapter; Education, Fish Culture, Early Life History, and Fish Management Sections
Iowa Aquaculture Association
World Aquaculture Society
Phi Kappa Phi
Sigma Xi

SELECTED PUBLICATIONS

- Lane, R.L., and J. E. Morris. 2000. Biology, prevention, and effects of common grubs (Digenetic trematodes) in freshwater fish. NCRAC Technical Bulletin Series #115, NCRAC Publications Office, Iowa State University, Ames.
- Morris, J.E., and C.C. Mischke. 1999. Plankton management for fish culture ponds. NCRAC Technical Bulletin Series, #114, NCRAC Publications Office, Iowa State University, Ames.
- Mischke, C.C., and J.E. Morris. 1998. Sunfish (*Lepomis* spp.) culture. NCRAC Video Series #104, NCRAC Publications Office, Iowa State University, Ames.
- Mischke, C.C., and J.E. Morris. 1998. Growth and survival of larval bluegills in the laboratory under different feeding regimes. *Progressive Fish-Culturist* 60:206-213.
- Mischke, C.C., and J.E. Morris. 1997. Out-of-season spawning of sunfish (*Lepomis* spp.) in the laboratory. *Progressive Fish-Culturist* 59:297-302.
- Bryan, M.D., J.E. Morris, and G.J. Atchison. 1994. Methods for culturing bluegill in the laboratory. *Progressive Fish-Culturist* 56:217-221.
- Bettoli, P.W., J.E. Morris, and R.L. Noble. 1991. Changes in the abundance of two atherinid species following aquatic vegetation removal. *Transactions of the American Fisheries Society* 120:90-97.

VITA

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EDUCATION

B.S. Southern Arkansas University, 1977, Biology/Agriculture
M.S. Mississippi State University, 1981, Wildlife Ecology
Ph.D. University of Missouri, 1998, Forestry

POSITIONS

Extension Fish and Wildlife Specialist (1989-present), School of Natural Resources, University of Missouri, Columbia
County Extension Agent - Staff Chairman (1988-1989), Dallas County, University of Arkansas Cooperative Extension Service
County Extension Agent - Agriculture, Forestry (1982-1988), Lincoln County, University of Arkansas Cooperative Extension Service
Graduate Research Assistant (1979-1981), School of Forestry and Natural Resources, Department of Wildlife and Fisheries, Mississippi State University
Biological Technician (1980), U.S. Fish and Wildlife Service, Migratory Bird and Habitat Research Laboratory, Vicksburg, Mississippi Research Unit

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Missouri Aquaculture Advisory Council
National Animal Damage Control Association
Soil and Water Conservation Society
University of Missouri Extension Association
Wildlife Society, Associate Wildlife Biologist, Missouri Chapter

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EDUCATION

B.S. Silliman University, Philippines, 1987, Wildlife Ecology
M.S. Mississippi State University, 1990, Biology

POSITIONS

Research and Extension Associate (1998-present), Ohio State University
Co-Investigator for Aquaculture (1992-1998) and Research Assistant for Aquaculture (1991-1992),
Kentucky State University
Technical Assistant (1990) and Graduate Research Assistant (1988-1990), Mississippi State University
Laboratory Technician (1987-1988), Mote Marine Laboratory, Sarasota, Florida
Tropical Fish Breeder, J & B Tropicals (1987), Lakeland, Florida

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Ohio Aquaculture Association
U.S. Chapter World Aquaculture Society
World Aquaculture Society

SELECTED PUBLICATIONS

- Webster, C.D., L.G. Tiu, and A.M. Morgan. 1999. Effect of partial and total replacement of fish meal on growth and body composition of sunshine bass fed practical diets. *Journal of the World Aquaculture Society* 30(4):443-453.
- Webster, C.D., L.G. Tiu, and J.H. Tidwell. 1997. Growth and body composition of hybrid bluegill (*Lepomis cyanellus* × *L. macrochirus*) fed practical diets containing various percentages of protein. *Journal of the World Aquaculture Society* 28:230-240.
- Webster, C.D., L.G. Tiu, J.H. Tidwell, and J.M. Grizzle. 1997. Growth and body composition of channel catfish fed diets containing various percentages of canola meal. *Aquaculture* 150:103-112.
- Webster, C.D., L.G. Tiu, and J.H. Tidwell 1997. Effects of replacing fish meal in diets on growth and body composition of palmetto bass (*Morone saxatilis* × *M. chrysops*) raised in cages. *Journal of Applied Aquaculture* 7(1):53-67.