

**NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT**

**Chairperson:** Joseph E. Morris, Iowa State University

**Administrative Advisor:** David C. Petritz, Purdue University

**Industry Advisory Council Liaison:** Dan Selock, Goreville, Illinois

**Funding Request:** \$40,000

**Duration:** 2 Years (September 1, 1997 - August 31, 1999)

**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:**

<b>Institution</b>	<b>Principal Investigator(s)</b>	<b>Objective(s)</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Total</b>
University of Wisconsin-Milwaukee	Fred P. Binkowski	1-3	\$500	\$500	\$1,000
Michigan State University	Donald L. Garling	1,2,&4	\$500	\$500	\$1,000
University of Minnesota-Duluth	Jeffrey L. Gunderson	1,2,&4	\$6,025	\$1,050	\$7,075
Ohio State University	John N. Hochheimer	1,2,&4	\$2,750	\$2,750	\$5,500
University of Nebraska-Lincoln	Terrence B. Kayes	1,2,&4	\$500	\$500	\$1,000
Michigan State University	Ronald E. Kinnunen	1,2,&4	\$500	\$500	\$1,000
Kansas State University	Charles D. Lee	2	\$500	\$500	\$1,000
Iowa State University	Joseph E. Morris	1,2,&4	\$1,275	\$800	\$2,075
University of Missouri-Columbia	Robert A. Pierce II	2	\$500	\$500	\$1,000
North Dakota State University	Brian R. Stange	1,2,&4	\$1,275	\$1,275	\$2,550
Purdue University	LaDon Swann	1-4	\$6,500	\$10,300	\$16,800
<b>Totals</b>			<b>\$20,825</b>	<b>\$19,175</b>	<b>\$40,000</b>

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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 1993 the world fishery production was 100 million metric tons (MT) with a per capita consumption of 18 kg (edible + inedible seafood) (National Marine Fisheries Service 1994). World fish harvests have risen for the last 13 consecutive years and, over that time, have increased 49%. If this trend continues, experts predict that there will be a serious shortfall of seafood products by the year 2000 due to limited availability of commercially caught species, e.g., haddock and cod.

A potential strategy to balance the shortfall is food production through aquaculture technology. More than 17% of the world's fish products are produced through aquaculture (FAO 1993). In 1985 aquaculture produced 11 million MT of fishery products. In 1991 this increased to 16.6 million MT. Aquaculture is now growing at an annual rate of more than 8% per year (Avault 1986). World experts estimate that aquaculture technology could produce between 20 to 25 million MT by the year 2000. United States' aquaculture currently produces 2.2% of the world's aquaculture (FAO 1993).

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 has increased; per capita consumption in the U.S. has grown from 5.8 kg in 1990 to 6.8 kg in 1993. 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 be supplying approximately 25% of all the seafood consumed in the U.S. (Harvey 1994).

The United States imported about \$10.8 billion of seafood products (edible + inedible seafood) in 1993 versus \$6.9 billion exported for a trade deficit of \$3.9 billion (National Marine Fisheries Service 1994). 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 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 North Central Regional Aquaculture Center (NCRAC) Extension Work Group, Cooperative Extension Service (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 for raising warmer water species 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 that regional residents have become accustomed to. 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, including finfish, 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.

In spite of the limited number of aquaculture FTEs (less than 4 FTEs) 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.

Prior to mid-1994 little coordination of international aquaculture information sharing existed. Information produced by national and international agencies could only be obtained by contacting the respective sources of this information. Also, individual CES personnel relied heavily on information produced by individual states

or through regional cooperative projects. As Internet access extended beyond educational institutions and governmental agencies, a clear need developed to utilize the Internet to reach a much broader audience. In the age of an "information overload" the need for a centralized gateway to the ever increasing number of aquaculture resources in electronic format was apparent.

The development of the Aquaculture Information Network Center (AquaNIC) has been instrumental in reaching the public with valuable and timely information. It has been funded, in part, by NCRAC and has currently over 4,000 contacts per month from more than 50 countries. AquaNIC receives direction from a national steering committee from public and private sector aquaculture. AquaNIC began on a Gopher Server in July 1994 and moved to a World Wide Web server in January 1996. AquaNIC (<http://www.ansc.purdue.edu/aquanic>) houses more than 1,650 extension publications, governmental documents, image files, comprehensive e-mail lists, newsletters, calendars, job announcements, and resumes. In addition, AquaNIC has 190 pointers to other aquaculture and fisheries related web sites. Ongoing promotional campaigns through mouse pads and access information cards has increased the level of awareness of this new resource available to the world aquaculture industry. It is the gateway to the world's electronic resources in aquaculture including the Regional Aquaculture Centers. It also serves as the home of NCRAC's web site (<http://www.ansc.purdue.edu/aquanic/ncrac>).

A NCRAC web page was developed in conjunction with NCRAC administrative staff and the Illinois-Indiana Sea Grant Program. The web site provides electronic versions of NCRAC extension publications, directories, operations manuals and newsletters.

Several fact sheets and bulletins have been completed and are available to the public. 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, and (8) niche marketing. 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.

A Tilapia Production Information Handbook has been produced by North Dakota State University (NDSU) extension specialists with funding provided by NCRAC. Prior to final submission of this material to the NCRAC Extension Work Group, this handbook needs to be reviewed as to content and timeliness.

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 and polyploid induction in sunfish held in the region. These workshops have often been conducted using a combination of regional extension specialists 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.

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**

The NCRAC Extension Work 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: increase in 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; improve lines of communication between interstate aquaculture extension specialists and associated industry contacts; and enhance the legal and socioeconomic atmosphere for aquaculture in the NCR.

### 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, 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 between NCRAC Research and Extension Work Groups (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 reports.

Research Work Group	Extension Liaison(s)	State(s)
Economics/Marketing	Don Garling Terry Kayes* LaDon Swann	MI NE IN
Wastes Effluents	LaDon Swann*	IN
Hybrid Striped Bass	John Hochheimer* Joe Morris	OH IA
Salmonids	Ron Kinnunen*	MI
Sunfish	Joe Morris*	IA
Tilapia	Brian Stange*	ND
Walleye	Ron Kinnunen Jeff Gunderson*	MI MN
Yellow Perch	Fred Binkowski Don Garling* Terry Kayes	WI MI NE

\*Lead Extension Liaison

#### **Enhance the NCRAC Extension Network for Aquaculture Information Transfer (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 of 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. These activities will be continued.

Swann (Purdue University) established AquaNIC in June 1993. Between January and October 1996 more than 31,000 people from 49 countries have chosen to use AquaNIC as an alternative or in conjunction with 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 in delivering information associated with other information delivery methods.

AquaNIC serves as host to other industry web sites including NCRAC, the World Aquaculture Society, the Illinois Aquaculture Industry Association and the Indiana Aquaculture Association. Through partial support from NCRAC (\$6,000), Swann will continue to maintain AquaNIC.

### **Provide In-service Training for Cooperative Extension Service, Sea Grant Advisory Service, and Other Landowner Assistance Personnel (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.

### **Develop and Implement Aquaculture Education Programs and Materials for the North Central Region (Objective 4)**

#### Education Programs

*Yellow Perch Culture Workshop/Task Force Meeting.* (\$5,500) NCRAC has identified yellow perch as one of the region's top candidates for successful aquaculture development. In fact, many private aquaculturists have already begun raising them in the NCR. All-time high yellow perch market prices have resulted from the current wild harvest of yellow perch (a historic low). These high prices have caused some existing aquaculturists to switch their operations to yellow perch production. In addition, a number of aquaculture companies that are selling indoor culture systems have stepped up their marketing efforts and are convincing new fish farmers to make the significant financial investments needed to raise these fish in indoor, recirculating aquaculture systems.

Prospective yellow perch aquaculturists are currently seeking loans from banks throughout the region. Without a proven track record, many lending institutions are reluctant to make the \$200,000 to \$300,000 loans being requested. NCRAC researchers and extension personnel are also reluctant to fully endorse this type of aquaculture because so little is known about its economic feasibility. NCRAC personnel do not want to encourage investments that may fail and seriously jeopardize future aquaculture loan applications in the region, yet they do not want to be perceived as impeding aquaculture development in the region.

While NCRAC has funded several yellow perch research projects, good research takes time and many of the people getting into the business now cannot wait for science-based solutions. It would be easy to dismiss these people and rationalize that it was their own fault for jumping into an unproven venture or blame the companies that are selling unproven systems. That rationalization will not help either NCRAC or the industry. If these large investments fail throughout the region, it may become difficult in the future to justify spending research dollars on yellow perch if their track record has been so poor that no lending institution will ever again consider giving a loan for such a venture.

Gunderson, UMD, will conduct a workshop/task force meeting to address the problem previously described. NCRAC researchers have already learned a great deal about yellow perch and are presenting some of those results throughout the region in workshops and conferences. Unfortunately, much of the information remains unpublished, is in a form unusable by fish farmers, or does not really relate to commercial scale production. Conversely, fish farmers have gained potentially valuable information by raising yellow perch in commercial scale operations and some are experiencing problems that may not be apparent to researchers conducting controlled studies.

By bringing together yellow perch aquaculturists, researchers, and extension specialists to share information and identify problems and successes, it may be possible to help this industry in a way that will have long term benefits. Just getting the yellow perch producers together to share their experiences may prove invaluable. Because the industry is not competing with each other as much as they are with wild-caught fish and alternative species, there is great incentive for them to work together and with the NCRAC extension and research communities.

A limited number of active yellow perch fish farmers and those companies selling aquaculture systems and feed for yellow perch will be invited to this 1½ day workshop/task force meeting, scheduled for winter 1997-98. NCRAC representatives would be limited to researchers and extension specialists dealing directly with yellow perch. Each invited aquaculturist will be asked to describe their experiences, problems, and solutions to problems. NCRAC research information would be presented as well. The majority of the meeting would focus on identifying problems, assessing their importance, and discussing/sharing solutions. Because it is important to bring aquaculturists and NCRAC researchers and extension specialists from throughout the region to one location for this meeting to be successful, travel, lodging and meals of participants must be addressed. The bulk of the funds being requested will go towards the travel costs associated with bringing all of these individuals together for this meeting.

The meeting will result in a listing of yellow perch production problems, research and extension needs to be submitted to NCRAC in spring 1998. This listing will help focus future NCRAC research and bring the industry closer to the research community. Extension specialists will leave with a much better understanding of the problems and successes of yellow perch aquaculture so that they are better prepared to answer questions from prospective growers and lenders. It is important for extension specialists and researchers to take a proactive approach to industry needs in this area.

*Recirculating Aquaculture Systems Workshop.* (\$4,500) Potential aquaculturists and extension personnel will be invited to this workshop. It will be designed to teach the recirculating aquaculture system novice about the different components that make up a recirculating system; how these components fit together to make a working system; operation and management of these systems and some of the economics associated with recirculating aquaculture systems. The workshop will be structured to give them the necessary decision-making tools to evaluate recirculating aquaculture technologies.

The workshop will follow the outline below:

- A. Introduction - Overview of the workshop
- B. Recirculating systems 101
  - 1. Basics of recirculating technologies
  - 2. Why even consider using a recirculating system
  - 3. Comparison with other culture technologies
  - 4. Technical questions that should have asked
- C. Economics and recirculating technology
  - 1. Comparison with other technologies
  - 2. Successes and failures
  - 3. Retrofitting an existing structure
  - 4. Questions to ask
- D. Recirculating system design
  - 1. Tanks and other places to put fish
  - 2. Materials for aquaculture
  - 3. Water movement (pumps, piping systems, valves and other fixtures)
  - 4. Aeration (mechanical aeration, diffused air, and pure oxygen)
  - 5. Biofiltration systems
  - 6. Solids removal
  - 7. Temperature modifications
  - 8. Computers, controllers, and system automation



- E. Management; bringing it all together
  - 1. Operating recirculating systems, (tricks and pitfalls)
  - 2. Starting and running a recirculating system
  - 3. Water quality management
  - 4. Other management considerations

The parameters of the workshop are as follows:

A. Duration

The workshop will take two days, preferably over a weekend, with three morning sessions of 45 minutes each and four 45 minute afternoon sessions. Since there are always many questions that do not particularly fit the subject at hand, the evening time slot of the first day could be used as an open forum/informal get-together to talk to the experts about a variety of subjects.

B. Teaching Methods and Props

- 1. The instructors will use multimedia methods (e.g., videos, slides, interactive computer demos) and several hands-on sessions. Each topic will be covered quickly with ample time for questions and answers. The goal will be to use a few dynamic instructors and lots of activities, which necessitate limited numbers of participants - not sessions with hundreds of people.
- 2. Several activities will be developed for the afternoon sessions that get the people involved. Activities will be developed to get the participants thinking about applying some of the general principles being taught to everyday aquacultural problems. Small group activities will be used.
- 3. Ohio State University (OSU) has a demonstration recirculating system that is portable and can be used for this workshop. This system has the basic components and is large enough (418 L) to show larger than pilot-scale operation of a recirculating system. Some of the technologies and management techniques associated with recirculating aquaculture systems will be illustrated with this system.

C. Workshop Locations

Workshops will be held in three locations within the region and will be funded through participant fees. Each workshop will be limited to no more than 75 participants. The first workshop will be held in Michigan. After evaluating the session, additional workshops will be planned for Ohio and Indiana/Illinois. Others can be scheduled depending on interest and availability of the instructors.

D. Personnel

- 1. Hochheimer (OSU) will take the lead in the development of the technical materials for this project. He will serve as one of the instructors.
- 2. Garling, Michigan State University (MSU), will assist with the meeting arrangements and provide input to the development of the course materials.
- 3. Additional personnel will be added as instructors. They will be solicited from within the region if possible with areas of expertise to include economics, water quality management, and engineering.

E. Schedule

- 1. Start funding September 1997
- 2. Meet with instructors October 1997
- 3. Develop curriculum October-December 1997
- 4. Review materials December 1997-January 1998
- 5. Workshop 1, Michigan February/March 1998
- 6. Review Workshop 1 within two weeks of first workshop
- 7. Workshop 2, Ohio March/April 1998
- 8. Workshop 3, Indiana-Illinois, April/May 1998
- 9. Additional workshops as needed

*Business Planning Workshops.* (\$500) In 1998, two workshops will be hosted by Southern Illinois University-Carbondale personnel working with Morris of ISU. The goal of these workshops is to provide technical and

business support for individuals currently in aquaculture production or who are considering aquaculture as a new business. Information will be provided on various physical, biological, and financial factors to be considered in starting and operating an aquaculture business. Economic information on the costs of producing fish in aquaculture will also be provided. The \$500 investment of NCRAC will go toward travel costs associated with this workshop. Other partners in these workshops include Illinois/Indiana Sea Grant and the Illinois Council on Food and Agricultural Research Grants Program. Participants from the region will be invited to attend; registration fees will be assessed.

### Education Materials

*Tilapia Production Information Handbook Update.* (\$1,550) A Tilapia Production Information Handbook has been produced with funding provided by NCRAC. Prior to final submission of this material to the NCRAC Extension Work Group, this handbook needs to be reviewed as to content and timeliness. In an effort to keep this publication current, updated information will be added to the existing handbook and a database maintained of individuals who purchase this handbook; new information will be sent to the individuals as it becomes available.

*4-H Leader's Guide for High School Youth (Aquaculture).* (\$8,350) The youth in the NCR have a rich history of practical hands-on (experiential) learning through CES 4-H programs. Universities in the NCR collaborated in the production of a series of 4-H guides for various species of livestock. These include: swine, dairy, beef, poultry, horses, rabbits and sheep. There is a need for similar 4-H guides for aquaculture which will allow for a broader incorporation of aquaculture into state 4-H programs. Swann, Purdue University (Purdue); Gunderson, UM-D; and Morris, ISU will coordinate production and pilot testing of a 4-H leader's guide in aquaculture using the format outlined in the National Criteria for 4-H Youth Development Curricula. In brief, this method involves an experiential learning format where content and curriculum specialists work together to develop an initial 4-H leader's guide that will be pilot tested at up to 10 sites across the Midwest before being revised and implemented. This material will be developed during Year 1 of the funding cycle; pilot testing and subsequent revisions will take place during Year 2.

*Getting Started in Aquaculture Interactive CD-ROM.* (\$2,600) With limited budgets for travel to bring together CES field staff, alternative approaches to training CES educators will consist of more self-paced training programs. The benefits of multimedia learning systems are: just-in-time delivery, tied to on-the-job application, re-usable resource, learn when there is time, little or no travel/seminar costs, and higher learning retention.

The Illinois-Indiana Sea Grant is sponsoring the production of an interactive CD-ROM based training course. This application should be available for beta testing by the fourth quarter of 1996. Upon completion of the final version, Swann (Purdue) will work with the NCRAC publication coordinator to replicate the CD-ROM and distribute through the national aquaculture extension network and to the aquaculture industry.

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## PROJECT LEADERS

<u>State</u>	<u>Name</u>	<u>Institution</u>
<b>Illinois/Indiana</b>	LaDon Swann	Purdue University
<b>Iowa</b>	Joseph E. Morris	Iowa State University
<b>Kansas</b>	Charles D. Lee	Kansas State University
<b>Michigan</b>	Donald L. Garling Ronald E. Kinnunen	Michigan State University Michigan State University
<b>Minnesota</b>	Jeffrey L. Gunderson	University of Minnesota-Duluth
<b>Missouri</b>	Robert A. Pierce II	University of Missouri-Columbia
<b>Nebraska</b>	Terrence B. Kayes	University of Nebraska-Lincoln
<b>North Dakota</b>	Brian R. Stange	North Dakota State University
<b>Ohio</b>	John N. Hochheimer	Ohio State University
<b>Wisconsin</b>	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

**Ohio State University (OSU)**

John N. Hochheimer

**University of Nebraska-Lincoln (UNL)**

Terrence B. Kayes

**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

**North Dakota State University (NDSU)**

Brian R. Stange

**Purdue University (Purdue)**

LaDon Swann

## 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 biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Wisconsin 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 Wisconsin.
  - 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 Cooperative Extension Service, 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**

<b>ORGANIZATION AND ADDRESS</b> Center for Great Lakes Studies University of Wisconsin-Milwaukee Milwaukee, WI 53204			<b>USDA AWARD NO.</b> Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Fred P. Binkowski			<b>FUNDS REQUESTED by PROPOSER</b>	<b>FUNDS APPROVED BY CSREES (If Different)</b>
<b>A. Salaries and Wages</b> 1. No. of Senior Personnel	<b>CSREES FUNDED WORK MONTHS</b>			\$
	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 . . . . .				
<b>Total Salaries and Wages</b> . . . . . →				
<b>B. Fringe Benefits (If charged as Direct Costs)</b>				
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →				
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>				
<b>E. Materials and Supplies</b>				
<b>F. Travel</b>				
1. Domestic (Including Canada) . . . . .				
2. Foreign (List destination and amount for each trip.)				
<b>G. Publication Costs/Page Charges</b>				
<b>H. Computer (ADPE) Costs</b>				
<b>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 (\$150), Postage (\$250), Photocopying (\$100)</b>			\$500	
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$500	
<b>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.)</b>				
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$500	
<b>M. Other</b> . . . . . →				
<b>N. Total Amount of This Request</b> . . . . . →			\$500	\$
<b>O. Cost Sharing (If Required Provide Details)</b>		\$14,148		

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

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

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Center for Great Lakes Studies University of Wisconsin-Milwaukee Milwaukee, WI 53204			<b>USDA AWARD NO.</b> Year 2: Objectives 1-3		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Fred P. Binkowski			<b>FUNDS REQUESTED by PROPOSER</b>	<b>FUNDS APPROVED BY CSREES (If Different)</b>	
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>		
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					\$
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					
<b>F. Travel</b>					
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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 (\$150), Postage (\$250), Photocopying (\$100)</b>			\$500		
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$500		
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$500		
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →			\$500	\$	
<b>O. Cost Sharing (If Required Provide Details)</b>		\$15,562			

**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 JUSTIFICATION FOR UNIVERSITY OF WISCONSIN-MILWAUKEE**

**(Binkowski)**

**Objectives 1-3**

**I. All Other Direct Costs.** Annual costs: telephone (\$150), postage (\$250), and photocopying (\$100).



## 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 biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Michigan 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 Michigan.
  - 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Donald L. Garling			<b>FUNDS REQUESTED by PROPOSER</b>	<b>FUNDS APPROVED BY CSREES (If Different)</b>	
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>		
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					
<b>F. Travel</b>					
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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.)</b>					
<b>J. Total Direct Costs (C through I)</b> . . . . . →					
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →					
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →					
<b>O. Cost Sharing (If Required Provide Details)</b>					
			\$13,324		

**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**

<b>ORGANIZATION AND ADDRESS</b> Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>		
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Donald L. Garling			<b>FUNDS REQUESTED by PROPOSER</b>		<b>FUNDS APPROVED BY CSREES</b> (If Different)
			<b>A. Salaries and Wages</b>		
1. No. of Senior Personnel			<b>CSREES FUNDED WORK MONTHS</b>		
			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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					
<b>F. Travel</b>			\$500		
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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.)</b>					
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$500		
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$500		
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →			\$500		\$
<b>O. Cost Sharing (If Required Provide Details)</b>			\$13,324		

**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 JUSTIFICATION FOR MICHIGAN STATE UNIVERSITY**

**(Garling)**

**Objectives 1, 2, and 4**

**F. Travel.** Transportation, lodging and meal expenses to attend Extension/Research Work Group meetings.

## 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.
  - c. Facilitating the North Central Aquaculture Conference together with the Ninth Annual Minnesota Aquaculture Conference.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
  - a. Attending the biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Minnesota 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 Minnesota.
  - 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
  - a. Conduct the NCRAC Yellow Perch Workshop/Task Force Meeting.
  - b. Participate in the development of the 4-H Leader's Guide for High School Youth (Aquaculture).

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Minesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Jeffrey L. Gunderson			<b>FUNDS                  REQUESTED by                  PROPOSER</b>		
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>		
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					\$
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					\$275
<b>F. Travel</b>					\$5,250
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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 (\$300), Postage (\$100), Photocopying (\$100)</b>					\$500
<b>J. Total Direct Costs (C through I)</b> . . . . . →					\$6,025
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →					\$6,025
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →					\$6,025
<b>O. Cost Sharing (If Required Provide Details)</b>			\$5,561		

**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**

<b>ORGANIZATION AND ADDRESS</b> Minesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and			
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Jeffrey L. Gunderson						
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>			
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 . . . . .						
<b>Total Salaries and Wages</b> . . . . . →						
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →						
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>						\$300
<b>F. Travel</b>						\$750
1. Domestic (Including Canada) . . . . .						
2. Foreign (List destination and amount for each trip.)						
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>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.)</b>						
<b>J. Total Direct Costs (C through I)</b> . . . . . →						\$1,050
<b>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.)</b>						
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →						\$1,050
<b>M. Other</b> . . . . . →						
<b>N. Total Amount of This Request</b> . . . . . →						\$1,050
<b>O. Cost Sharing (If Required Provide Details)</b>			\$5,561			

**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 JUSTIFICATION FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

### Objectives 1, 2, and 4

- E. Materials and Supplies.** General office supplies.
- F. Travel.** Transportation, lodging and meal expenses for invited yellow perch aquaculturists, researchers and extension specialists to attend the Yellow Perch Culture Workshop/Task Force Meeting and for the P.I. to attend Extension Work Group meetings.
- I. All Other Direct Costs:** Year 1: telephone (\$300), postage (\$100), and photocopying (\$100).



## PROPOSED ACTIVITIES FOR OHIO STATE UNIVERSITY

(Hochheimer)

### Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
  - a. Serving as lead liaison between the NCRAC Hybrid Striped Bass 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 biennial Extension Work Group meeting.
  - 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
  - a. Provide a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Ohio and the region.
  - b. Conduct seminar(s) on recirculating aquaculture systems.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and			
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> John N. Hochheimer						
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>			
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 . . . . .						
<b>Total Salaries and Wages</b> . . . . . →						
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →						
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>					\$1,000	
<b>F. Travel</b>					\$750	
1. Domestic (Including Canada) . . . . .						
2. Foreign (List destination and amount for each trip.)						
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>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 (\$150), Postage (\$300), Photocopying (\$550)</b>					\$1,000	
<b>J. Total Direct Costs (C through I)</b> . . . . . →					\$2,750	
<b>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.)</b>						
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →					\$2,750	
<b>M. Other</b> . . . . . →						
<b>N. Total Amount of This Request</b> . . . . . →					\$2,750	\$
<b>O. Cost Sharing (If Required Provide Details)</b>			\$3,451			

**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**

<b>ORGANIZATION AND ADDRESS</b> Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> John N. Hochheimer			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES</b> (If Different)		
<b>A. Salaries and Wages</b>			\$		
<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
B. Fringe Benefits (If charged as Direct Costs)					
C. <b>Total Salaries, Wages, and Fringe Benefits</b> (A plus B) . . . . . →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$500		
F. Travel			\$1,250		
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 (\$150), Postage (\$300), Photocopying (\$550)			\$1,000		
J. <b>Total Direct Costs</b> (C through I) . . . . . →			\$2,750		
K. <b>Indirect Costs If Applicable</b> (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. <b>Total Direct and Indirect Costs</b> (J plus K) . . . . . →			\$2,750		
M. <b>Other</b> . . . . . →					
N. <b>Total Amount of This Request</b> . . . . . →			\$2,750		\$
O. <b>Cost Sharing</b> (If Required Provide Details)			\$3,451		

**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 JUSTIFICATION FOR OHIO STATE UNIVERSITY**

**(Hochheimer)**

**Objectives 1, 2, and 4**

**E. Materials and Supplies.** General office supplies.

**F. Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings.

**I. All Other Direct Costs.** Annual costs: telephone (\$150), postage (\$300), and photocopying (\$550).

## PROPOSED ACTIVITIES FOR UNIVERSITY OF NEBRASKA-LINCOLN

(Kayes)

### 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/Marketing Work Group and Extension Work Group.
  - b. Serving as a liaison between the NCRAC Yellow Perch 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 biennial Extension Work Group meeting.
  - 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 Nebraska.
  - 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Department of Forestry, Fisheries and Wildlife University of Nebraska-Lincoln Lincoln, NE 68583-0814			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Terrence B. Kayes			<b>FUNDS                  REQUESTED by                  PROPOSER</b>	<b>FUNDS                  APPROVED BY CSREES                  (If Different)</b>	
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>		
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					\$
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					
<b>F. Travel</b>					\$500
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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.)</b>					
<b>J. Total Direct Costs (C through I)</b> . . . . . →					\$500
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →					\$500
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →					\$500
<b>O. Cost Sharing (If Required Provide Details)</b>			\$5,408		\$

**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**

<b>ORGANIZATION AND ADDRESS</b> Department of Forestry, Fisheries and Wildlife University of Nebraska-Lincoln Lincoln, NE 68583-0814			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Terrence B. Kayes			<b>FUNDS                  REQUESTED by                  PROPOSER</b>	<b>FUNDS                  APPROVED BY CSREES                  (If Different)</b>
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>	
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 . . . . .				
<b>Total Salaries and Wages</b> . . . . . →				\$
<b>B. Fringe Benefits (If charged as Direct Costs)</b>				
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →				
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>				
<b>E. Materials and Supplies</b>				
<b>F. Travel</b>			\$500	
1. Domestic (Including Canada) . . . . .				
2. Foreign (List destination and amount for each trip.)				
<b>G. Publication Costs/Page Charges</b>				
<b>H. Computer (ADPE) Costs</b>				
<b>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.)</b>				
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$500	
<b>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.)</b>				
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$500	
<b>M. Other</b> . . . . . →				
<b>N. Total Amount of This Request</b> . . . . . →			\$500	\$
<b>O. Cost Sharing (If Required Provide Details)</b>		\$4,946		

**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 JUSTIFICATION FOR UNIVERSITY OF NEBRASKA-LINCOLN**

**(Kays)**

**Objectives 1, 2, and 4**

**F. Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings.



## 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 biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Michigan 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 Michigan.
  - 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.
  - e. Compile aquaculture extension information for use by Great Lakes Sea Grant agents and Cooperative Extension Service personnel.
4. Develop and implement aquaculture education programs and materials for the North Central Region.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Michigan State University - Upper Peninsula 702 Chippewa Square Marquette, MI 49855-4811			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and			
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Ronald E. Kinnunen						
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>			
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 . . . . .						
<b>Total Salaries and Wages</b> . . . . . →						
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →						
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>				\$50		
<b>F. Travel</b>				\$400		
1. Domestic (Including Canada) . . . . .						
2. Foreign (List destination and amount for each trip.)						
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>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 (\$15), Postage (\$10), Photocopying (\$25)</b>				\$50		
<b>J. Total Direct Costs (C through I)</b> . . . . . →				\$500		
<b>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.)</b>						
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →				\$500		
<b>M. Other</b> . . . . . →						
<b>N. Total Amount of This Request</b> . . . . . →				\$500	\$	
<b>O. Cost Sharing (If Required Provide Details)</b>						
<b>NOTE:</b> Signatures required only for Revised Budget			This is Revision No. →			
<b>NAME AND TITLE (Type or print)</b>			<b>SIGNATURE</b>		<b>DATE</b>	
<b>Principal Investigator/Project Director</b>						
<b>Authorized Organizational Representative</b>						

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Michigan State University - Upper Peninsula 702 Chippewa Square Marquette, MI 49855-4811			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and			
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Ronald E. Kinnunen						
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>			
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 . . . . .						
<b>Total Salaries and Wages</b> . . . . . →						
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →						
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>				\$50		
<b>F. Travel</b>				\$400		
1. Domestic (Including Canada) . . . . .						
2. Foreign (List destination and amount for each trip.)						
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>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 (\$15), Postage (\$10), Photocopying (\$25)</b>				\$50		
<b>J. Total Direct Costs (C through I)</b> . . . . . →				\$500		
<b>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.)</b>						
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →				\$500		
<b>M. Other</b> . . . . . →						
<b>N. Total Amount of This Request</b> . . . . . →				\$500	\$	
<b>O. Cost Sharing (If Required Provide Details)</b>						
<b>NOTE:</b> Signatures required only for Revised Budget			This is Revision No. →			
<b>NAME AND TITLE (Type or print)</b>			<b>SIGNATURE</b>		<b>DATE</b>	
<b>Principal Investigator/Project Director</b>						
<b>Authorized Organizational Representative</b>						

**BUDGET JUSTIFICATION FOR MICHIGAN STATE UNIVERSITY**

**(Kinnunen)**

**Objectives 1, 2, and 4**

**E. Materials and Supplies.** General office supplies.

**F. Travel.** Transportation, lodging, and meal expenses to attend Great Lakes Fish Disease Control Committee as NCRAC representative.

**I. All Other Direct Costs.** Annual costs: telephone (\$15); postage (\$10), and photocopying (\$25).

## PROPOSED ACTIVITIES FOR KANSAS STATE UNIVERSITY

(Lee)

### Major Actions for Each Objective

2. Enhance the NCRAC extension network for aquaculture information transfer by:
  - a. Attending the biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Kansas 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 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**

<b>ORGANIZATION AND ADDRESS</b> Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			<b>USDA AWARD NO.</b> Year 1: Objective 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Charles D. Lee			<b>FUNDS REQUESTED by PROPOSER</b>	<b>FUNDS APPROVED BY CSREES (If Different)</b>	
<b>A. Salaries and Wages</b>			\$		
1. No. of Senior Personnel					
			<b>CSREES FUNDED WORK MONTHS</b>		
			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 . . . . .					
<b>Total Salaries and Wages . . . . . →</b>					
B. Fringe Benefits (If charged as Direct Costs)					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B) . . . . . →</b>					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$150		
F. Travel			\$350		
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.)					
<b>J. Total Direct Costs (C through I) . . . . . →</b>			\$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.)					
<b>L. Total Direct and Indirect Costs (J plus K) . . . . . →</b>			\$500		
M. Other . . . . . →					
<b>N. Total Amount of This Request . . . . . →</b>			\$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**

<b>ORGANIZATION AND ADDRESS</b> Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			<b>USDA AWARD NO.</b> Year 2: Objective 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Charles D. Lee			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES</b> (If Different)		
<b>A. Salaries and Wages</b>			\$		
<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
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 . . . . .					
<b>Total Salaries and Wages . . . . . →</b>					
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				\$150	
F. Travel				\$350	
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) . . . . . →				\$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) . . . . . →				\$500	
M. Other . . . . . →					
N. Total Amount of This Request . . . . . →				\$500	\$
O. Cost Sharing (If Required Provide Details)			\$		
<b>NOTE:</b> Signatures required only for Revised Budget			This is Revision No. →		
<b>NAME AND TITLE</b> (Type or print)		<b>SIGNATURE</b>		<b>DATE</b>	
<b>Principal Investigator/Project Director</b>					
<b>Authorized Organizational Representative</b>					

**BUDGET JUSTIFICATION FOR KANSAS STATE UNIVERSITY**

**(Lee)**

**Objective 2**

**E. Materials and Supplies.** General office supplies.

**F. Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings.



## 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 biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Iowa 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 Iowa.
  - 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
  - a. Participate in the 4-H Leader's Guide for High School Youth (Aquaculture).
  - b. Sub-contract to Southern Illinois University-Carbondale in support of the aquaculture business planning workshops.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Department of Animal Ecology Iowa State University Ames, IA 50011-3221			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and				
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Joseph E. Morris							
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>				
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 . . . . .							
<b>Total Salaries and Wages . . . . . →</b>							
<b>B. Fringe Benefits (If charged as Direct Costs)</b>							
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B) . . . . . →</b>							
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>							
<b>E. Materials and Supplies</b>					\$275		
<b>F. Travel</b>					\$1,000		
1. Domestic (Including Canada) . . . . .							
2. Foreign (List destination and amount for each trip.)							
<b>G. Publication Costs/Page Charges</b>							
<b>H. Computer (ADPE) Costs</b>							
<b>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.)</b>							
<b>J. Total Direct Costs (C through I) . . . . . →</b>					\$1,275		
<b>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.)</b>							
<b>L. Total Direct and Indirect Costs (J plus K) . . . . . →</b>					\$1,275		
<b>M. Other . . . . . →</b>							
<b>N. Total Amount of This Request . . . . . →</b>					\$1,275	\$	
<b>O. Cost Sharing (If Required Provide Details)</b>			\$3,988				

**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		

UNITED STATES DEPARTMENT OF AGRICULTURE  
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-0022  
Expires 5/31/98

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Department of Animal Ecology Iowa State University Ames, IA 50011-3221			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Joseph E. Morris					
<b>A. Salaries and Wages</b> 1. No. of Senior Personnel	<b>CSREES FUNDED WORK MONTHS</b>				\$
	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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>			\$300		
<b>F. Travel</b>			\$500		
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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.)</b>					
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$800		
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$800		
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →			\$800		\$
<b>O. Cost Sharing (If Required Provide Details)</b>		\$4,150			

**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 JUSTIFICATION FOR IOWA STATE UNIVERSITY**

**(Morris)**

**Objectives 1, 2, and 4**

**E. Materials and Supplies.** General office supplies.

**F. Travel.** Year 1: Transportation, lodging, and meal expenses to attend Extension/Research Work Group Meetings (\$500); Year 2: Transportation, lodging, and meal expenses for two Business Planning Workshops (\$500).

## PROPOSED ACTIVITIES FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

### Major Actions for Each Objective

2. Enhance the NCRAC extension network for aquaculture information transfer by:
  - a. Attending the biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in Missouri 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 Missouri.
  - 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**

<b>ORGANIZATION AND ADDRESS</b> School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			<b>USDA AWARD NO.</b> Year 1: Objective 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Robert A. Pierce II			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES</b> (If Different)		
<b>A. Salaries and Wages</b>			\$		
<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
B. Fringe Benefits (If charged as Direct Costs)					
C. <b>Total Salaries, Wages, and Fringe Benefits</b> (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) . . . . .				\$500	
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. <b>Total Direct Costs</b> (C through I) . . . . . →				\$500	
K. <b>Indirect Costs If Applicable</b> (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. <b>Total Direct and Indirect Costs</b> (J plus K) . . . . . →				\$500	
M. <b>Other</b> . . . . . →					
N. <b>Total Amount of This Request</b> . . . . . →				\$500	\$
O. <b>Cost Sharing</b> (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		

UNITED STATES DEPARTMENT OF AGRICULTURE  
COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE

OMB Approved 0524-0022  
Expires 5/31/98

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			<b>USDA AWARD NO.</b> Year 2: Objective 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Robert A. Pierce II			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES</b> (If Different)		
<b>A. Salaries and Wages</b>			\$		
<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
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 . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					
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) . . . . .				\$500	
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) . . . . . →				\$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) . . . . . →				\$500	
M. Other . . . . . →					
N. Total Amount of This Request . . . . . →				\$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 JUSTIFICATION FOR UNIVERSITY OF MISSOURI-COLUMBIA**

**(Pierce)**

**Objective 2**

**F. Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings.



## PROPOSED ACTIVITIES FOR NORTH DAKOTA STATE UNIVERSITY

(Stange)

### Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
  - a. Serving as lead liaison between the NCRAC Tilapia Work Group and Extension Work Group.
  - b. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Tilapia Work Group.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
  - a. Attending the biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced in North Dakota 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 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.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
  - a. Updating of the Tilapia Production Information Handbook.

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Carrington Research Extension Center North Dakota State University Carrington, ND 58421			<b>USDA AWARD NO.</b> Year 1: Objectives 1, 2, and	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Brian R. Stange			<b>FUNDS REQUESTED by PROPOSER</b>	<b>FUNDS APPROVED BY CSREES (If Different)</b>
<b>A. Salaries and Wages</b> 1. No. of Senior Personnel	<b>CSREES FUNDED WORK MONTHS</b>			\$
	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. <u>1</u> Technical, Shop and Other . . . . .				\$500
<b>Total Salaries and Wages</b> . . . . . →				\$500
<b>B. Fringe Benefits (If charged as Direct Costs)</b>			\$125	
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →			\$625	
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>				
<b>E. Materials and Supplies</b>			\$150	
<b>F. Travel</b>			\$500	
1. Domestic (Including Canada) . . . . .				
2. Foreign (List destination and amount for each trip.)				
<b>G. Publication Costs/Page Charges</b>				
<b>H. Computer (ADPE) Costs</b>				
<b>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.)</b>				
<b>J. Total Direct Costs (C through I)</b> . . . . . →			\$1,275	
<b>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.)</b>				
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →			\$1,275	
<b>M. Other</b> . . . . . →				
<b>N. Total Amount of This Request</b> . . . . . →			\$1,275	\$
<b>O. Cost Sharing (If Required Provide Details)</b>		\$		

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

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

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Carrington Research Extension Center North Dakota State University Carrington, ND 58421			<b>USDA AWARD NO.</b> Year 2: Objectives 1, 2, and			
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____		<b>FUNDS REQUESTED by PROPOSER</b>
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> Brian R. Stange						
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>			
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. <u>1</u> Technical, Shop and Other . . . . .						\$500
<b>Total Salaries and Wages</b> . . . . . →						\$500
<b>B. Fringe Benefits (If charged as Direct Costs)</b>						\$125
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →						\$625
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>						
<b>E. Materials and Supplies</b>						\$150
<b>F. Travel</b>						\$500
1. Domestic (Including Canada) . . . . .						
2. Foreign (List destination and amount for each trip.)						
<b>G. Publication Costs/Page Charges</b>						
<b>H. Computer (ADPE) Costs</b>						
<b>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.)</b>						
<b>J. Total Direct Costs (C through I)</b> . . . . . →						\$1,275
<b>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.)</b>						
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →						\$1,275
<b>M. Other</b> . . . . . →						
<b>N. Total Amount of This Request</b> . . . . . →						\$1,275
<b>O. Cost Sharing (If Required Provide Details)</b>						\$
<b>NOTE:</b> Signatures required only for Revised Budget			This is Revision No. →			
<b>NAME AND TITLE (Type or print)</b>			<b>SIGNATURE</b>			<b>DATE</b>
<b>Principal Investigator/Project Director</b>						
<b>Authorized Organizational Representative</b>						

## BUDGET JUSTIFICATION FOR NORTH DAKOTA STATE UNIVERSITY

(Stange)

### Objectives 1, 2, and 4

- A. **Salaries and Wages.** Technician support for the updates of the Tilapia Production Information Handbook.
- B. **Fringe Benefits.** Benefit rate for technical employees is 25%.
- E. **Materials and Supplies.** General office supplies.
- F. **Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings.

## PROPOSED ACTIVITIES FOR PURDUE UNIVERSITY

(Swann)

### 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. Coordinating distribution of NCRAC Annual Reports with the NCRAC publications coordinator through the Aquaculture Network Information Center (AquaNIC).
2. Enhance the NCRAC extension network for aquaculture information transfer by:
  - a. Attending the biennial Extension Work Group meeting.
  - b. Providing 15 copies of aquaculture extension related materials produced by the Illinois-Indiana Sea Grant Program to the extension chairperson for distribution to all state contacts once annually.
  - c. Providing a link between NCRAC, public and private aquaculturists and other appropriate individuals or groups in Indiana and Illinois.
  - 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.
  - e. Coordinating distribution of NCRAC extension and technical publications with the NCRAC publications coordinator through the Aquaculture Network Information Center (AquaNIC).
3. Providing in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
  - a. Providing one update on AquaNIC to extension personnel at biennial Extension Work Group meeting.
  - b. Providing hands-on demonstrations at state in-service training's conducted by NCRAC extension contacts as requested.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
  - a. Developing a Getting Started in Aquaculture interactive CD-ROM.
  - b. Developing a 4-H Leader's Guide for High School Youth (Aquaculture).

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			<b>USDA AWARD NO.</b> Year 1: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> LaDon Swann			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES (If Different)</b>		
<b>A. Salaries and Wages</b>			\$		
<b>CSREES FUNDED WORK MONTHS</b>					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
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>1</u> Prebaccalaureate Students . . . . .				\$2,190	
e. ___ Secretarial-Clerical . . . . .					
f. ___ Technical, Shop and Other . . . . .					
<b>Total Salaries and Wages</b> . . . . . →				\$2,190	
B. Fringe Benefits (If charged as Direct Costs)					
C. <b>Total Salaries, Wages, and Fringe Benefits</b> (A plus B) . . . . . →				\$2,190	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies				\$1,800	
F. Travel				\$1,300	
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 (\$50), Postage (\$510), Photocopying (\$350), Graphic design (\$50), CD duplication (\$250)				\$1,210	
J. <b>Total Direct Costs</b> (C through I) . . . . . →				\$6,500	
K. <b>Indirect Costs If Applicable</b> (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. <b>Total Direct and Indirect Costs</b> (J plus K) . . . . . →				\$6,500	
M. <b>Other</b> . . . . . →					
N. <b>Total Amount of This Request</b> . . . . . →				\$6,500	\$
O. <b>Cost Sharing</b> (If Required Provide Details)		\$4,070			

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

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

**BUDGET**

<b>ORGANIZATION AND ADDRESS</b> Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			<b>USDA AWARD NO.</b> Year 2: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
<b>PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S)</b> LaDon Swann			<b>FUNDS REQUESTED by PROPOSER</b>		
			<b>FUNDS APPROVED BY CSREES</b> (If Different)		
<b>A. Salaries and Wages</b>			<b>CSREES FUNDED WORK MONTHS</b>		
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. <u>1</u> Prebaccalaureate Students . . . . .					\$2,790
e. ___ Secretarial-Clerical . . . . .					
f. ___ Technical, Shop and Other . . . . .					
<b>Total Salaries and Wages</b> . . . . . →					\$2,790
<b>B. Fringe Benefits (If charged as Direct Costs)</b>					
<b>C. Total Salaries, Wages, and Fringe Benefits (A plus B)</b> . . . . . →					\$2,790
<b>D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)</b>					
<b>E. Materials and Supplies</b>					\$2,200
<b>F. Travel</b>					\$3,800
1. Domestic (Including Canada) . . . . .					
2. Foreign (List destination and amount for each trip.)					
<b>G. Publication Costs/Page Charges</b>					
<b>H. Computer (ADPE) Costs</b>					
<b>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 (\$50), Postage (\$810), Photocopying (\$350), Graphic design (\$50), CD duplication (\$250)</b>					\$1,510
<b>J. Total Direct Costs (C through I)</b> . . . . . →					\$10,300
<b>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.)</b>					
<b>L. Total Direct and Indirect Costs (J plus K)</b> . . . . . →					\$10,300
<b>M. Other</b> . . . . . →					
<b>N. Total Amount of This Request</b> . . . . . →					\$10,300
<b>O. Cost Sharing (If Required Provide Details)</b>			\$4,765		

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

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

## BUDGET JUSTIFICATION FOR PURDUE UNIVERSITY

(Swann)

### Objectives 1-4

- A. Salaries and Wages.** Total for Years 1 and 2: 831 hours @ \$6.00/hour for student help to prepare documents for AquaNIC and assist PI in the 4-H Leader's Guide for High School Youth (Aquaculture) and Getting Started in Aquaculture Interactive CD-ROM.
- E. Materials and Supplies.** General office supplies, binders, Web server phone line and software upgrades.
- F. Travel.** Transportation, lodging, and meal expenses to attend Extension/Research Work Group meetings and 4-H Leader's Guide for High School Youth (Aquaculture) workshop and committee meeting.
- I. All Other Direct Costs.** Year 1: telephone (\$50), postage (\$510), photocopying (\$350), graphic design (\$50), and CD duplication (\$250); Year 2: telephone (\$50), postage (\$810), photocopying (\$350), graphic design (\$50), and CD duplication (\$250).



**NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT**

Budget Summary for Each Participating Institution for the First Year

	<b>UW-Mil.</b>	<b>MSU</b>	<b>UMD</b>	<b>OSU</b>	<b>UNL</b>	<b>KSU</b>	<b>ISU</b>	<b>UMC</b>	<b>NDSU</b>	<b>Purdue</b>	<b>TOTALS</b>
Salaries and Wages	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$2,190	\$2,690
Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$125	\$0	\$125
Total Salaries, Wages, and Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$625	\$2,190	\$2,815
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$50	\$275	\$1,000	\$0	\$150	\$275	\$0	\$150	\$1,800	\$4,200
Travel	\$0	\$900	\$5,250	\$750	\$500	\$350	\$1,000	\$500	\$500	\$1,300	\$11,050
All Other Direct Costs	\$500	\$50	\$500	\$1,000	\$0	\$0	\$0	\$0	\$0	\$1,210	\$2,760
<b>TOTAL PROJECT COSTS</b>	\$500	\$1,000	\$6,025	\$2,750	\$500	\$500	\$1,275	\$500	\$1,275	\$6,500	\$20,825

**NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT**

Budget Summary for Each Participating Institution for the Second Year

	<b>UW-Mil.</b>	<b>MSU</b>	<b>UMD</b>	<b>OSU</b>	<b>UNL</b>	<b>KSU</b>	<b>ISU</b>	<b>UMC</b>	<b>NDSU</b>	<b>Purdue</b>	<b>TOTALS</b>
Salaries and Wages	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$500	\$2,790	\$3,290
Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$125	\$0	\$125
Total Salaries, Wages, and Fringe Benefits	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$625	\$2,790	\$3,415
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$50	\$300	\$500	\$0	\$150	\$300	\$0	\$150	\$2,200	\$4,150
Travel	\$0	\$900	\$750	\$1,250	\$500	\$350	\$500	\$500	\$500	\$3,800	\$9,050
All Other Direct Costs	\$500	\$50	\$0	\$1,000	\$0	\$0	\$0	\$0	\$0	\$1,510	\$2,560
<b>TOTAL PROJECT COSTS</b>	\$500	\$1,000	\$1,050	\$2,750	\$500	\$500	\$800	\$500	\$1,275	\$10,300	\$19,175

**RESOURCE COMMITMENT FROM INSTITUTIONS<sup>1</sup>**

<b>State/Institution</b>	<b>Year 1</b>	<b>Year 2</b>
<b>University of Wisconsin-Milwaukee</b>		
Salaries and Benefits: SY @ 0.20 FTE	\$14,148	\$15,562
<b>Michigan State University</b>		
Salaries and Benefits: SY @ 0.30 FTE	\$9,034	\$9,034
Waiver of Overhead	\$4,290	\$4,290
<b>Total</b>	<b>\$13,324</b>	<b>\$13,324</b>
<b>University of Minnesota-Duluth</b>		
Salaries and Benefits: SY @ 0.10 FTE	\$5,561	\$5,561
<b>Ohio State University</b>		
Salaries and Benefits: SY @ 0.04 FTE	\$2,416	\$2,416
Waiver of Overhead	\$1,035	\$1,035
<b>Total</b>	<b>\$3,451</b>	<b>\$3,451</b>
<b>University of Nebraska-Lincoln</b>		
Salaries and Benefits: SY @ 0.05 FTE	\$3,366	\$3,366
Supplies, Expenses, and Equipment	\$2,042	\$1,580
<b>Total</b>	<b>\$5,408</b>	<b>\$4,946</b>
<b>Iowa State University</b>		
Salaries and Benefits: SY @ 0.05 FTE	\$2,938	\$3,100
Waiver of Overhead	\$1,050	\$1,050
<b>Total</b>	<b>\$3,988</b>	<b>\$4,150</b>
<b>University of Missouri-Columbia</b>		
Salaries and Benefits: SY @ 0.05 in Year 1; 0.10 in Year 2	\$2,250	\$4,500
Waiver of Overhead	\$700	\$1,400
<b>Total</b>	<b>\$2,950</b>	<b>\$5,900</b>
<b>Purdue University</b>		
Salaries and Benefits: SY @ 0.05	\$1,985	\$2,085
Waiver of Overhead	\$2,085	\$2,680
<b>Total</b>	<b>\$4,070</b>	<b>\$4,765</b>
<b>Total per Year</b>	<b>\$52,900</b>	<b>\$57,659</b>
<b>GRAND TOTAL</b>	<b>\$110,559</b>	

<sup>1</sup>Because 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

**John N. Hochheimer**, Ohio State University

**Terrence B. Kayes**, University of Nebraska-Lincoln

**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

**Brian R. Stange**, North Dakota State University

**LaDon Swann**, Purdue University

## VITA

Fred P. Binkowski  
Center for Great Lakes Studies  
University of Wisconsin-Milwaukee  
600 E. Greenfield Avenue  
Milwaukee, WI 53204

Phone: (414) 382-1700  
Fax: (414) 382-1705  
E-mail: sturgeon@csd.uwm.edu

### EDUCATION

B.S. University of Wisconsin-Milwaukee, 1971  
M.S. University of Wisconsin-Milwaukee, 1974

### POSITIONS

Director (1993-present), Aquaculture Institute, University of Wisconsin System Great Lakes Research Facility  
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.
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- 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.
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- Binkowski, F.P., and S.I. Doroshov, editors. 1985. *Proceedings of North American sturgeons: biology and aquaculture potential*. Kluwer Academic Publications, Dordrecht, Netherlands.

## VITA

Donald L. Garling, Jr.  
Department of Fisheries and Wildlife  
Michigan State University  
9A Natural Resources Building  
East Lansing, MI 48824-1222

Phone: (517) 353-1989  
Fax: (517) 432-1699  
E-mail: garlingd@pilot.msu.edu

### EDUCATION

B.S. University of Dayton, 1970  
M.S. Eastern Kentucky University, 1972  
Ph.D. Mississippi State University, 1975

### 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  
Comparative Nutrition Society  
World Aquaculture Society

### SELECTED PUBLICATIONS

- Nichols, S.J., and D.L. Garling. 1996. Food habits of *Dreissena polymorpha* as compared to other freshwater bivalves. 6th International Zebra Mussel and Other Aquatic Nuisance Species Conference. Dearborn, Michigan, March 5-7 (abstract).
- Brown, P., K. Dabrowski, and D. Garling. 1995. Nutritional requirements and commercial diets for yellow perch. Pages 42-43 in P. Kestemont and K. Dabrowski, editors. Aquaculture of percids. Presses Universitaires De Namur (Vaasa, Finland).
- Cain, K.D., and D.L. Garling. 1995. Pretreatment of soy bean meal for salmonid diets with phytase to reduce phosphorus concentration in hatchery effluents. *Progressive Fish Culturist* 57:114-119.
- Nichols, S.J., T. Dietz, J. Lynn, H. Silverman, and D.L. Garling. 1995. Non-siphoning feeding behavior in zebra mussels, quagga mussels, and freshwater clams. 5th International Zebra Mussel and Other Aquatic Nuisance Species Conference. Toronto, Ontario, Canada, February 22-24 (abstract).

## VITA

Jeffrey L. Gunderson  
Minnesota Sea Grant Extension Program  
University of Minnesota-Duluth  
2305 E. 5th Street  
Duluth, MN 55812

Phone: (218) 726-8106  
Fax: (218) 726-6556  
E-mail: [jgunderson@mes.umn.edu](mailto:jgunderson@mes.umn.edu)

### EDUCATION

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

### POSITIONS

Assistant Specialist-Fisheries, Extension Education, and Associate Professor (1979 to present), University of Minnesota-Minnesota Extension Service and 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  
International Association for Great Lakes Research  
Minnesota Association of Extension Agents (President of the MACENRDP Section 1989-1990)  
Sea Grant Advisory Service Association -- Great Lakes Network

### SELECTED PUBLICATIONS

- McDonald, M., C. Richards, and J. Gunderson. 1993. Crayfish in Minnesota wild rice paddies. *In* Minnesota Wild Rice Research 1992. Miscellaneous Publication 78-1993, Minnesota Agricultural Experiment Station, St. Paul.
- Gunderson, J.L. 1993. Northern crayfish: An update. Minnesota Sea Grant Extension Publication.
- McDonald, M., P. DeVore, C. Richards, J. Skurla, and J. Gunderson. 1992. Economic and technologic developments for the crayfish industry in Minnesota. Natural Resources Research Institute Technical Report, Duluth, Minnesota.
- Gunderson, J.L., and A. Kapuscinski. 1992. Crayfish aquaculture demonstration in Minnesota wild rice paddies. Legislative Commission on Minnesota Resources Report.
- Gunderson, J.L., and G. Kreeg. 1991. Estimated economic impact of recreational fishing on Minnesota waters of Lake Superior. Minnesota Sea Grant Extension Publication.
- Gunderson, J.L. 1988. 1987-88 Charter fishing study: Minnesota waters of Lake Superior. Minnesota Sea Grant Research Report No. 27.

## VITA

John N. Hochheimer  
Piketon Research and Extension Center  
Ohio State University  
1864 Shyville Road  
Piketon, OH 45661

Phone: (614) 289-2071  
Fax: (614) 289-1953  
E-mail: hochheimer.1@osu.edu

### EDUCATION

B.S. West Virginia University, 1979  
M.S. University of Maryland, 1982  
Ph.D. University of Maryland, 1990

### POSITIONS

Research Associate (1996-present), Piketon Research and Extension Center, Ohio State University  
Faculty Research Assistant (1994-1996), Agricultural Engineering Department, University of Maryland  
Principle Engineer (1991-1994), Tetra Tech, Inc., Fairfax, Virginia  
Faculty Research Assistant (1990-1991), Horn Point Environmental Laboratories, Center for Environmental and Estuarine Studies, and Extension Specialist (1982-1990), Agricultural Engineering Department, University of Maryland

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society  
American Society of Agricultural Engineers  
Aquacultural Engineering Society  
World Aquaculture Society  
Sigma Xi

### SELECTED PUBLICATIONS

Hochheimer, J.N., and F.W. Wheaton. In press. Intensive culture of striped bass. Chapter 5 *in* R.M. Harrell, editor. Culture of striped bass and its hybrids. Elsevier Science Publishers, Amsterdam, Netherlands.

Hochheimer, J.N., and F.W. Wheaton. 1995. Ozone use in aquaculture. Aquacultural Engineering and Waste Management. Proceedings of the Aquacultural Expo VII and Aquaculture in the Mid-Atlantic Conference, Washington, D.C.

Wheaton, F.W., J.N. Hochheimer, G.E. Kaiser, and M.J. Krones. 1994. Nitrification filter principles. Chapter 4 *in* M. Timmons, editor. Engineering design and management of aquaculture water reuse systems. Elsevier Science Publishers, Amsterdam, Netherlands.



## VITA

Terrence B. Kayes  
Department of Forestry, Fisheries and Wildlife  
12 Plant Industry, East Campus  
University of Nebraska-Lincoln  
Lincoln, NE 68583-0814

Phone: (402) 472-8183  
Fax: (402) 472-2964  
E-mail: fofw023@unlvm.unl.edu

### EDUCATION

B.A. Chico State College, 1968  
M.A. California State University at Chico, 1972  
Ph.D. University of Wisconsin-Madison, 1978

### POSITIONS

Associate Professor (1990-present), Department of Forestry, Fisheries and Wildlife, University of Nebraska-Lincoln  
Assistant Director and Associate Scientist (1979-1990), University of Wisconsin Aquaculture Program, University of Wisconsin-Madison  
Project Biologist (1974-1979), Aquaculture Research Laboratory, University of Wisconsin-Madison  
EPA Trainee (1970-1972), Laboratory of Limnology, University of Wisconsin-Madison  
Instructor (1968-1970), Department of Biological Sciences, Chico State College

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society: Fish Culture, Bioengineering, Fish Health, Water Quality, and Early Life History Sections  
American Society of Zoologists: Divisions of Comparative Endocrinology, Comparative Physiology and Biochemistry, Ecology, and Comparative Immunology  
World Aquaculture Society

### SELECTED PUBLICATIONS

Kohler, C.C., R.J. Sheehan, C. Habicht, J.A. Malison, and T.B. Kayes. In press. Habituation to captivity and controlled spawning of white bass. *Transactions of the American Fisheries Society*.

Malison, J.A., L.S. Procarione, T.P. Barry, A.R. Kapuscinski, and T.B. Kayes. In press. Endocrine and gonadal changes during the annual reproductive cycle of the freshwater teleost, *Stizostedion vitreum* ("walleye"). *Fish Physiology and Biochemistry*.

Malison, J.A., T.B. Kayes, J.A. Held, T.P. Barry, and C.H. Amundson. In press. Manipulation of ploidy in yellow perch (*Perca flavescens*) by heat shock, hydrostatic pressure shock, and spermatozoa inactivation. *Aquaculture*.

## VITA

Ronald E. Kinnunen  
Michigan State University - Upper Peninsula  
702 Chippewa Square  
Marquette, MI 49855-4811

Phone: (906) 228-4830  
Fax: (906) 228-4572  
E-mail: kinnunen@msue.msu.edu

### EDUCATION

B.S. Michigan State University, 1976  
M.S. Michigan State University, 1979  
Ph.D. Michigan Technological University (in progress)

### 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

American Fisheries Society (Section: Fish Health)  
Michigan Association of Extension Agents  
National Association of Extension Agents  
Sea Grant Advisory Service Association

### SELECTED PUBLICATIONS

- Kinnunen, R.E. 1992. North Central Region 1990: Salmonid egg and fingerling purchase, production, and sales. Technical Bulletin Series #103. North Central Regional Aquaculture Center.
- Kinnunen, R.E., and E.M. Mahoney. 1989. 1987 Upper Michigan charter fishing study. Michigan Sea Grant Extension (MICHU-SG-89-501).
- Kinnunen, R., J. Lempke, and T. Sundstrom. 1987. Behavior patterns of divers visiting the Alger Underwater Preserve. Michigan Sea Grant Extension (MICHU-SG-87-505).
- Peterson, J., T. Sundstrom, and R. Kinnunen. 1987. 1986 Recreational diving activity in Michigan bottomland preserves. Michigan Sea Grant Extension (MICHU-SG-87-506).
- Kinnunen, R., and H. Johnson. 1986. Pathology of sea lamprey inflicted wounds on rainbow trout. Technical Report No. 48, Great Lakes Fishery Commission, Ann Arbor, Michigan.

## VITA

Charles D. Lee  
Department of Animal Science and Industry  
Kansas State University  
Call Hall  
Manhattan, KS 66506-1600

Phone: (913) 532-5734  
Fax: (913) 532-5681  
E-mail: clee@oz.oznet.ksu.edu

### EDUCATION

B.S. Kansas State University, 1975  
M.S. Kansas State University, 1988

### 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. In press. Walk-in hunting access program in Kansas. Proceedings of the National Extension Wildlife and Fisheries Workshop, Western Washington University, Bellingham.
- Lee, C.D. In press. Wildlife needs of the Southern Great Plains for the 1995 farm bill discussions. Transactions of North American Wildlife Conference.
- Lee, C.D. 1995. Wetland and riparian area project (9501). Environmental Protection Agency, Kansas City, Kansas.
- Lee, C.D. 1993. Status of the M-44 device. *In* R. Pierce and F.R. Henderson, editors. The Proceedings of the 11th Great Plains Wildlife Damage Control Workshop, Kansas City, Kansas.
- Lee, C.D. 1993. Wetland and riparian area project (9401). Environmental Protection Agency, Kansas City, Kansas.
- Lee, C.D. 1992. Kansas Playa Lakes project #3. North American Waterfowl Conservation Council.

## VITA

Joseph E. Morris  
Department of Animal Ecology  
Iowa State University  
124 Science II  
Ames, Iowa 50011-3221

Phone: (515) 294-4622  
Fax: (515) 294-7874  
E-mail: jemorris@iastate.edu

### EDUCATION

B.S. Iowa State University, 1979  
M.S. Texas A&M University, 1982  
Ph.D. Mississippi State University, 1988

### 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, Computer Users, and Fish Management Sections  
Iowa Aquaculture Association  
World Aquaculture Society  
Phi Kappa Phi  
Sigma Xi

### SELECTED PUBLICATIONS

- Bryan, M.D., J.E. Morris, and G.J. Atchison. 1994. Methods for culturing bluegill in the laboratory. *Progressive Fish-Culturist* 56:217-221.
- Morris, J.E., L.R. D'Abramo, and R.J. Muncy. 1990. An inexpensive marking technique to assess ingestion of artificial feeds by larval fish. *Progressive Fish-Culturist* 52:121-122.
- Bettoli, P.W., J.E. Morris, and R.L. Noble. 1991. Changes in the abundance of two atherinid species following vegetation removal. *Transactions of the American Fisheries Society* 120:90-97.

## VITA

Robert A. Pierce II  
School of Natural Resources  
University of Missouri-Columbia  
1-31 Agriculture Building  
Columbia, MO 65211

Phone: (573) 882-4337  
Fax: (573) 882-1977  
E-mail: Robert\_A.\_Pierce@muccmail.missouri.edu

### EDUCATION

B.S. Southern Arkansas University, 1977  
M.S. Mississippi State University, 1981

### 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

## VITA

Brian R. Stange  
Carrington Research Extension Center  
North Dakota State University  
Box 219  
Carrington, ND 58421

Phone: (701) 652-2951  
Fax: (701) 652-2055  
E-mail: brian@daktel.com

### EDUCATION

B.S. Humboldt State University, 1995

### POSITIONS

Director (1996 - present), Carrington Research Extension Center, North Dakota State University  
Fish Production/Water Quality Specialist (1995-1996), Fish Producers, Niland, California  
Wastewater Treatment Plant Operator (1994-1995), Elk River Wastewater Treatment Plant, Eureka, California  
Research Coordinator (Summers 1993 - 1995), and Research Assistant (Summers 1990 - 1992), Inyo County  
Water Department, Bishop, California  
Volunteer Research Assistant (Summer 1989), California Department of Fish and Game, Bishop, California

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

California Water Environment Association  
World Aquaculture Society

### SELECTED PUBLICATIONS

Stange, B.R. 1995. Effects of four selected soluble chloride salts on the germination of *Tamarix rammossima*.  
Bachelor's thesis. Humboldt State University, Arcata, California.

## VITA

LaDon Swann  
Department of Animal Science  
Purdue University  
1026 Poultry Building  
West Lafayette, IN 47907-1026

Phone: (317) 494-6264  
Fax: (317) 494-9347  
E-mail: lswann@ansc.purdue.edu

### EDUCATION

B.S. Tennessee Technological University, 1982  
M.S. Tennessee Technological University, 1985

### POSITIONS

Aquaculture Extension Specialist (1989-present), Illinois-Indiana Sea Grant  
Assistant Project Leader (1988-89), Non-Native Fish Research Lab, Boca Raton, Florida  
Aquaculture Trainer (1989), Peace Corps Stateside Training Program, University of South Carolina  
Farm Technician (1989), Fish Acres Tropical Fish Farm  
Aquaculture Extension Agent (1985-87), U.S. Peace Corps, Togo, West Africa  
Research and Teaching Assistant, (1982-85).

### SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Illinois Aquaculture Industry Association  
Indiana Aquaculture Association  
National Aquaculture Association  
National Association of State Aquaculture Coordinators  
PADI Diver  
World Aquaculture Society  
Beta Beta Beta, Gamma Sigma Delta, Sigma Xi

### SELECTED PUBLICATIONS

- Swann, D.L., J.E. Morris, J.R. Riepe, and D. Selock. 1995. Cage culture of fish in the North Central Region. NCRAC Technical Bulletin Series #110.
- Swann, L., and J.R. Riepe. 1995. Niche marketing your aquaculture products. NCRAC Technical Bulletin Series # 107.
- Swann, D.L., and G.L. Jensen. 1994. Accessing aquaculture information through the Aquaculture Network Information Center. Fact Sheet AS-492. Aquaculture Extension, Illinois-Indiana Sea Grant Program, Purdue University and the University of Illinois Cooperative Extension Services.
- Brown, P.B., M.R. White, D.L. Swann, and M.S. Fuller. 1993. A severe outbreak of ectoparasitism due to *Epistylis sp.* in pond-reared orconectid crayfish. *Journal of the World Aquaculture Society* 24:116-120.