

NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT

Chairperson: Joseph E. Morris, Iowa State University

Industry Advisory Council Liaison: Curtis Harrison, Hurdland, Missouri

Funding Request: \$219,280

Duration: 2 Years (September 1, 2005 - August 31, 2007)

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. Develop and implement aquaculture educational programs and materials for the North Central Region (NCR).

Proposed Budgets:

Institution	Principal Investigator(s)	Objective(s)	Year 1	Year 2	Total
University of Wisconsin-Milwaukee	Fred P. Binkowski	1 - 3	\$27,410	\$27,410	\$54,820
North Dakota State University	Mark E. Clark	1 & 2	\$1,000	\$1,000	\$2,000
Purdue University	Mark E. Einstein	2	\$5,500	\$5,500	\$11,000
Michigan State University	Donald L. Garling	1 & 2	\$1,000	\$1,000	\$2,000
University of Minnesota-Duluth	Jeffrey L. Gunderson	1 - 3	\$1,000	\$1,000	\$2,000
Michigan State University	Ronald E. Kinnunen	1 - 3	\$26,487	\$26,713	\$53,200
Kansas State University	Charles D. Lee	1 & 2	\$1,000	\$1,000	\$2,000
South Dakota State University	Jerry B. Mills	1 & 2	\$1,000	\$1,000	\$2,000
Iowa State University	Joseph E. Morris	1 - 3	\$21,525	\$7,735	\$29,260
University of Missouri-Columbia	Robert A. Pierce II	1 & 2	\$1,000	\$1,000	\$2,000
University of Illinois	Michael D. Plumer	1 & 2	\$1,000	\$1,000	\$2,000
Ohio State University	Laura G.Tiu	1 - 3	\$31,250	\$25,750	\$57,000
Totals			\$119,172	\$100,108	\$219,280

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JUSTIFICATION

In 2000 the National Marine Fisheries Service (NMFS) reported that world fishery production was almost 131 million metric tons (MT) (NMFS 2003). This equates to 28 kg per capita consumption of edible and industrial fishery products, 3% increase in 2001 compared to 2000. World fish harvests have risen significantly over the last two decades, increasing over 77%. If this trend continues it will result in a serious shortfall of fishery products in this century due to limited availability of many commercially caught species, e.g., haddock and cod.

A potential strategy to balance the shortfall is food production through aquaculture technology. Based on FAO's most recent data, 28% of the world's fish products are produced through aquaculture (FAO 1998). On a global basis aquaculture production has risen dramatically over the last decade. In 1987, aquaculture produced 13.5 million MT of fishery products whereas in 1996 this increased to 34.1 million MT (New 1999). World aquaculture production is currently 37.8 million MT (NMFS 2003). Given the current and future state of the capture fisheries, experts indicate that aquaculture technology would need to double by the year 2010 if the world's consumption of fishery products is to be maintained at 13 kg per person (FAO 1995). Currently, U.S. aquaculture produces 1.2% of the world's aquacultural production (NMFS 2003).

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 \$384 million and trout sales in the U.S. equaled \$66 million in 2003 (Harvey 2004). Total sales value of all aquaculture produced seafood products in the U.S. in 1990 was \$760 million, which represents a growth rate of 265% between 1980 and 1990.

As Americans became more health conscious, the demand for fisheries production increased; per capita consumption in the U.S. has grown from 5.7 kg in 1980 to 7.1 kg in 2002 (NMFS 2003). Aquaculture has proceeded to capture a larger percentage of the seafood market at the expense of the commercial harvests. It is estimated that aquaculture could supply approximately 25% of all the seafood consumed in the U.S. (Harvey 1994).

The U.S. imported over \$19.7 billion of seafood products (edible and nonedible) in 2002 versus \$11.7 billion exported for a trade deficit of \$8 billion (NMFS 2003). The U.S. now ranks as the third largest consumer of seafood in the world. A healthy U.S. aquaculture industry would reduce the need to import fish products and help improve the U.S. trade imbalance, a fact increasingly recognized in Washington. Given the high demand for fishery products, the premium value of aquaculture products, and the vast quantity of water resources in the North Central Region (NCR), a viable aquaculture industry utilizing these resources would have a substantial economic impact on the region and the entire United States. This region has approximately 25% of the country's population but produces less than 1% of the fish consumed.

Aquaculture-related business in the NCR has increased dramatically in the past several years and is on the verge of making a leap forward. This is evident in the interest in and the requests for information channeled through the U.S. Department of Agriculture (USDA) and the NCRAC Extension Work Group, 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 once they are proven to be economically feasible.

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

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

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

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

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

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

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

RELATED CURRENT AND PREVIOUS WORK

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

In spite of the limited number of aquaculture full-time equivalent positions (less than three) in this region, substantial progress on the previously described objectives has been made. Extension liaisons are evolved in several research projects, e.g., hybrid striped bass, nutrition, and yellow perch; they helped to improve the information transfer from research work groups to the public. Extension liaisons have also assisted with the planning, promotion, and implementation of the hybrid striped bass, walleye, and yellow

perch workshops held throughout the region. These workshops have included “hands-on” experiences, e.g., walleye, formal presentations, e.g., hybrid striped bass, as well as forum sessions whereby producers share their experience with other producers as well as extension specialists. They have also provided the NCRAC Economics and Marketing Work Group with information relevant to that group’s efforts to develop cost of production budgets and expected revenues for the commercial production of food-sized hybrid striped bass, walleye, and yellow perch in the NCR.

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

There have been workshops on general aquaculture, fish diseases, commercial recirculation systems, aquaculture business planning, crayfish culture, pond management, yellow perch and hybrid striped bass culture, rainbow trout production, in-service training for high school vocational-agricultural teachers, polyploid induction in sunfish, and organic aquaculture standards held in the region. These workshops have often been conducted using a combination of regional extension specialists and researchers as well as industry representatives. The Walleye Culture Manual has been the basis for two Walleye Culture Workshop, which were held in 1996. Gunderson, University of Minnesota-Duluth (UMD); Kinnunen, Michigan State University (MSU); and Morris, Iowa State University (ISU) were 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. The Sunfish Culture Guide has since been published since the last NCRAC Extension project; it details various facets of sunfish culture including, in part, their biology, culture, as well as their diseases.

Four North Central Regional Aquaculture Conferences have been held. The first in Kalamazoo, Michigan was held in March 1991, the second was held in February 1995 in Minneapolis, Minnesota, the third conference was held in Indianapolis, Indiana in February 1997, and the fourth was held in Columbia, Missouri in February 1999. These regional meetings were attended by hundreds of individuals including persons from Canada.

In addition to the previously mentioned areas, several NCRAC extension contacts have been instrumental in fostering the continued growth of the aquaculture industry in the region. For example, Pierce has created the Cooperative Extension Aquaculture and Marketing Educational Program to facilitate the development and implementation of aquaculture educational programs in Missouri. Tiu has also worked to revitalize the Ohio Aquaculture Association (OAA). Tiu has continued to coordinate monthly OAA board meetings and edit the OAA newsletter. Many NCRAC extension contacts have also worked with industry and governmental representatives to produce state aquaculture plans and improve governmental regulations. It is this interaction by extension contacts that the NCRAC Board of Directors wanted to support when they voted to increase funding support for NCRAC extension contacts in 1999, which continues through this proposal. The end result will be increased interaction between NCRAC extension contacts and their respective state aquaculture associations.

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

ANTICIPATED BENEFITS

There are several user groups that need to be served. First are the existing aquaculture industry members who need relevant information on new techniques and technologies in aquaculture as well as

upcoming concerns related to changing state and federal regulations. A second user group is a large number of individuals interested in aquaculture as a means of agriculture diversification. This group often requires an enormous amount of time to educate and can benefit most from the electronic media. The NCRAC Extension Work Group will continue to serve both groups while also expand its efforts to promote and advance commercial aquaculture in a responsible fashion through an organized education/training outreach program. The primary benefits are: increased public awareness through publications, short courses, and conferences regarding the potential of aquaculture as a viable agricultural enterprise in the NCR; technology transfer to enhance current and future production methodologies for selected species, e.g., hybrid striped bass, salmonids, sunfish, walleye, and yellow perch; improved lines of communication between interstate aquaculture extension specialists and associated industry contacts; and an enhanced legal and socioeconomic atmosphere for aquaculture in the NCR.

The development of aquaculture education programs for the NCR has provided "hands-on" opportunities for prospective and experienced producers. Approximately 5,000 individuals have attended workshops or conferences organized and delivered by the NCRAC Extension Work Group. Clientele attending regional workshops have gained information related to aquaculture development strategies in other areas of the country and acquired information which was of direct use to their own enterprises. Education programs also created situations where problems encountered by producers were expressed to extension personnel who later relayed them to researchers at NCRAC work group meetings for possible solutions through the research effort.

Fact sheets, technical bulletins, and videos have served to inform a variety of clients about numerous aquaculture practices for the NCR. For instance, "Making Plans for Commercial Aquaculture in the North Central Region," is often used to provide clients with initial information about aquaculture, while species-specific publications on walleye, trout, and catfish have been used in numerous regional meetings and have been requested by clients from throughout the United States. Publications on organizational structure for aquaculture businesses, transportation of fish in bags, and others are beneficial to both new and established aquaculturists.

In addition to the extension materials previously noted, a Web site, AquaNIC, was developed under earlier NCRAC Extension projects. AquaNIC houses over 8,000 electronic publications, images, slide sets, videos, and directories used by more than 60,000 stakeholders per year from 89 countries. The positive impact to the international aquaculture community is realized through continued accessibility to aquaculture information regardless of time or day of the week. Financial support for AquaNIC is provided by the Mississippi-Alabama Sea Grant Consortium, Auburn University, Illinois-Indiana Sea Grant College Program, the National Sea Grant College Program, and NCRAC. Specific advantages of the AquaNIC Web site include:

- ▶ Current and prospective producers use our Web sites as a source of reference (i.e., species and systems pages, Regional Aquaculture Center publications, directories, calendar of events).
- ▶ Employers will benefit from an increased pool of applicants for job openings.
- ▶ Customers seeking jobs will benefit from increased exposure by posting their résumés online.
- ▶ CES and Sea Grant educators will benefit from increased access to electronic media (i.e., photographs, slide sets, and publications) essential to developing outreach programs.
- ▶ All customers will benefit from the "gateway" or "portal" services provided by AquaNIC through decreased time searching for information (i.e., companies, universities involved in aquaculture, CES, and Sea Grant contacts, federal agencies, and other Web links to aquaculture information).

As with research programs, project outputs, and impact assessment and evaluation criteria are being used for extension activities. In fact, these criteria are noted in the following text. As the aquaculture industry develops in the NCR, such impacts will be measured directly. However, there continues to be a need for extension professionals to be able to address public inquires when there may not be an economic impact. For instance, potential aquaculturists being advised not to pursue specific activities which may cost them large sums of money; such impacts may be hard to document but nevertheless important to both the individual as well as for the aquaculture industry development.

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. Develop and Implement Aquaculture Education Programs and Materials for the NCR.

PROCEDURES

Strengthen Linkages (Objective 1)

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

Research Work Group	Extension Liaison(s)	State(s)
Baitfish	Jeffery L. Gunderson	MN
Economics/Marketing	Ronald E. Kinnunen	MI
Hybrid Striped Bass	Joseph E. Morris	IA
Nutrition	Donald L. Garling	MI
Salmonids	Ronald E. Kinnunen	MI
Sunfish	Joseph E. Morris	IA
Wastes Effluents	Fred P. Binkowski	WI
Yellow Perch	Donald L. Garling	MI

Enhance Extension Network (Objective 2)

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

AquaNIC Support (Einstein, Purdue University)

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

The Internet is now the first place people go for locating information. Enhancing NCRAC's Web site enables customers to easily find reliable accurate information. This is accomplished by updating and adding materials to the NCRAC Web site. Specifically, new or revised NCRAC publications, white papers and policies, NCRAC directory, and Annual Reports are added as they become available. The Calls for Statements of Interest are time sensitive so they are posted and removed in the appropriate time frame. Assistance is provided to post and link other Web sites that satisfy other funded project objectives, e.g., the "State Importation and Transportation Requirements for Cultured Aquatic Animals" site (Extension Project #9). The NCRAC Web site's home page is updated and links are added as per request by the NCRAC administrative staff in a timely fashion.

Develop and Implement Aquaculture Education Programs and Materials for the NCR (Objective 3)

NCRAC Project Review (Kinnunen, MSU, and Binkowski, University of Wisconsin-Milwaukee)

- Plan: PIs will review the results of previous NCRAC projects to identify significant and useful technical information or results that could be developed into several extension fact sheets. PIs will correspond and interact with current and past extension liaisons and researchers to review more detailed information than is present in NCRAC annual progress, termination reports or compendium reports. Review of the past NCRAC projects will be partitioned between the PI's based on their past degree of involvement with the projects. Kinnunen will review the four salmonid projects (1990-2001), the seven walleye projects (1989-2003), the walleye and sunfish marketing project (4th Economics and Marketing project 1999-2002), and the five aquaculture drug (1996-2005) and two INAD projects (1993-2005). Binkowski will review the eight yellow perch projects (1989-2004), the three waste and effluent projects (1992-2004), the seven hybrid striped bass projects (1989-2004), the five sunfish projects (1990-2003), the economics and marketing projects, the tilapia, the crayfish, and the baitfish project. Criteria for selection of information generated by past activities as material for fact sheet development will include:
 - Is there information relevant to current needs and priorities as set out in NCRAC white papers?.
 - Is it relevant to current industry needs based on the practical experience and interaction of the extension specialists with the industry?
 - Is it relevant for industry application based on interview or opinion of the former investigators?
 - Will it have greater potential utility to regional aquaculturists if packaged in less technical jargon?
 - Is it only currently available in technical reports or journals of limited distribution and generally unavailable to non-academic readers?
 - Does it include useful summary data in tables or graphic form that was omitted from annual reports due to considerations of brevity?

This recovered information will be packaged into more readily understandable and useful format as extension fact sheets to improve the transfer of technical information to regional aquaculturists. Because the past projects were designed to address regional priorities and interests, the fact sheets developed from this effort will have definite regional interest and will reflect priorities address in NCRAC white papers.

- Project outputs: It is anticipated that following the initial review of past projects 3-5 draft fact sheets will be developed and subsequently submitted for publication through NCRAC publication funds.
- Impact assessment and evaluation: The evaluation of the impact of this material will be assessed through the demand for the fact sheets and incidents of application of the results though follow-up survey of individuals receiving the fact sheets as to how the information may have influenced their decisions regarding their own operations.

Use of technology to enhance aquaculture information transfer (Tiu, Ohio State University)

- Plan: This project will be regional in nature but national or international in scope as the outputs will be available on the Internet. In the NCR, most farmers are digging ponds that are, on average, about

0.40-ha (1-acre) in size. Most of the current information available on pond construction is based on catfish ponds and is in the form of a fact sheet. By using technology, clients would get to see, through the use of streaming video, the actual steps involved in constructing aquaculture ponds in the NCR. Similarly, an interested individual could be electronically walked through the steps of producing both yellow perch and freshwater shrimp in the NCR. Information on both of these species is in demand in this region. There will also be included a segment on pond fertilization techniques for the farmer, another popular topic.

- **Project Outputs:** The aquaculture research and extension specialists at the Ohio Center for Aquaculture Development will develop a step-by-step process highlighting critical components for the following topics: How to raise freshwater shrimp, how to raise yellow perch, how to build an aquaculture pond, how to collect and analyze water quality and pond fertilization for the farmer. On-going research projects addressing these topics will be recorded using a digital camera. Working with the technology specialist at the Ohio State University (OSU) South Centers, the footage will be edited to fit the process delineated by the aquaculture specialists. Streaming video will then be posted to a Web site, linked to the NCRAC homepage, where it can be viewed by the public. It is anticipated that each on-line instructional topic will contain around twenty 3-5 minute streaming video segments. Clients will be able to view streaming video segments on the five instructional areas (perch culture, shrimp culture, pond construction, water quality, and pond fertilization) on-line, and access links to additional supporting information.
- **Impact Assessments and Evaluation:** An electronic pre-test will be required before accessing the streaming videos. It will be a short assessment of demographic data and prior knowledge of topic and use of streaming video. This will enable us to track who is using the information and how they like this method of information dissemination. A post-test will also be included on the site with an incentive built in to encourage completion. This will enable us to determine impact.

Aquatic Invasive Species-Hazard Analysis Critical Control Point Training (AIS-HACCP) (Kinnunen, MSU)

- **Plan:** Eight of the twelve extension representatives from the NCRAC Extension Technical Committee will participate in the Train-the-Trainer course for AIS-HACCP and they will later coordinate training for clientele in their respective states. Kinnunen and Gunderson will conduct the Train-the-Trainer course the day before the annual NCRAC program planning meeting and thus save on travel costs for this initial training.
- **Project Outputs:** Aquaculture/baitfish clientele in the eight states will be trained in AIS-HACCP principles and they will receive a certificate upon course completion.
- **Impact Assessment and Evaluation:** Formal course evaluation will be completed for each session.

Michigan Aquaculture Association Annual Conference (Kinnunen, MSU)

- **Plan:** Aquaculture industry clientele from Michigan and surrounding states will attend. Participants will include speakers and aquaculture clientele from the NCR. Some of the Conference topics will be based on aquaculture industry information needs garnered from the Aquaculture Regional Extension Facilitator (AREF) Project.
- **Project Outputs:** Annual conference will be conducted each winter in 2006 and 2007.
- **Impact Assessment and Evaluation:** Formal course evaluation will be completed for each session.

Regional Workshops on Aquaculture Basics (Binkowski, UW-Milwaukee and Morris, ISU)

- **Plan:** Binkowski will organize and present an initial general workshop concerning a variety of basic aquacultural topic information patterned after those have been presented in the past at various locations in Wisconsin. Binkowski will coordinate the logistics of these workshops, initially at a northern sector site within the NCR. The workshop will include approximately eight presentations of

basic aquaculture information on topics such as: aquatic animal husbandry, water chemistry, rearing methods and species choices, environmental issues and planning for developing or starting regional aquaculture operations, etc. The schedule of the workshop will be arranged to provide extended periods for facilitated question and answer sessions. Audience participants will be asked to submit questions in advance that can then be presented to the expert presenters by the facilitator. Subsequent to their presentations the participants will again be given the opportunity to meet with the presenters in a less formal setting for continued face to face discussion and questioning of the presenters. In addition to coordinating the logistics of this workshop PIs will personally prepare and give the presentations for approximately three of these topical areas, with the remainder being presented by other cooperating NCRAC extension specialists and University of Wisconsin-Milwaukee's WATER Institute staff (to be determined). Following this initial workshop PIs will participate cooperatively, offering to make approximately three topical presentations at a second general workshop coordinated by Morris at a site in either Missouri or Iowa.

- Project Outputs: One-day workshops, repeated at two different regional locations during the project period, and associated handout and reference materials relevant to these workshops.
- Impact Assessment and Evaluation: Exit surveys will be used to evaluate the impact of the workshop on participants. Results from the survey of the initial workshop will be used to provide advice for improvement in content and presentation of subsequent workshops. Efforts to contact individuals based on survey results and track their progress in establishing commercial operations will continue until the end of this project.

Specialized Workshops on Intensive Tank Culture - Eggs to Fingerlings (Binkowski, UW -Milwaukee)

- Plan: As a cooperative effort with an additional extension specialist, Binkowski will organize and prepare a specialized workshop on indoor tank based early life history rearing techniques for commercial rearing of fingerlings from eggs. Specifically, techniques of transitional green tank and live foods for habituating fish to formulated diets will be presented. This workshop will present early life history rearing technical information on pertinent topics including:
 - Techniques for artificial fertilization and egg incubation.
 - Aspects of the physical setup requirements, lighting, proper flows, mesh sizing of screens, etc.; larval diets and feeding procedures to gradually habituate larvae from live foods to formulated diets.
 - Methods used to monitor and evaluate feeding behavior, growth and developmental changes.
 - Estimating costs of intensive indoor rearing.
 - Information would be gathered and presented concerning current advances and research needs for developing larval fish first feeding diets.

The limited enrollment in this workshop serves to maximize one-to-one contact between the presenters and the participants, and to provide opportunity for the participants to have hands-on experience with these techniques. In addition, the presented information can be applicable to other aquaculture species in the NCR.

- Project Outputs: Two 1- to 2-day workshops attended by interested regional aquaculturists that will provide opportunity for hands-on experience with these techniques. Handouts and reference materials on the topics used for the workshop will be developed into a manual or guide/workbook on early life history rearing.
- Impact Assessment and Evaluation: Exit surveys of workshop attendees and incidence of adoption of these techniques by participants will be used for assessment and evaluation. PIs will continue to track the progress of select individuals that provide detailed information on their commercial operation. With this on-going updating of their progress PIs plan to develop "case study" examples, which could include information on construction, business plans, technology, production and cost profit analysis.

Predator Management (Morris, ISU)

- Plan: Morris and Jim Pease, ISU Wildlife Specialist, will produce and maintain a Web site, including information about alternatives in wildlife damage management on fish production facilities and agency contacts, USDA-Animal and Plant Health Inspection Service (USDA-APHIS) and natural resource agencies.
- Project Outputs: Web site linked to the NCRAC Web site.
- Impact Assessment and Evaluation: Number of contacts as well as input mechanism by clients as to Web site content and direction. Follow-up surveys will be conducted with willing participants to determine impacts and possible improvements of the Web site.

Aquatic Vegetation Management (Morris, ISU)

- Plan: Morris will survey regional as well as national extension publications related to aquatic vegetation management issues. Effort will be made to address aquatic vegetation materials specifically related to aquaculture ponds.
- Project Outputs: Video stream information will be produced to guide regional aquaculturists in managing aquatic vegetation in aquaculture ponds. PI will contact OSU personnel for guidance in the development of the video stream information. In addition staff associated with the Predator Management component of this proposal will be asked to assist in producing the needed materials for this exercise.
- Impact Assessment and Evaluation: Upon final distribution, evaluation forms will be provided to regional extension specialists to allow for a review of the items covered as well as suggestions for future outputs.

REFERENCES

- FAO (Food and Agriculture Organization). 1995. The state of world fisheries and aquaculture. Food and Agriculture Organization of the United Nations, Rome, Italy.
- FAO (Food and Agriculture Organization). 1998. Aquaculture production statistics: 1987-1996. FAO Fisheries Circular No. 815, Revision 10. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Harvey, D. 1994. Aquaculture: situation and outlook report. U.S. Department of Agriculture, Economic Research Service, AQS-12, Washington, D.C.
- Harvey, D. 2004. Aquaculture outlook. U.S. Department of Agriculture, Economic Research Service, LDP-AQS-19, Washington, D.C.
- New, M.B. 1999. Global aquaculture: current trends and challenges for the 21st century. World Aquaculture 30(1):8-13, 63-79.
- NMFS (National Marine Fisheries Service). 2003. Current fishery statistics no. 2002: fisheries of the United States, 2002. U.S. Department of Commerce, National Oceanographic Atmospheric Association, National Marine Fisheries Service, Silver Springs, Maryland.

PROJECT LEADERS

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

PARTICIPATING INSTITUTIONS AND PRINCIPAL INVESTIGATORS

University of Wisconsin-Milwaukee (UW-Milwaukee)

Fred P. Binkowski

North Dakota State University (NDSU)

Mark E. Clark

Purdue University (Purdue)

Mark E. Einstein

Michigan State University (MSU)

Donald L. Garling

University of Minnesota-Duluth (UMD)

Jeffrey L. Gunderson

Michigan State University (MSU)

Ronald E. Kinnunen

Kansas State University (KSU)

Charles D. Lee

South Dakota State University (SDSU)

Jerry B. Mills

Iowa State University (ISU)

Joseph E. Morris

University of Missouri-Columbia (UMC)

Robert A. Pierce II

University of Illinois (UI)

Michael D. Plumer

Ohio State University (OSU)

Laura G. Tiu

PROPOSED ACTIVITIES FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - b. Assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Yellow Perch Work Group.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Wisconsin to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Wisconsin.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Develop and implement aquaculture educational programs and materials for the NCR.
 - a. Participation in the NCRAC Project Review project.
 - b. Development and participation in regional aquaculture workshops on aquaculture basics.
 - c. Development and participation in specialized workshops on intensive tank culture.

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

OMB Approved 0524-0039
Expires 03/31/2004

BUDGET

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 1: Objectives 1- 3			
PROJECT DIRECTOR(S) Fred P. Binkowski			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . .						
b. <u>1</u> Other Professionals			4			\$14,000
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$14,000
B. Fringe Benefits (If charged as Direct Costs)						\$4,760
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$18,760
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$3,650
F. Travel						\$4,900
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$100
K. Total Direct Costs (C through I)						\$27,410
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)						\$27,410
N. Other						
O. Total Amount of This Request						\$27,410
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.
Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 2: Objectives 1- 3			
PROJECT DIRECTOR(S) Fred P. Binkowski			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . . b. <u>1</u> Other Professionals			4			\$14,000
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$14,000
B. Fringe Benefits (If charged as Direct Costs)						\$4,760
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$18,760
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$3,650
F. Travel						\$4,900
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$100
K. Total Direct Costs (C through I)						\$27,410
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)						\$27,410
N. Other						
O. Total Amount of This Request						\$27,410
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)			DATE
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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BUDGET EXPLANATION FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Objectives 1 - 3

- A. Salaries and Wages.** Annual costs: Academic Staff for 4.0 months to assist in development of technical fact sheets, developing, organizing, coordinating, and presenting regional aquaculture workshops.
- B. Fringe Benefits.** Annual costs: The fringe benefit rate for Academic Staff at the University of Wisconsin-Milwaukee is 34%.
- E. Materials and Supplies.** Annual costs: general office supplies including paper, pens, pencils, ink cartridges, toner, staples, file folders, erasers, tape, and mailing supplies.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Wisconsin Aquaculture Association at a location to be determined by the aquaculture association (\$750); transportation, lodging, and meal expenses for Academic Staff and PI for travel to interact with and interview researcher and industry representatives associated with NCRAC-supported research projects (\$1,500); transportation, lodging, and meal expenses for Academic Staff and PI and other associated University of Wisconsin Great Lakes WATER Institute staff to lead and participate in a 1-day regional aquaculture workshop focusing on basic aquaculture at a northern sector location of the NCR (\$1,750); and transportation, lodging, and meal expenses for Academic Staff and PI and other associated University of Wisconsin Great Lakes WATER Institute staff to lead and participate in a specialized aquaculture workshop on early life history intensive aquaculture technology at a location to be determined (\$900).
- J. All Other Direct Costs.** Annual costs: telephone (\$75) and fax (\$25).

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Clark)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Biological Sciences North Dakota State University 119 Stevens Hall, Fargo, ND 58105-5517			USDA AWARD NO. Year 1: Objectives 1 & 2			
PROJECT DIRECTOR(S) Mark E. Clark			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ... b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$250			
F. Travel			\$750			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →			\$1,000	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$1,000	0	\$0	\$0
N. Other						
O. Total Amount of This Request →			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable) Federal Funds: \$			Non-Federal funds: \$		Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Biological Sciences North Dakota State University 119 Stevens Hall, Fargo, ND 58105-5517			USDA AWARD NO. Year 2: Objectives 1 & 2			
PROJECT DIRECTOR(S) Mark E. Clark			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates ...						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$250			
F. Travel			\$750			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →			\$1,000	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$1,000	0	\$0	\$0
N. Other →						
O. Total Amount of This Request →			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party) →						
Non-Cash Contributions (both Applicant and Third Party) →						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR NORTH DAKOTA STATE UNIVERSITY

(Clark)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the North Dakota State Aquaculture Association at a location to be determined by the aquaculture association as well as travel to NDSU's off-campus aquaculture facility in Carrington and the primary aquaculture/hatchery facilities in North Dakota (including federal, tribal, and private facilities).

PROPOSED ACTIVITIES FOR PURDUE UNIVERSITY

(Einstein)

Major Actions for Each Objective

2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Managing the AquaNIC and NCRAC Web sites located at Purdue University.

BUDGET

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 1: Objective 2				
PROJECT DIRECTOR(S) Mark E. Einstein			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
a. ____ (Co)-PD(s)							
b. ____ Senior Associates							
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . . b. ____ Other Professionals							
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. ____ Prebaccalaureate Students							
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages						\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)							
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0	0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						\$3,500	
F. Travel						\$2,000	
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs							
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)							
K. Total Direct Costs (C through I)						\$5,500	0
L. F&A/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.)							
M. Total Direct and F&A/Indirect Costs (J plus K)						\$5,500	0
N. Other							
O. Total Amount of This Request						\$5,500	0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O) Cash (both Applicant and Third Party)							
Non-Cash Contributions (both Applicant and Third Party)							
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE		
Project Director							
Authorized Organizational Representative							
Signature (for optional use)							

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 2: Objective 2			
PROJECT DIRECTOR(S) Mark E. Einstein			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . . b. ____ Other Professionals c. ____ Paraprofessionals d. ____ Graduate Students e. ____ Prebaccalaureate Students f. ____ Secretarial-Clerical g. ____ Technical, Shop and Other Total Salaries and Wages →						
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$3,500			
F. Travel			\$2,000			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →			\$5,500	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$5,500	0	\$0	\$0
N. Other →						
O. Total Amount of This Request →			\$5,500	0	\$0	\$0
P. Carryover -- (If Applicable) Federal Funds: \$			Non-Federal funds: \$		Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O) Cash (both Applicant and Third Party) → Non-Cash Contributions (both Applicant and Third Party) →						
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)			DATE
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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BUDGET EXPLANATION FOR PURDUE UNIVERSITY

(Einstein)

Objective 2

- E. Materials and Supplies.** Annual costs: software licenses, e.g., Ultraseek Search and Webtrend log analyzer (\$2,000) and hardware replacement, e.g., hard drives and media (\$1,500).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to visit with LaDon Swann (Mississippi/Alabama Sea Grant) to discuss AquaNIC programming issues.

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 Nutrition 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 Nutrition Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending up to one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Three or more trips per year to Michigan aquaculture facilities to assist producers in problem solving or to assist individuals in their planning for commercial aquaculture development.
 - c. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 1: Objectives 1 & 2						
			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	Funds Requested by Proposer	Funds Approved by CSREES (If different)	
PROJECT DIRECTOR(S) Donald L. Garling									
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS						
			Calendar	Academic	Summer				
a. ____ (Co)-PD(s)									
b. ____ Senior Associates									
2. No. of Other Personnel (Non-Faculty)									
a. ____ Research Associates-Postdoctorates ...									
b. ____ Other Professionals									
c. ____ Paraprofessionals									
d. ____ Graduate Students									
e. ____ Prebaccalaureate Students									
f. ____ Secretarial-Clerical									
g. ____ Technical, Shop and Other									
Total Salaries and Wages →					\$0	\$0	\$0	\$0	
B. Fringe Benefits (If charged as Direct Costs)									
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					\$0	0	\$0	\$0	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies					\$250				
F. Travel					\$500				
G. Publication Costs/Page Charges									
H. Computer (ADPE) Costs									
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)									
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)					\$250				
K. Total Direct Costs (C through I) →					\$1,000	0	\$0	\$0	
L. F&A/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.)									
M. Total Direct and F&A/Indirect Costs (J plus K) →					\$1,000	0	\$0	\$0	
N. Other →									
O. Total Amount of This Request →					\$1,000	0	\$0	\$0	
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$				
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)									
Cash (both Applicant and Third Party) →									
Non-Cash Contributions (both Applicant and Third Party) →									
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)				DATE		
Project Director									
Authorized Organizational Representative									
Signature (for optional use)									

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 2: Objectives 1 & 2						
			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	Funds Requested by Proposer	Funds Approved by CSREES (If different)	
PROJECT DIRECTOR(S) Donald L. Garling									
A. Salaries and Wages			CSREES FUNDED WORK MONTHS						
1. No. of Senior Personnel			Calendar	Academic	Summer				
a. ____ (Co)-PD(s)									
b. ____ Senior Associates									
2. No. of Other Personnel (Non-Faculty)									
a. ____ Research Associates-Postdoctorates ...									
b. ____ Other Professionals									
c. ____ Paraprofessionals									
d. ____ Graduate Students									
e. ____ Prebaccalaureate Students									
f. ____ Secretarial-Clerical									
g. ____ Technical, Shop and Other									
Total Salaries and Wages →						\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)									
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies						\$250			
F. Travel						\$500			
G. Publication Costs/Page Charges									
H. Computer (ADPE) Costs									
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)									
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$250			
K. Total Direct Costs (C through I) →						\$1,000	0	\$0	\$0
L. F&A/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.)									
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$1,000	0	\$0	\$0
N. Other →									
O. Total Amount of This Request →						\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$				
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)									
Cash (both Applicant and Third Party) →									
Non-Cash Contributions (both Applicant and Third Party) →									
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)						DATE
Project Director									
Authorized Organizational Representative									
Signature (for optional use)									

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Garling)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 2-day annual meeting of the Michigan Aquaculture Association at a location to be determined by the aquaculture association as well as to attend up to one out-of-state aquaculture association meeting per year, and three or more trips per year to Michigan aquaculture facilities to assist producers in problem solving or to assist individuals in their planning for commercial aquaculture development.
- J. All Other Direct Costs.** Annual costs: postage (\$100) and telephone (\$150).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Minnesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			USDA AWARD NO. Year 1: Objectives 1-3			
PROJECT DIRECTOR(S) Jeffrey L. Gunderson			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates . . . b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B)			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$250			
F. Travel			\$750			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I)				0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)			\$0	0	\$0	\$0
N. Other						
O. Total Amount of This Request			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O) Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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 Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Minnesota Sea Grant Extension Program University of Minnesota-Duluth Duluth, MN 55812			USDA AWARD NO. Year 2: Objectives 1-3			
PROJECT DIRECTOR(S) Jeffrey L. Gunderson			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$0
B. Fringe Benefits (If charged as Direct Costs)						\$0
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$250
F. Travel						\$750
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I)						\$1,000
L. F&A/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.)						0
M. Total Direct and F&A/Indirect Costs (J plus K)						\$0
N. Other						
O. Total Amount of This Request						\$1,000
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

BUDGET EXPLANATION FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Objectives 1-3

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to disseminate results of his work on hornyhead chub aquaculture to the aquaculture industry via workshops conducted by the PI at locations to be determined. The PI has written a technical report, a fact sheet, and developed a spreadsheet model to assess the economic viability of hornyhead chub aquaculture. The economic model and a users guide has been placed on a CD for distribution.

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Salmonid Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Walleye Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Attend Annual Great Lakes Fish Disease Control Committee meetings as NCRAC representative.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - f. Compile aquaculture extension information for use by Great Lakes Sea Grant agents and CES personnel.
3. Develop and implement aquaculture educational programs and materials for the NCR.
 - a. Participation in the NCRAC Project Review project.
 - b. Conduct the Train-the-Trainer courses in eight training sessions for AIS-HACCP.
 - c. Facilitate/coordinate the 2006 and 2007 annual meetings of the Michigan Aquaculture Association.

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Michigan Sea Grant Michigan State University 710 Chippewa Square, Suite 202, Marquette, MI 49855			USDA AWARD NO. Year 1: Objectives 1- 3			
PROJECT DIRECTOR(S) Ronald E. Kinnunen			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. <u>1</u> (Co)-PD(s)			0.9			\$5,174
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ... b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →						\$5,174
B. Fringe Benefits (If charged as Direct Costs)						\$1,713
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$6,887
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$9,050
F. Travel						\$10,300
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$250
K. Total Direct Costs (C through I) →						\$26,487
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$26,487
N. Other						
O. Total Amount of This Request →						\$26,487
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)			DATE
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.
 Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Michigan Sea Grant Michigan State University 710 Chippewa Square, Suite 202, Marquette, MI 49855			USDA AWARD NO. Year 2: Objectives 1- 3			
PROJECT DIRECTOR(S) Ronald E. Kinnunen			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. <u>1</u> (Co)-PD(s)			0.9			\$5,300
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ...						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →						\$5,300
B. Fringe Benefits (If charged as Direct Costs)						\$1,813
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$7,113
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$9,050
F. Travel						\$10,300
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$250
K. Total Direct Costs (C through I) →						\$26,713
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$26,713
N. Other						
O. Total Amount of This Request →						\$26,713
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Objectives 1-3

- A. **Salaries and Wages.** Annual costs: 7.5% of PI's salary.
- B. **Fringe Benefits.** Year 1: the fringe benefit rate is 33.1%. Year 2: the fringe benefit rate will be 34.2%.
- E. **Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers (\$250); 350 AIS-HACCP training packages at a cost of \$25 each to include a manual (\$10), video (\$5), CD (\$5), fact sheets and folder (\$5) (\$8,750); and educational materials for the annual conference (\$50).
- F. **Travel.** Annual costs: transportation, lodging, and meal expenses to attend and facilitate/coordinate a 2-day annual meeting of the Michigan Aquaculture Association at a location to be determined by the aquaculture association (\$750); transportation, lodging, and meal expenses for PI for travel to interact with and interview researcher and industry representatives associated with NCRAC-supported research projects (\$1,750); transportation, lodging, and meal expenses for the state extension specialist (\$500) and PI (\$850) for each AIS-HACCP training session, four sessions per year (\$5,400); and transportation, lodging, and meal expenses for three speakers from the NCR (\$800 each) to make presentation at the 2-day annual meeting of Michigan Aquaculture Association (\$2,400).
- J. **All Other Direct Costs.** Annual costs: telephone (\$185) and fax (\$65).

PROPOSED ACTIVITIES FOR KANSAS STATE UNIVERSITY

(Lee)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			USDA AWARD NO. Year 1: Objectives 1 & 2			
PROJECT DIRECTOR(S) Charles D. Lee			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$0
B. Fringe Benefits (If charged as Direct Costs)						\$0
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$300
F. Travel						\$600
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$100
K. Total Direct Costs (C through I)						\$1,000
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)						\$1,000
N. Other						
O. Total Amount of This Request						\$1,000
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.
 Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Animal Science and Industry Kansas State University Manhattan, KS 66506-1600			USDA AWARD NO. Year 2: Objectives 1 & 2			
PROJECT DIRECTOR(S) Charles D. Lee			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$0
B. Fringe Benefits (If charged as Direct Costs)						\$0
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$300
F. Travel						\$600
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$100
K. Total Direct Costs (C through I)						\$1,000
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)						\$1,000
N. Other						
O. Total Amount of This Request						\$1,000
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR KANSAS STATE UNIVERSITY

(Lee)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Kansas Aquaculture Association at a location to be determined by the aquaculture association and one additional state aquaculture meeting.
- J. All Other Direct Costs.** Annual costs: telephone charges.

PROPOSED ACTIVITIES FOR SOUTH DAKOTA STATE UNIVERSITY

(Mills)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS South Dakota State University Grants Administration P.O. Box 2201, Brookings, SD 57007			USDA AWARD NO. Year 1: Objectives 1 & 2			
PROJECT DIRECTOR(S) Jerry B. Mills			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages						\$0
B. Fringe Benefits (If charged as Direct Costs)						\$0
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$250
F. Travel						\$750
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I)						\$1,000
L. F&A/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.)						0
M. Total Direct and F&A/Indirect Costs (J plus K)						\$0
N. Other						
O. Total Amount of This Request						\$1,000
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS South Dakota State University Grants Administration P.O. Box 2201, Brookings, SD 57007			USDA AWARD NO. Year 2: Objectives 1 & 2			
PROJECT DIRECTOR(S) Jerry B. Mills			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates . . .						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B)			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$250			
F. Travel			\$750			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I)			\$1,000	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K)			\$1,000	0	\$0	\$0
N. Other						
O. Total Amount of This Request			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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 Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR SOUTH DAKOTA STATE UNIVERSITY

(Mills)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the South Dakota Aquaculture Association at a location to be determined by the aquaculture association as well as additional transportation, lodging, and meal expenses in support of extension activities related to South Dakota aquaculture.

PROPOSED ACTIVITIES FOR IOWA STATE UNIVERSITY

(Morris)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Sunfish Work Groups and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Hybrid Striped Bass Work Groups and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Sunfish, Hybrid Striped Bass, and Walleye Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 15 copies of aquaculture extension related materials produced in Iowa for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Iowa.
 - e. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - f. Providing support to Purdue University for AquaNIC and NCRAC Web site.
3. Develop and implement aquaculture educational programs and materials for the NCR.
 - a. Participation in the basic aquaculture workshop series and will host one workshop at ISU in fall 2007.
 - b. Work with Jim Pease, ISU Wildlife Specialist, to develop Web site on predator management.
 3. Develop a video stream segment on aquatic vegetation management for aquaculture facilities.

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Natural Resource Ecology and Management Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 1: Objectives 1- 3			
PROJECT DIRECTOR(S) Joseph E. Morris			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ...						
b. <u>2</u> Other Professionals			3.4			\$9,425
c. ____ Paraprofessionals						
d. <u>1</u> Graduate Students						\$6,650
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →						\$16,075
B. Fringe Benefits (If charged as Direct Costs)						\$3,674
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$19,749
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$1,176
F. Travel						\$600
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through J) →						\$21,525
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$21,525
N. Other						
O. Total Amount of This Request →						\$21,525
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.
 Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Department of Natural Resource Ecology and Management Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 2: Objectives 1- 3			
PROJECT DIRECTOR(S) Joseph E. Morris			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ... b. <u>1</u> Other Professionals			1.4			\$3,825
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →						\$3,825
B. Fringe Benefits (If charged as Direct Costs)						\$1,186
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$5,011
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$826
F. Travel						\$1,898
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →						\$7,735
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$7,735
N. Other						
O. Total Amount of This Request →						\$7,735
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039. The time required to complete this information collection is estimated to average 1.00 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing the collection of information.

Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR IOWA STATE UNIVERSITY

(Morris)

Objectives 1 - 3

- A. Salaries and Wages.** Year 1: Four months salary for graduate student to assist PIs in developing Web site on predator management (\$6,650). Two months salary for research/extension associate to assist Morris in the video needed for an aquatic vegetation component of this project as well hosting one workshop on aquaculture basics (\$5,600). In addition, 1.4 months salary for a computer specialist to design and maintain web site for the 2-year project (\$3,825). Year 2: 1.4 months for a computer specialist to design and maintain Web site for the 2-year project (\$3,825).
- B. Fringe Benefits.** Annual costs: ISU's fringe benefit rate for graduate students is 11.3% and for professional staff it is 31%.
- E. Materials and Supplies.** Year 1: general office supplies including paper, pens, and toner (\$236); supplies needed to develop aquatic vegetation video including film and supporting video software (\$940). Year 2: general office supplies including paper, pens, and toner (\$326). Additional supplies for aquatic vegetation video costs for binder and supplies associated with hosting one workshop on aquaculture basics (\$350) plus purchase of needed software to support the Iowa Aquaculture Association Web site (\$150 - Dream Weaver program).
- F. Travel.** Year 1: transportation, lodging, and meal expenses for the PI to participate in one workshop on aquaculture basics held in the NCR at a location to be determined (\$600). Year 2: transportation, lodging, and meal expenses for the PI to present aquatic vegetation management video to an aquaculture audience in the NCR at a location to be determined (\$750); transportation, lodging, and meal expenses for the PI to participate in one workshop on advanced aquaculture topics to be hosted by University of Wisconsin-Milwaukee staff (\$750); and transportation, lodging, and meal expenses for the PI to attend and host one meeting of the Iowa Aquaculture Association at a location to be determined by the aquaculture association (\$398).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			USDA AWARD NO. Year 1: Objectives 1 & 2				
PROJECT DIRECTOR(S) Robert A. Pierce II			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
a. ____ (Co)-PD(s)							
b. ____ Senior Associates							
2. No. of Other Personnel (Non-Faculty)							
a. ____ Research Associates-Postdoctorates . . .							
b. ____ Other Professionals							
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. ____ Prebaccalaureate Students							
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages						\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)							
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0	0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						\$100	
F. Travel						\$900	
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs							
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)							
K. Total Direct Costs (C through I)						\$1,000	0
L. F&A/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.)							
M. Total Direct and F&A/Indirect Costs (J plus K)						\$1,000	0
N. Other							
O. Total Amount of This Request						\$1,000	0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							
Cash (both Applicant and Third Party)							
Non-Cash Contributions (both Applicant and Third Party)							
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE		
Project Director							
Authorized Organizational Representative							
Signature (for optional use)							

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Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS School of Natural Resources University of Missouri-Columbia Columbia, MO 65211			USDA AWARD NO. Year 2: Objectives 1 & 2			
			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
PROJECT DIRECTOR(S) Robert A. Pierce II			Funds Requested by Proposer	Funds Approved by CSREES (If different)		
A. Salaries and Wages			CSREES FUNDED WORK MONTHS			
1. No. of Senior Personnel			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates ...						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$100			
F. Travel			\$900			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →			\$1,000	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$1,000	0	\$0	\$0
N. Other →						
O. Total Amount of This Request →			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party) →						
Non-Cash Contributions (both Applicant and Third Party) →						
NAME AND TITLE (Type or print)		SIGNATURE (required for revised budget only)			DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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Form CSREES-2004 (12/2000)

BUDGET EXPLANATION FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses to collaborate in the development and delivery of extension aquaculture programs in Missouri, including the Missouri Aquaculture Conference, extension aquaculture field days and workshops conducting during the year; Missouri Aquaculture Coordinating Council Events and Educational Programs; and to participate in a regional or national aquaculture educational program to interact with industry leaders and state extension personnel.

PROPOSED ACTIVITIES FOR UNIVERSITY OF ILLINOIS

(Plumer)

Major Actions for Each Objective

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

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS University of Illinois Extension Mumford Hall Urbana, IL 61801			USDA AWARD NO. Year 1: Objectives 1 & 2				
PROJECT DIRECTOR(S) Michael D. Plumer			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
a. ____ (Co)-PD(s)							
b. ____ Senior Associates							
2. No. of Other Personnel (Non-Faculty)							
a. ____ Research Associates-Postdoctorates . . .							
b. ____ Other Professionals							
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. ____ Prebaccalaureate Students							
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages						\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)							
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						\$0	0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						\$250	
F. Travel						\$750	
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs							
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)							
K. Total Direct Costs (C through I)						\$1,000	0
L. F&A/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.)							
M. Total Direct and F&A/Indirect Costs (J plus K)						\$1,000	0
N. Other							
O. Total Amount of This Request						\$1,000	0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							
Cash (both Applicant and Third Party)							
Non-Cash Contributions (both Applicant and Third Party)							
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE		
Project Director							
Authorized Organizational Representative							
Signature (for optional use)							

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS University of Illinois Extension Mumford Hall Urbana, IL 61801			USDA AWARD NO. Year 2: Objectives 1 & 2			
			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
PROJECT DIRECTOR(S) Michael D. Plumer			Funds Requested by Proposer	Funds Approved by CSREES (If different)		
A. Salaries and Wages			CSREES FUNDED WORK MONTHS			
1. No. of Senior Personnel			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty)						
a. ____ Research Associates-Postdoctorates ...						
b. ____ Other Professionals						
c. ____ Paraprofessionals						
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →			\$0	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)						
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$0	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$250			
F. Travel			\$750			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						
K. Total Direct Costs (C through I) →			\$1,000	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$1,000	0	\$0	\$0
N. Other →						
O. Total Amount of This Request →			\$1,000	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party) →						
Non-Cash Contributions (both Applicant and Third Party) →						
NAME AND TITLE (Type or print)		SIGNATURE (required for revised budget only)			DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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 Form CSREES-2004 (12/2000)

BUDGET EXPLANATION UNIVERSITY OF ILLINOIS

(Plumer)

Objectives 1 and 2

- E. Materials and Supplies.** Annual costs: general office supplies including paper, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Illinois Aquaculture Association at a location to be determined by the aquaculture association (\$300). Additional travel costs include other aquaculture informational programs (\$200), and aquaculture-related meetings to work with producer groups, individuals on production issues and aquaculture practices, and present NCRAC information (\$250).

PROPOSED ACTIVITIES FOR OHIO STATE UNIVERSITY

(Tiu)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Economics and Marketing Research Work Group and Extension Work Group.
 - b. Serving as an extension liaison between NCRAC Hybrid Striped Bass Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Providing 15 copies of aquaculture extension related materials produced in Ohio to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Ohio.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
3. Develop and implement aquaculture educational programs and materials for the NCR.
 - a. Develop material needed for video streaming related to information transfer concerning aquaculture pond construction.

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			USDA AWARD NO. Year 1: Objectives 1-3			
PROJECT DIRECTOR(S) Laura G. Tiu			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ... b. ____ Other Professionals						
c. <u>1</u> Paraprofessionals						\$15,038
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →			\$15,038	\$0	\$0	\$0
B. Fringe Benefits (If charged as Direct Costs)			\$4,962			
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$20,000	0	\$0	\$0
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies			\$7,000			
F. Travel			\$3,250			
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)			\$1,000			
K. Total Direct Costs (C through I) →			\$31,250	0	\$0	\$0
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →			\$31,250	0	\$0	\$0
N. Other						
O. Total Amount of This Request →			\$31,250	0	\$0	\$0
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE		
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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 Form CSREES-2004 (12/2000)

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

OMB Approved 0524-0039
 Expires 03/31/2004

ORGANIZATION AND ADDRESS Ohio State University Research Foundation 1960 Kenny Road Columbus, OH 43210-1063			USDA AWARD NO. Year 2: Objectives 1-3			
PROJECT DIRECTOR(S) Laura G. Tiu			Duration Proposed Months: <u>12</u> Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			
			Calendar	Academic	Summer	
a. ____ (Co)-PD(s)						
b. ____ Senior Associates						
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates ... b. ____ Other Professionals						
c. <u>1</u> Paraprofessionals						\$15,038
d. ____ Graduate Students						
e. ____ Prebaccalaureate Students						
f. ____ Secretarial-Clerical						
g. ____ Technical, Shop and Other						
Total Salaries and Wages →						\$15,038
B. Fringe Benefits (If charged as Direct Costs)						\$4,962
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →						\$20,000
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$1,500
F. Travel						\$3,250
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$1,000
K. Total Direct Costs (C through I) →						\$25,750
L. F&A/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.)						
M. Total Direct and F&A/Indirect Costs (J plus K) →						\$25,750
N. Other						
O. Total Amount of This Request →						\$25,750
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$	
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party)						
Non-Cash Contributions (both Applicant and Third Party)						
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)				DATE	
Project Director						
Authorized Organizational Representative						
Signature (for optional use)						

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BUDGET EXPLANATION FOR OHIO STATE UNIVERSITY

(Tiu)

Objectives 1 - 3

- A. Salaries and Wages.** Annual costs: salary for a part-time communication specialist 6 months annually; duties to include videotaping the pond construction and on-going research projects and assist in editing video tape.
- B. Fringe Benefits.** Annual costs: OSU's fringe benefit rates are 33% for professional staff.
- E. Materials and Supplies.** Year 1: general office supplies including paper, pens, pencils, folders, toner, and mailers (\$1,500); software (Adobe Premier) used for the video streaming (\$500); server to host video streaming (\$4,000); and stand for server (\$1,000). Year 2: general office supplies including paper, pens, pencils, folders, toner, and mailers.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for multiple trips to fish farms throughout the state at locations to be determined to document and video tape pond construction, fish production, actual producers and their facilities (\$2,500); transportation, lodging, and meal expenses to attend a meeting of the Ohio Aquaculture Association at a location to be determined by the aquaculture association (\$750).
- J. All Other Direct Costs.** Annual costs: telephone (\$750) and fax (\$250).

BUDGET SUMMARY ALL PARTICIPATING INSTITUTIONS

Year 1

	UW- Mil.	NDSU	PURDUE	MSU	UMD	KSU	SDSU	ISU	UMC	UI	OSU	TOTALS
Salaries and Wages	\$14,000			\$5,174				\$16,075			\$15,038	\$50,287
Fringe Benefits	\$4,760			\$1,713				\$3,674			\$4,962	\$15,109
Total Salaries, Wages, and Fringe Benefits	\$18,760			\$6,887				\$19,749			\$20,000	\$65,396
Nonexpendable Equipment												\$0
Materials and Supplies	\$3,650	\$250	\$3,500	\$9,300	\$250	\$300	\$250	\$1,176	\$100	\$250	\$7,000	\$26,026
Travel	\$4,900	\$750	\$2,000	\$10,800	\$750	\$600	\$750	\$600	\$900	\$750	\$3,250	\$26,050
All Other Direct Costs	\$100			\$500		\$100					\$1,000	\$1,700
TOTAL PROJECT COSTS	\$27,410	\$1,000	\$5,500	\$27,487	\$1,000	\$1,000	\$1,000	\$21,525	\$1,000	\$1,000	\$31,250	\$119,172

Year 2

	UW- Mil.	NDSU	PURDUE	MSU	UMD	KSU	SDSU	ISU	UMC	UI	OSU	TOTALS
Salaries and Wages	\$14,000			\$5,300				\$3,825			\$15,038	\$38,163
Fringe Benefits	\$4,760			\$1,813				\$1,186			\$4,962	\$12,721
Total Salaries, Wages, and Fringe Benefits	\$18,760			\$7,113				\$5,011			\$20,000	\$50,884
Nonexpendable Equipment												\$0
Materials and Supplies	\$3,650	\$250	\$3,500	\$9,300	\$250	\$300	\$250	\$826	\$100	\$250	\$1,500	\$20,176
Travel	\$4,900	\$750	\$2,000	\$10,800	\$750	\$600	\$750	\$1,898	\$900	\$750	\$3,250	\$27,348
All Other Direct Costs	\$100			\$500		\$100					\$1,000	\$1,700
TOTAL PROJECT COSTS	\$27,410	\$1,000	\$5,500	\$27,713	\$1,000	\$1,000	\$1,000	\$7,735	\$1,000	\$1,000	\$25,750	\$100,108

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.

LIST OF PRINCIPAL INVESTIGATORS

Fred P. Binkowski, University of Wisconsin-Milwaukee

Mark E. Clark, North Dakota State University

Mark E. Einstein, Purdue University

Donald L. Garling, Michigan State University

Jeffrey L. Gunderson, University of Minnesota-Duluth

Ronald E. Kinnunen, Michigan State University

Charles D. Lee, Kansas State University

Jerry B. Mills, South Dakota State University

Joseph E. Morris, Iowa State University

Robert A. Pierce II, University of Missouri-Columbia

Michael D. Plumer, University of Illinois

Laura G. Tiu, Ohio State University

VITA

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E-mail: sturgeon@csd.uwm.edu

Education

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

Positions

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

Scientific and Professional Organizations

American Fisheries Society, Early Life History and Fish Culture Sections
U.S. Aquaculture Society
World Aquaculture Society

Selected Publications

Yeo, S.E., F.P. Binkowski, and J.E. Morris. 2004. Aquaculture effluents and waste by-products: characteristics, potential recovery and beneficial reuse. NCRAC Ames, Iowa and University of Wisconsin Sea Grant, Madison, Wisconsin. 50 pgs.

Rosenthal, H., R.M., Bruch, F.P. Binkowski, and S.I. Doroshov, Editors. 2002. Proceedings of the 4th International Symposium on Sturgeon. *Journal of Applied Ichthyology* 18 (4-6):219-698.

Bruch, R.M., and F.P. Binkowski. 2002. Spawning behavior of lake sturgeon (*Acipenser fluvescens*). *Journal of Applied Ichthyology* 18 (4-6):570-579.

VITA

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Education

B.A. University of Tennessee, 1987, Mathematics
M.S. University of Tennessee, 1989
Ph.D. University of Tennessee, 1996, Ecology

Positions

Assistant Professor (2002-present), Department of Biological Sciences, North Dakota State University
Postdoctoral Research Associate (2000-2002), Cooperative Wildlife Research Unit, University of Montana
Postdoctoral Research Associate (1997-2000), Department of Animal Ecology, Iowa State University
Postdoctoral Research Associate (1996-1997), Environmental Sciences Division, Oak Ridge National Laboratory

Scientific and Professional Organizations

American Fisheries Society
Ecological Society of America
Society of Integrative & Comparative Biology

Selected Publications

- Clark, M.E., K.A. Rose, D.A. Levine, and W.W. Hargrove. 2001. Predicting global change effects on brook and rainbow trout in southern Appalachian streams: combining GIS and individual-based modeling. *Ecological Applications* 11:161-178.
- Clark, M.E., and K.A. Rose. 1997. Factors affecting competitive dominance of rainbow trout over brook trout in southern Appalachian streams. *Transactions of the American Fisheries Society* 126:1-20.
- Clark, M.E., K.A. Rose, J.A. Chandler, T.J. Richter, D.J. Orth, and W. Van Winkle. 1998. Simulating smallmouth bass reproductive success in reservoirs subject to water level fluctuations. *Environmental Biology of Fishes* 51:161-174.
- Clark, M.E., and K.A. Rose. 1997. An individual-based modeling analysis of management strategies for enhancing brook trout populations in southern Appalachian streams. *North American Journal of Fisheries Management* 17:54-76.

VITA

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Education

B.S. Purdue University, 1976, Quantitative Genetics
M.S. Purdue University, 1981, Cytogenetics,

POSITIONS

Chief Web Officer for Illinois/Indiana Sea Grant College Program (2000-present), Purdue University
Site Manager (1996-present), SGNIS (Sea Grant Nonindigenous Species)
Site Manager (1994-present), AquaNIC (Aquaculture Network Information Center)
Senior Statistical Associate (1991-present), Statistical Research Associate (1985-1991), Departmental
Statistics, Animal Sciences, Purdue University
Lab Manager (1976-1985), Quantitative Genetics, Animal Sciences Department, Purdue University

SELECTED PUBLICATIONS

- Swarm, L, T. Luba, and M. Einstein. 1994. Putting multimedia to work in outreach education. Abstract for World Aquaculture Society meeting.
- Swann, L., G. Jensen, and M. Einstein. 1994. Using the Aquaculture etwork Information Center (AquaNIC). Abstract for World Aquaculture Society meeting.
- Einstein, M., and L. Swann. 1994. Guidelines for submitting documents for electronic distribution. Fact Sheet.
- Einstein, M.E. and D.P. Doolittle. 1984. Direct and indirect selection for eight week body weight near a selection limit in mice. *Zeitschrift fuer Tierzuechtung und Zuechtungsbiologie* 101:275-279.
- Einstein, M.E., T.S. Stewart, D.L Lofgren, and A.P. Schinckel. 1988. A summary of genetic and phenotypic parameters for characteristics in swine. *Indiana Agricultural Experiment Station Bulletin #545*. 47pp.

VITA

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Riche, M., and D. Garling. 2003. Feeding tilapia in intensive recirculating systems. NCRAC Fact Sheet Series #114, NCRAC Publications Office, Iowa State University, Ames.
- Garling, D.L., and W.W. Taylor. 2002. My bluegills are stunted HELP! Michigan State University Extension, MSU, Bulletin E-1776. 2 pp.
- Garling, D.L. 2002. Fee fishing pond management. Pages 44-47 in J.E. Morris, C.C. Mischke, and D.L. Garling, editors. Sunfish Culture Guide. NCRAC Culture Series #102, NCRAC Publications Office, Iowa State University, Ames.
- Garling, D., P. Wilbert, A. Westmaas, S. Miller, R. Sheehan, P. Wills, and J. Paret. 2002. Production of polyploid sunfishes. Pages 34-40 in J.E. Morris, C.C. Mischke, and D.L. Garling, editors. Sunfish Culture Guide. NCRAC Culture Series #102, NCRAC Publications Office, Iowa State University, Ames.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
International Association of Astacology
Sea Grant Advisory Service Association (Great Lakes Network)
North Central Regional Aquaculture Center's Extension Technical Committee

SELECTED PUBLICATIONS

- Gunderson, J.L. and R. Kinnunen. 2002. The HACCP approach to prevent the spread of aquatic nuisance species by aquaculture and baitfish operations. *In* R.E. Kinnunen, editor. Environmental Strategies for Aquaculture Symposium Proceedings. December 2000. NCRAC CD Series #101, North Central Regional Aquaculture Center Publications Office, Iowa State University, Ames.
- Gunderson, J.L., and R. Kinnunen. 2001. ANS-HACCP: aquatic nuisance species–Hazard Analysis and Critical Control Point training curriculum. Minnesota Sea Grant Publication MN SG-F11.
- Gunderson, J.L., and P. Tucker. 2000. A white paper on the status and needs of baitfish aquaculture in the North Central Region. NCRAC, Michigan State University, East Lansing.
- Gunderson, J., M. Klepinger, C. Bronte, and J.E. Marsden. 1998. Overview of the international ruffe symposium on Eurasian ruffe (*Gymnocephalus cernuus*) biology, impacts, and control. *Journal of Great Lakes Research* 24(2):165-169.
- Brown, P., and J. Gunderson, editors. 1997. Culture potential of selected crayfishes in the North Central Region. NCRAC Technical Report Series #112, NCRAC Publications Office, Iowa State University, Ames.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

Kinnunen, R.E., editor. 2002. Environmental Strategies for Aquaculture Symposium Proceedings. December 2000. NCRAC CD Series #101, NCRAC Publications Office, Iowa State University, Ames.

Gunderson, J.L., and R.E. Kinnunen. 2001. Aquatic nuisance species-Hazard Analysis and Critical Control Point raining curriculum. Michigan Sea Grant Publication No. MSG-00-400.

Kinnunen, R.E. 2000. A white paper on the status and needs of salmonid aquaculture in the North Central Region. North Central Regional Aquaculture Center. Michigan State University.

Hoff, M.H., R.E. Kinnunen, and H. Quinlan. 1999. Variation in year-class strengths in coregonids. A report to the Lake Superior Technical Committee and Lake Superior Committee.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Lee, C.D. 1998. Deer damage control options. Kansas State University and Cooperative Extension Service Publication No. C-728.
- Lee, C.D, and R.J. Johnson. 1997. Wildlife habitat evaluation handbook-participant's manual. Kansas State University Cooperative Extension Service Publication No. MF 2266.
- Hall, D., R.J. Johnson, and C.D. Lee 1997. Wildlife habitat evaluation handbook-leader's guide, Kansas State University Cooperative Extension Service Publication No. MF 2265.
- Weins, J.R., C.S. Guy, and C.D. Lee. 1997. Streambank revetment. Kansas State University Agricultural Experiment Station and Cooperative Extension Service Publication No. MF 2294.

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EDUCATION

B.S. South Dakota State University, 1976

POSITIONS

Extension Educator - Horticulture (2000-present), Extension Agent - Agriculture (1983-2000), Brown County Extension, Aberdeen, South Dakota
Extension Agent In Training (1981-1983), Brown County Extension, Aberdeen, South Dakota

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

National Association of County Agricultural Agents
South Dakota County Agents Association

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

Lane, R.L., and J.E. Morris. 2002. Comparison of prepared feed versus natural food ingestion between pond-cultured bluegill and hybrid sunfish. *Journal of the World Aquaculture Society* 33: 517-519.

Lane, R.L., and J.E. Morris. 2000. Biology, prevention, and effects of common grubs (Digenetic trematodes) in freshwater fish. NCRAC Technical Bulletin Series #115, NCRAC Publications Office, Iowa State University, Ames.

Morris, J.E., and C.C. Mischke. 1999. Plankton management for fish culture ponds. NCRAC Technical Bulletin Series, #114, NCRAC Publications Office, Iowa State University, Ames.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

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EDUCATION

B.S. University of Illinois, 1971, Agricultural Science
M.S. Southern Illinois University, 1990, Plant & Soil Science

POSITIONS

Natural Resource Management Educator (1992-present), University of Illinois
Extension Agriculture Advisor (1976-present), University of Illinois

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Association of Natural Resource Extension Professionals
Illinois Extension Agricultural Association
National Association of County Agricultural Agents
Soil and Water Conservation Society

SELECTED PUBLICATIONS

- Ebelhar, S., and M. Plumer. 1999. Management of rye and ryegrass as cover crops for no-till. Agronomy Research Report, Dixon Springs.
- Ebelhar, S., and M. Plumer. 1998. Rye cover crops for no-till soybeans. Agronomy Research Report, Dixon Springs.
- Ebelhar, S., and M. Plumer. 1999. Effects of rye cover crops and reduced herbicides rates on weed control in soybeans. Agronomy Research Report, Dixon Springs.
- Plumer, M., and E. Knake. 1996. Vegetative filter strip slow runoff. Weed Control Manual, volume 30. Meister Publishing Company, Ohio.
- Plumer, M. 1994. Bringing idle land into production under conservation compliance. Agronomy Research Report 1994-10.
- Plumer, M. 1998. No-till, what we have learned. Illinois Steward 6(4).
- Farnsworth, R., and M. Plumer. 1993. Short term profit or long term stewardship. Illinois Steward 2(4).

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EDUCATION

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

POSITIONS

Senior Research and Extension Associate (2003-present), and Research and Extension Associate (1998-2003), Ohio State University
Co-Investigator for Aquaculture (1992-1998) and Research Assistant for Aquaculture (1991-1992), Kentucky State University
Technical Assistant (1990) and Graduate Research Assistant (1988-1990), Mississippi State University
Laboratory Technician (1987-1988), Mote Marine Laboratory, Sarasota, Florida
Tropical Fish Breeder, J & B Tropicals (1987), Lakeland, Florida

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Ohio Aquaculture Association (Advisor to the Board)
U.S. Aquaculture Society (Newsletter Editor)
World Aquaculture Society
North Central Regional Aquaculture Center Technical Research Committee

SELECTED PUBLICATIONS

Wallat, G., L. Tiu, H. Wang, D. Rapp, and C. Leighfield. In press. The effects of size grading on production structure and growth performance of yellow perch in earthen ponds. *North American Journal of Aquaculture*.

Wallat, G.K., L.G. Tiu, J.D. Rapp, and R.A. Moore. 2003. Effect of stocking density on growth, yield and costs of producing rainbow trout in cages. *Journal of Applied Aquaculture* 15(3/4):72-82.

Webster, C.D., L.G.Tiu, and A.M.Morgan. 2000. Differences in growth in blue catfish *Ictalurus furcatus* and channel catfish *I. punctatus* fed low-protein diets with and without supplemental methionine and/or lysine. *Journal of the World Aquaculture Society* 31:195-205.