

NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT

Chairperson: Joseph E. Morris, Iowa State University

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

Funding Request: \$95,000

Duration: 2 Years (September 1, 1999 - August 31, 2001)

Objectives:

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

Proposed Budgets:

Institution	Principal Investigator(s)	Objective(s)	Year 1	Year 2	Total
University of Wisconsin-Milwaukee	Fred P. Binkowski	1-3	\$500	\$500	\$1,000
Michigan State University	Donald L. Garling	1,2,&4	\$3,275	\$1,350	\$4,625
University of Minnesota-Duluth	Jeffrey L. Gunderson	1-3	\$1,500	\$1,500	\$3,000
Michigan State University	Ronald E. Kinnunen	1-3	\$1,500	\$1,500	\$3,000
Kansas State University	Charles D. Lee	1 & 2	\$1,500	\$1,500	\$3,000
Iowa State University	Joseph E. Morris	1-4	\$24,000	\$24,000	\$48,000
University of Missouri-Columbia	Robert A. Pierce II	1 & 2	\$1,500	\$1,500	\$3,000
Purdue University	LaDon Swann	1-4	\$15,175	\$7,200	\$22,375
Ohio State University	Laura G. Tiu	1-4	\$1,500	\$1,500	\$3,000
North Dakota State University	Unnamed	1-4	\$1,500	\$1,500	\$3,000
University of Nebraska-Lincoln	Unnamed	2	\$500	\$500	\$1,000
Totals			\$52,450	\$42,550	\$95,000

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JUSTIFICATION

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

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

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

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

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

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

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

Aquaculture resource conditions in the NCR are ideally suited for both coldwater and coolwater species, e.g., ciscos, hybrid striped bass, northern pike, salmon, trout, walleye, whitefish, and yellow perch, all of which are marketable. While some states in this region, e.g., Kansas and Missouri, have established channel catfish operations similar to the southern states, it is necessary to consider coolwater and coldwater species as alternatives due to regional climatic conditions. It is expected that indoor recirculating systems will become more popular once they are proven to be economically feasible.

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

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

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

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

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

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

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

RELATED CURRENT AND PREVIOUS WORK

The NCRAC Extension Project is designed to assess and meet the information needs of the various clientele groups through cooperative and coordinated regional educational programming. A network of Sea Grant and CES-designated contacts has been established to help maximize efficiency of education programs in the 12-state NCR.

In spite of the limited number of aquaculture full-time equivalent positions (less than four) in this region, substantial progress on the previously described objectives has been made. In 1992, multiple extension liaisons evolved for several research projects, e.g., economics, hybrid striped bass, walleye, and yellow perch. This increased number of extension liaisons has helped to improve the information transfer from research work groups to the public. Extension liaisons have also assisted with the planning, promotion, and implementation of the hybrid striped bass, walleye, and yellow perch workshops held throughout the region. 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.

Prior to mid-1994 little coordination of international aquaculture information sharing existed. Information produced by national and international agencies could only be obtained by contacting the respective sources of this information. Also, individual CES personnel relied heavily on information produced by individual states or through regional cooperative projects. As Internet access extended beyond educational institutions and governmental agencies, a clear need developed to utilize the Internet to reach a much broader audience. In the age of an "information overload" the need for a centralized gateway to the ever increasing number of aquaculture resources in electronic format was apparent.

The development of the Aquaculture Network Information Center (AquaNIC) has been instrumental in reaching the public with valuable and timely information. It has been funded, in part, by NCRAC and currently has over 60,000 contacts per year from more than 89 countries. AquaNIC receives direction from a national steering committee of representatives from public and private sector aquaculture. AquaNIC began on a Gopher Server in July 1994 and moved to a World Wide Web server in January 1996. AquaNIC (currently <http://aquanic.org>) houses more than 8,000 extension publications, governmental documents, image files, comprehensive e-mail lists, newsletters, calendars, job announcements, and résumés. In addition, AquaNIC has links to over 1,000 other aquaculture and fisheries related Web sites. Ongoing promotional campaigns through mouse pads and access information cards has increased the level of awareness of this new resource available to the world aquaculture industry. It is the gateway to the world's electronic resources in aquaculture including the Regional Aquaculture Centers. It also serves as the home of NCRAC's Web site (<http://ag.ansc.purdue.edu/aquanic/ncrac>) which was developed in conjunction with NCRAC administrative staff and the Illinois-Indiana Sea Grant Program. The Web site provides electronic versions of NCRAC extension publications (fact sheets and technical bulletins), directories, operations manuals, and newsletters.

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

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

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

In addition to the previously mentioned areas, several NCRAC extension contacts have been instrumental in fostering the continued growth of the aquaculture industry in the region. For example, Pierce has recently created the Cooperative Extension Aquaculture and Marketing Educational Program to facilitate the development and implementation of aquaculture educational programs in Missouri. Many of the NCRAC extension contacts have 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. The end result should 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

The NCRAC Extension Work Group will continue and expand its efforts to promote and advance commercial aquaculture in a responsible fashion through an organized education/training outreach program. The primary benefits are: increased public awareness through publications, short courses, and conferences regarding the potential of aquaculture as a viable agricultural enterprise in the NCR; technology transfer to enhance current and future production methodologies for selected species, e.g., hybrid striped bass, salmonids, sunfish, walleye, and yellow perch; improved lines of communication between interstate aquaculture extension specialists and associated industry contacts; and an enhanced legal and socioeconomic atmosphere for aquaculture in the NCR. The development of aquaculture education programs for the NCR has provided "hands-on" opportunities for prospective and experienced producers. Approximately 5,000 individuals have attended workshops or conferences organized and delivered by the NCRAC Extension Work Group. Clientele attending regional workshops have gained information related to aquaculture development strategies in other areas of the country and acquired information which was of direct use to their own enterprises. Education programs also created situations where problems encountered by producers were expressed to extension personnel who later relayed them to researchers at NCRAC work group meetings for possible solutions through the research effort.

Fact sheets, technical bulletins, and videos have served to inform a variety of clients about numerous aquaculture practices for the NCR. For instance, "Making Plans for Commercial Aquaculture in the North Central Region" is often used to provide clients with initial information about aquaculture, while species-specific publications on walleye, trout, and catfish have been used in numerous regional meetings and have been requested by clients from throughout the United States. Publications on organizational structure for aquaculture businesses, transportation of fish in bags, and others are beneficial to both new and established aquaculturists. In a 1994 survey, NCRAC extension contacts estimated that NCRAC publications were used to address approximately 15,000 client questions annually.

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

- ▶ Current and prospective producers use our Web sites as a source of reference (i.e. species and systems pages, RAC 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.
- ▶ Extension 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).

Prospective fish producers in the Midwest will benefit from a comprehensive business planning document (Aquaculture Business Planning Book) which is essential when seeking loans. Catfish producers in the Midwest will benefit from the comprehensive computer-based database (National Catfish Information Database) as a single source document for catfish and through quicker access to catfish information. Non-catfish producers will benefit through the numerous cross-species documents (i.e., water quality, diseases, marketing, etc.) contained on the catfish database.

OBJECTIVES

1. Strengthen linkages between the North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other land-owner assistance personnel.
4. Develop and implement aquaculture educational programs and materials for the North Central Region (NCR).

PROCEDURES

Strengthen Linkages (Objective 1)

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

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

*Lead Extension Liaison

Enhance Extension Network (Objective 2)

At least one contact person has been designated by CES for each NCR state, an extension contact directory has been developed and kept current, and a mechanism for sharing materials produced by individual states has been established. Liaisons with state and federal agencies, and with state aquaculture organizations have been made to identify industry needs. These activities will be continued.

Swann (Purdue University) established AquaNIC in June 1993. In the five years since AquaNIC has been online, it has become the premier Web site for aquaculture information. Each year, more than 60,000 people from 89 countries have chosen to use AquaNIC as an alternative or in addition to traditional means of

obtaining information. As a gateway to electronic resources in aquaculture, AquaNIC has increased the timeliness and variety of information available to outreach educators, governmental agencies, and individual users while more effectively utilizing existing personnel resources. AquaNIC can be accessed anytime and, therefore, does not face the challenges associated with office hours, time zones or weekends.

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

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

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

NCRAC's directories, annual reports, and publications will be posted to the NCRAC Web site. Additionally, a Web site for every state aquaculture association will be developed. AquaNIC's support from NCRAC has been essential to any success experienced. The Illinois-Indiana Sea Grant College Program through NOAA also provides annual support to AquaNIC. Within the next two years AquaNIC anticipates collaborative funding between NOAA-Sea Grant and USDA-National Agriculture Library.

Provide In-service Training (Objective 3)

As time and finances allow, additional in-service training programs will be conducted in the NCR. Although limited moneys are available for this objective, individuals in the NCRAC Extension Work Group expect to participate in future workshops hosted in the region. In 1999-2000, Morris will survey the NCR CES and Sea Grant networks to obtain baseline information regarding future outreach activities and products from NCRAC.

As the World Wide Web becomes the front door to more businesses, it is essential that state aquaculture associations develop a presence on the Web. The Indiana Aquaculture Association and the Illinois Aquaculture Industry Association have Web pages: <http://ag.ansc.purdue.edu/aquanic/iaa> and <http://ag.ansc.purdue.edu/aquanic/iaia>. Web pages for each of the other 10 North Central states will be developed by Swann. The Illinois-Indiana contact will work with the state aquaculture contact in each of the Midwest states to collect information from each of the state aquaculture associations. Types of information to be included on the state aquaculture association Web pages will include: officers and directors, membership information, membership application, calendar of events, newsletters, and links to other aquaculture related sites within each of the states. The related sites should include links to agencies responsible for aquaculture related permits, potential funding agencies, information sites, and other key sites. This service to our Midwest associations will increase their visibility and help them to promote associations to news groups, potential members, and state policy makers.

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

Whirling Disease for Trout and Salmon Aquaculturists Fact Sheet (\$1,625 - Garling, MSU)

Whirling disease is the common name for an infestation of trout or salmon by a microscopic protozoan parasite (*Myxobolus cerebralis*). The parasite has a two-host life cycle — fish and tubificid worms (Wolf and Markiw 1984, Wolf et al. 1986). The parasite's free-swimming form is called a triactinomyxon, TAM for short. The TAM enters young trout, attacking the cartilage. It is the destruction of cartilage and associated nerves which may cause the clinical signs of the disease. The fish may or may not show any signs of the infestation. Disease signs can include malformed heads, black tail, curvatures of the spine (scoliosis), and the fish may swim in a whirling pattern, hence the name whirling disease.

Once a fish dies or is eaten by a predator, spores are released that can tolerate freezing or remain in the sediment for long periods of time. Tubificid worms are essential in the protozoan's life cycle. Spores of *M. cerebralis* are taken in by tubificid worms and develop in their gut into actinosporean sporocytes that are transformed into TAM. The TAM can infect young fish either directly through the water or by the fish feeding on infected tubificid worms.

Whirling disease was first described in Europe in the late 1800s (Hoffman 1990). It was reported in the U.S. in Pennsylvania in 1956 and in Michigan in the fall of 1968 (Hnath 1970, Yoder 1972). A Michigan trout farmer had obtained fish from an Ohio trout farm known to be affected by the parasite. Later investigations showed that three hatcheries in Michigan were contaminated with the parasite. Through voluntary agreements, 159 establishments that received fish from the primary infested sources were treated to kill the fish in the late 60s. The fish were buried on the premises or in sanitary land fills. Subsequently, ponds were checked for whirling disease by placing rainbow fry in free-floating test cages at the suspect establishments. Four Michigan rivers and a few fish farms were found to have trout with whirling disease in 1998 (J. Hnath, Michigan Department of Natural Resources, Fish Division, personal communication). The trout farms likely became infected with the parasite either by purchasing trout that were infested by whirling disease or by using water from creeks or streams that contained fish infested by the parasite.

Why are trout and salmon aquaculturists, anglers, and fisheries biologists concerned about whirling disease since it has been in the NCR for 30+ years? Whirling disease was discovered in rainbow trout from the Madison River in Montana in December 1994 while fisheries biologists were investigating the cause of a major decline in the rainbow trout population in the upper Madison River. Montana Fish, Wildlife and Parks personnel have estimated that whirling disease may have caused a 90% decline in the rainbow trout population. Prior to 1994, the parasite had not been detected in Montana during monitoring for this parasite of hatchery stocks and limited inspections of wild populations. As of early 1998, a state-wide monitoring survey in Montana has detected the parasite in over 60 individual sites of the 300 tested. Montana's fisheries biologists believe that many of these waters have been infected for several years, but went undetected until the state-wide survey was initiated. While Montana is not one of the NCR states, nevertheless, the subsequent changes in individual states' regulation concerning this disease related to both public and private hatchery stock is of concern to NCR aquaculturists.

The Michigan Department of Natural Resources, Fish Division has proposed new rules for fish health inspections for trout aquaculture facilities to prevent the spread or magnification of the parasite in Michigan streams. The Michigan Fish Growers Association and the Michigan Departments of Agriculture and Natural Resources have requested that a fact sheet be developed for trout and salmon aquaculturists in the NCR that describes the parasite, its life cycle, and history of infestation, and contains recommendations to help fish farmers avoid infection of their facility and/or magnifying infestations in receiving waters where eradication is impossible.

MSU will develop a fact sheet on whirling disease for salmonid aquaculturists in the NCR with assistance from the Michigan Fish Growers Association, Michigan Departments of Agriculture and Natural Resources, the Great Lakes Fish Health Committee, and the US Fish and Wildlife Service La Crosse Fish Health Laboratory. The fact sheet will include appropriate graphics, references to whirling disease Web pages, and other sources of pertinent information. Some excellent Web resources are available including:

- ▶ Whirling Disease Foundation: <http://www.whirling-disease.org/>
- ▶ Montana Whirling Disease Task Force: <http://www.whirlingdisease.org/wdtfweb/index.htm>
- ▶ National Partnership on the Management of Wild and Native Cold Water Fisheries, Whirling Disease Initiative, Administered by the Montana University System Water Center: <http://btc.montana.edu/watercenter/docs/whirling.html>
- ▶ and an annotated bibliography of whirling disease in salmonid fishes through 1995: <http://www.montana.edu/wwwrc/docs/whirling/centerpage/bib.html>

Existing pertinent reference materials will be collected and reviewed and the annotated bibliography will be updated through the end of 1999. A fact sheet will be drafted for NCR trout and salmon aquaculturists that describes the parasite, its life cycle, history of infestation, and recommendations for fish farmers to avoid infection of their facility and magnifying infestations in receiving waters where eradication is impossible.

NCRAC Yellow Perch Culture Guide and Video (\$45,000 - Morris, ISU)

The NCRAC Yellow Perch Work Group has developed considerable technology to advance the culture of this important food fish. While these results have been disseminated in peer-reviewed publications and NCRAC annual and termination reports, there has been a limited number of outreach products available to the industry. The Industry Advisory Council has earmarked \$45,000 for the development of a yellow perch culture guide and video to help fill this need.

A culture guide will be produced consisting of various chapters on all phases of yellow perch culture including spawning, hatching, intensive culture of fry on formulated feed, pond culture of fry to fingerlings, training pond fingerlings to formulated feed, rearing fingerlings for the food market, new biological technologies, and economics and marketing. Each chapter will also have a two to four page synopsis consisting of bulleted statements. Chapter authors are expected to interact with the NCRAC Extension Work Group during the preparation of these synopses. This project will be carried out by a steering committee, a managing editor, and the chapter authors. This committee will consist of:

- ▶ Managing Editor - Joseph E. Morris (ISU)
- ▶ Extension Liaison - Donald L. Garling (MSU)
- ▶ NCRAC Yellow Perch Research Group Representative - Jeffrey A. Malison (University of Wisconsin-Madison)
- ▶ Industry Representative - Christopher Starr (Bay Port Aquaculture Systems)
- ▶ Wisconsin Representative - Fred P. Binkowski (University of Wisconsin Sea Grant)

The committee will: (1) develop a list of chapters, (2) select authors for each chapter, (3) approve list of reviewers for each chapter (list prepared by managing editor), (4) monitor progress, and (5) approve final copy of chapters.

The Managing Editor will: (1) communicate to NCRAC regarding project progress, (2) organize meetings of the steering committee, (3) communicate with authors and monitor their progress, (4) prepare a list of peers to carry out technical reviews of chapters, (5) transmit drafts of the chapters to peers for review and monitor review process, and (6) be responsible for hiring of staff and a technical editor.

Tentative chapter titles are:

- ▶ Brood fish management and methods of spawning
- ▶ Egg fertilization, incubation, and hatch
- ▶ Pond fingerling production
- ▶ Tank fingerling production
- ▶ Habituating pond-reared fingerlings to formulated feeds in ponds, net-pens, and tanks
- ▶ Grow out in recirculating systems
- ▶ Grow out in ponds
- ▶ Grow out in net pens
- ▶ Grow out in flow-through systems
- ▶ Comparative economics of tank and pond fingerling production

- ▶ Comparative economics of pond, net-pen, flow-through, and recirculating systems grow out
- ▶ New biological technologies
- ▶ Sterile triploids, selective breeding, etc.
- ▶ Processing
- ▶ Marketing
- ▶ Diseases and therapeutants
- ▶ Nutrition

An accompanying 10-15 minute video will be produced by Iowa State University Extension Communication Service personnel. The content will be guided by the steering committee following the review of chapter drafts.

National Catfish Information Database (\$3,000 - Swann, Purdue University)

Agricultural Databases for Decision Support (ADDS) is a family of national cooperative projects being developed to bring the expertise of the land grant university system to bear on the needs of agricultural producers, rural communities, and the citizens of the nation. These projects are interdisciplinary and involve all states. They are intended to provide support for decision making by agricultural producers and those working with the producers in an educational, advisory, consultative or service role. They are also designed to address the knowledge, education, and decision support needs of the broader rural community.

These databases are broad-based, comprehensive, computerized/electronic collections linked with decision support tools. The content is peer reviewed and selected by experts. Extension specialists, research and teaching faculty, library and media specialists, and other public and private sector experts from throughout the U.S. have participated in the development of ADDS for dairy and are near completion of similar ADDS for swine and sheep. Swann will be working with the Southern Regional Aquaculture Center to develop a National Catfish Information Database (NCID). He will contribute with the planning and development process with emphasis on Internet access to this resource.

Swann serves on the NCID planning committee and has been designated as one of 34 lead editors for the national project. He will serve as the lead editor for the development of the section on *Aquaculture Resources*. The categories, lead editors, and states are:

- ▶ Catfish Biology and Life History - Andy Goodwin, Arkansas
- ▶ Catfish Welfare - Fred Conte, California
- ▶ Consumer Oriented Materials - Jim Davis, Texas
- ▶ Drug/Pesticide Usage – Labeling - Roz Schnick, Wisconsin
- ▶ Environmental Toxicology - Billy Griffin, Arizona
- ▶ Farm Safety - Steve Killian, Arizona
- ▶ Federal Regulations - Gary Jensen, USDA/District of Columbia
- ▶ Fee-fishing - Billy Higginbotham, Texas
- ▶ Feeding Practices - Jim Tidwell, Kentucky
- ▶ Feed Manufacturing - Mian Riaz, Texas
- ▶ Fish Health - John Plumb, Alabama
- ▶ Food Science - Yao-Wen Huang, Georgia
- ▶ Genetics/Breeding - Greg Lutz, Louisiana
- ▶ Harvesting - Len Lovshin, Alabama
- ▶ Historical Overview - Bob Stickney, Texas
- ▶ Hydrology - Nathan Stone, Arkansas
- ▶ Information/Educational Sources - LaDon Swann, Indiana-Illinois
- ▶ Industry Statistics - David Harvey, USDA/Economic Research Service and Al Drain, USDA/National Agriculture Statistics Service
- ▶ Marketing-Economics-Business - Carol Engle, Arkansas
- ▶ Nutrition - Del Gatlin, Texas
- ▶ Off-Flavor - Craig Tucker, Mississippi
- ▶ Photos, etc. - Jimmy Avery, Louisiana
- ▶ Pond Construction/Facilities - Andy Lazur, Florida

- ▶ Predation (or Birds) - Mark Tobin and Phil Mastrangelo, Mississippi
- ▶ Processing - George Flick, Virginia
- ▶ Production Systems - Michael Masser, Texas
- ▶ Quality Assurance/Food Safety/Hazard Analysis and Critical Control Point (HACCP) - Brian Perkins, Alabama
- ▶ Reproduction/Hatcher - Bo Collins and Jim Steeby, Arkansas-Mississippi
- ▶ Small Scale Production - Tom Hill, Tennessee
- ▶ Software - Greg Clary, Texas
- ▶ Water Quality - John Hargreaves, Mississippi
- ▶ Weed Control - George Lewis, Georgia
- ▶ Yield Verification - David Heikes, Arkansas

Aquaculture Business Plan Guide (\$5,000 - Swann, Purdue University)

A technical bulletin, "Developing an Aquaculture Business Plan," will be produced. The document will be co-authored by Norma Turok, CES Small Business Educator with the University of Illinois. The business planning bulletin will utilize existing economic data generated for Midwest species and production systems. The completed document will serve as a template for new producers seeking financial support and as a resource for lending institutions. It is expected that more than \$5 million in loans will be provided based on the prospective producers' use of the aquaculture business planning document.

Because aquaculture is fast becoming recognized as a valuable and viable option to improve local and state economies, it is important to develop business plans which help reduce the risks and increase the chances for success. A simplistic guide is needed to assist potential and existing aquaculture business owners develop a written plan. A prospective business owner, as well as those already in business, need to develop a written plan. Written plans provide a management tool for determining specific strengths and weaknesses of an idea, documenting reasonable objectives, and identifying resources to attain them. A written plan will also provide the basis for developing a more detailed business-operating plan. Even though the risk of going into business cannot be eliminated, a good plan will help reduce the risk.

The object is to write an Aquaculture Business Plan Guide designed for anyone wanting to determine the feasibility of a new aquaculture business, expand or re-plan an existing business or write a business plan for financing. The guide will review the *thinking* process necessary for determining if a business idea will be profitable. It will also provide resources and references for obtaining the research information needed to make final projections.

The Aquaculture Business Plan Guide will be written following the basic format of the "Business Plan," a 100-page publication written by Turok, Extension Educator Small Business Management, University of Illinois Extension. This publication has been used extensively for many years for any type or size of business venture, including aquaculture, in the absence of a specific aquaculture business plan guide. The "Business Plan" and a "Child Care Business Plan" publication, which was written following the "Business Plan" format, have received national recognition.

Turok will be the principal author and will require the assistance of a researcher. The publication will be approximately 80 pages in length and will guide the user through the "thinking process," and help in gathering and organizing the necessary information. This publication will be distributed using printed copies ordered through a central supply, accessed via the Web (AquaNIC), and available through aquaculture workshops.

REFERENCES

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- Harvey, D. 1994. Aquaculture: situation and outlook report. United States Department of Agriculture, Economic Research Service, AQS-12, Washington, D.C.
- Harvey, D. 1996. Aquaculture outlook. United States Department of Agriculture, Economic Research Service, LDP-AQS-4, Washington, D.C.
- Hnath, J.G. 1970. Whirling disease in the state of Michigan. Second International Congress of Parasitology, Abstract #273, September 6-12, Washington, D.C. Journal of Parasitology 56 (Section II, Part I): 149-150.
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- New, M.B. 1999. Global aquaculture: current trends and challenges for the 21st century. World Aquaculture 30(1):8-13, 63-79.
- NMFS. 1998. Current fishery statistics no. 9700: fisheries of the United States, 1997. U. S. Department of Commerce, National Oceanographic Atmospheric Association, National Marine Fisheries Service, Silver Springs, Maryland.
- Wolf, K.. and M.E. Markiw. 1984. Biology contravenes taxonomy in the Myxozoa: new discoveries show alternation of invertebrate and vertebrate hosts. Science 225:1449-1452.
- Wolf, K., M.E. Markiw, and J.K. Hiltunen. 1986. Salmonid whirling disease: *Tubifex tubifex* (Muller) identified as the essential oligochaete in the protozoan life cycle. Journal of Fish Diseases 9:83-85.
- Yoder, W.G. 1972. The spread of *Myxosoma cerebralis* into native trout populations in Michigan. Progressive Fish-Culturist 34:103-106.

PROJECT LEADERS

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

PARTICIPATING INSTITUTIONS AND PRINCIPAL INVESTIGATORS

University of Wisconsin-Milwaukee (UW-Milw)

Fred P. Binkowski

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

Iowa State University (ISU)

Joseph E. Morris

University of Missouri-Columbia (UMC)

Robert A. Pierce II

Purdue University (Purdue)

LaDon Swann

Ohio State University (OSU)

Laura G. Tiu

North Dakota State University (NDSU)

Unnamed

University of Nebraska-Lincoln (UNL)

Unnamed

PROPOSED ACTIVITIES FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Major Actions for Each Objective

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

BUDGET

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 1: Objectives 1-3	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Fred P. Binkowski			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies				
F. Travel				
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$150), Postage (\$250), Photocopying (\$100)			\$500	
J. Total Direct Costs (C through I) →			\$500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$500	
M. Other →				
N. Total Amount of This Request →			\$500	\$
O. Cost Sharing (If Required Provide Details)		\$		

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

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

BUDGET

ORGANIZATION AND ADDRESS Great Lakes WATER Institute University of Wisconsin-Milwaukee Milwaukee, WI 53204			USDA AWARD NO. Year 2: Objectives 1-3		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Fred P. Binkowski			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			\$		
1. No. of Senior Personnel					
			CSREES FUNDED WORK MONTHS		
			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies					
F. Travel					
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$150), Postage (\$250), Photocopying (\$100)			\$500		
J. Total Direct Costs (C through I) →			\$500		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$500		
M. Other →					
N. Total Amount of This Request →			\$500	\$	
O. Cost Sharing (If Required Provide Details)			\$		
NOTE: Signatures required only for Revised Budget			This is Revision No. →		
NAME AND TITLE (Type or print)		SIGNATURE		DATE	
Principal Investigator/Project Director					
Authorized Organizational Representative					

BUDGET EXPLANATION FOR UNIVERSITY OF WISCONSIN-MILWAUKEE

(Binkowski)

Objectives 1-3

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

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Garling)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Yellow Perch Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Economics Work Group and Extension Work Group.
 - c. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - d. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Yellow Perch and Economics Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the 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.
4. Develop and implement aquaculture education programs and materials for the NCRAC.
 - a. Develop Whirling Disease for Trout and Salmon Aquaculturists Fact Sheet.

BUDGET

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 1: Objectives 1,2, and 4	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Donald L. Garling			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. <u>1</u> Graduate Students			\$1,742	
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →			\$1,742	
B. Fringe Benefits (If charged as Direct Costs)			\$133	
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$1,875	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$150	
F. Travel			\$1,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250	
J. Total Direct Costs (C through I) →			\$3,275	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$3,275	
M. Other →				
N. Total Amount of This Request →			\$3,275	\$
O. Cost Sharing (If Required Provide Details)		\$14,785		

NOTE: Signatures required only for Revised Budget

This is Revision No. →

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

BUDGET

ORGANIZATION AND ADDRESS Department of Fisheries and Wildlife Michigan State University East Lansing, MI 48824-1222			USDA AWARD NO. Year 2: Objectives 1,2, and 4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Donald L. Garling			FUNDS REQUESTED by PROPOSER		
			FUNDS APPROVED BY CSREES (If Different)		
A. Salaries and Wages			\$		
CSREES FUNDED WORK MONTHS					
			Calendar	Academic	Summer
1. No. of Senior Personnel					
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies			\$100		
F. Travel			\$1,000		
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$100), Postage (\$50), Photocopying (\$100)			\$250		
J. Total Direct Costs (C through I) →			\$1,350		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$1,350		
M. Other →					
N. Total Amount of This Request →			\$1,350	\$	
O. Cost Sharing (If Required Provide Details)			\$14,383		

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

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

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Garling)

Objectives 1, 2, and 4

- A. Salaries and Wages.** A whirling disease fact sheet will be developed with the assistance of a graduate student (0.06 FTE). Responsibilities of the graduate student will be to collect and review existing reference materials, update the annotated bibliography through the end of 1999, draft text, and secure graphics for the publication.
- B. Fringe Benefits.** MSU requires medical coverage for graduate extension assistants which is estimated to be \$133 for 0.06 FTE.
- E. Materials and Supplies.** General office supplies such as paper and toner - Year 1: \$150; Year 2: \$100.
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Michigan Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).
- I. All Other Direct Costs.** Annual costs: telephone (\$100), postage (\$50), and photocopying (\$100).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Major Actions for Each Objective

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

BUDGET

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

BUDGET

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

BUDGET EXPLANATION FOR UNIVERSITY OF MINNESOTA-DULUTH

(Gunderson)

Objectives 1-3

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

PROPOSED ACTIVITIES FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Major Actions for Each Objective

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

BUDGET

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

BUDGET

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

BUDGET EXPLANATION FOR MICHIGAN STATE UNIVERSITY

(Kinnunen)

Objectives 1-3

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

PROPOSED ACTIVITIES FOR KANSAS STATE UNIVERSITY

(Lee)

Major Actions for Each Objective

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

BUDGET

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

BUDGET

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

BUDGET EXPLANATION FOR KANSAS STATE UNIVERSITY

(Lee)

Objectives 1 and 2

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

PROPOSED ACTIVITIES FOR IOWA STATE UNIVERSITY

(Morris)

Major Actions for Each Objective

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

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Ecology Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 1: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Joseph E. Morris			FUNDS REQUESTED by PROPOSER		
			FUNDS APPROVED BY CSREES (If Different)		
A. Salaries and Wages			CSREES FUNDED WORK MONTHS		
1. No. of Senior Personnel			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. <u>1</u> Prebaccalaureate Students					\$3,840
e. ___ Secretarial-Clerical					
f. <u>1</u> Technical, Shop and Other					\$10,191
Total Salaries and Wages →					\$14,031
B. Fringe Benefits (If charged as Direct Costs)					\$1,719
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					\$15,750
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies					\$1,125
F. Travel					\$4,750
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telecommunications (\$900), Postage (\$350), Photocopying (\$600), Video camera rental (\$525)					\$2,375
J. Total Direct Costs (C through I) →					\$24,000
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →					\$24,000
M. Other →					
N. Total Amount of This Request →					\$24,000
O. Cost Sharing (If Required Provide Details)			\$13,205		

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

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

BUDGET

ORGANIZATION AND ADDRESS Department of Animal Ecology Iowa State University Ames, IA 50011-3221			USDA AWARD NO. Year 2: Objectives 1-4								
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____							
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Joseph E. Morris			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)							
A. Salaries and Wages			CSREES FUNDED WORK MONTHS								
1. No. of Senior Personnel			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td align="center">Calendar</td> <td align="center">Academic</td> <td align="center">Summer</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	Calendar	Academic	Summer				\$	
Calendar	Academic	Summer									
a. ___ (Co)-PI(s)/PD(s)											
b. ___ Senior Associates											
2. No. of Other Personnel (Non-Faculty)											
a. ___ Research Associates-Postdoctorates											
b. ___ Other Professional											
c. ___ Graduate Students											
d. <u>1</u> Prebaccalaureate Students			\$3,840								
e. ___ Secretarial-Clerical											
f. <u>1</u> Technical, Shop and Other			\$10,191								
Total Salaries and Wages →			\$14,031								
B. Fringe Benefits (If charged as Direct Costs)			\$1,719								
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$15,750								
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)											
E. Materials and Supplies			\$1,125								
F. Travel			\$4,750								
1. Domestic (Including Canada)											
2. Foreign (List destination and amount for each trip.)											
G. Publication Costs/Page Charges											
H. Computer (ADPE) Costs											
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telecommunications (\$900), Postage (\$350), Photocopying (\$600), Video camera rental (\$525)			\$2,375								
J. Total Direct Costs (C through I) →			\$24,000								
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)											
L. Total Direct and Indirect Costs (J plus K) →			\$24,000								
M. Other →											
N. Total Amount of This Request →			\$24,000	\$							
O. Cost Sharing (If Required Provide Details)		\$13,280									

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

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

BUDGET EXPLANATION FOR IOWA STATE UNIVERSITY

(Morris)

Objectives 1-4

- A. Salaries and Wages.** Year 1: Student labor - \$3,840 (480 hr @\$8.00/hr for assistance with data collection related to Yellow Perch Manual). Technical - \$6,066 (technical writing for Yellow Perch Manual); and \$4,125 (filming and editing by ISU Extension Media personnel - Yellow Perch Video). Year 2: Student labor - \$3,840 (480 hr @\$8.00/hr for assistance with data collection related to Yellow Perch Manual). Technical - \$6,066 (\$2,000 technical writing and \$4,066 technical editing for Yellow Perch Manual); and \$4,125 (technical assistance consisting of final editing and voice over by ISU Extension Media personnel - Yellow Perch Video).
- B. Fringe Benefits.** Year 1: Hourly labor - 12% of \$3,840 = \$461; technical assistance @30.5% of \$4,125 = \$1,258. Year 2: Hourly labor - 12% of \$3,840 = \$461; technical assistance @30.5% of \$4,125 = \$1,258.
- E. Materials and Supplies.** Annual costs: general office supplies such as paper, pens, and toner (\$1,125).
- F. Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Iowa Aquaculture Association at a destination to be determined by the aquaculture association (\$500); a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500); and travel to destinations to be determined to collect on-site video footage (\$3,750).
- I. All Other Direct Costs.** Annual costs: telecommunications (\$900), postage (\$350), photocopying (\$600), and video camera rental (\$525).

PROPOSED ACTIVITIES FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Major Actions for Each Objective

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

BUDGET

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

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

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

BUDGET

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

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

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

BUDGET EXPLANATION FOR UNIVERSITY OF MISSOURI-COLUMBIA

(Pierce)

Objectives 1 and 2

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

PROPOSED ACTIVITIES FOR PURDUE UNIVERSITY

(Swann)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
 - b. Coordinating distribution of NCRAC Annual Reports, extension publications, and newsletters with the NCRAC publications coordinator, Midwest extension contacts, and Midwest aquaculture associations, through the Aquaculture Network Information Center (AquaNIC).
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 by the Illinois-Indiana Sea Grant Program to the extension chairperson for distribution to all state contacts once annually.
 - d. Providing a link between NCRAC, public, and private aquaculturists and other appropriate individuals or groups in Indiana and 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.
 - f. Coordinating distribution of NCRAC extension and technical publications with the NCRAC publications coordinator through the Aquaculture Network Information Center (AquaNIC).
3. Providing in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Providing one update on AquaNIC to extension personnel at biennial North Central Region Aquaculture Conference.
 - b. Providing hands-on demonstrations at state in-service training's conducted by NCRAC extension contacts as requested.
 - c. Create Web sites for all Midwest aquaculture associations.
4. Develop and implement aquaculture education programs and materials for the NCR.
 - a. Work with the Southern Regional Aquaculture Center to develop an Agriculture Database for Decision Support for Channel Catfish.
 - b. Write one technical bulletin on Aquaculture Business Plan.

BUDGET

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 1: Objectives 1-4								
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____							
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) LaDon Swann			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)							
A. Salaries and Wages			CSREES FUNDED WORK MONTHS								
1. No. of Senior Personnel			<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td align="center">Calendar</td> <td align="center">Academic</td> <td align="center">Summer</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	Calendar	Academic	Summer				\$	
Calendar	Academic	Summer									
a. ___ (Co)-PI(s)/PD(s)											
b. ___ Senior Associates			\$								
2. No. of Other Personnel (Non-Faculty)			\$								
a. ___ Research Associates-Postdoctorates			\$								
b. ___ Other Professional			\$								
c. ___ Graduate Students			\$								
d. <u>2</u> Prebaccalaureate Students			\$4,660	\$							
e. ___ Secretarial-Clerical			\$								
f. <u>1</u> Technical, Shop and Other			\$2,000	\$							
Total Salaries and Wages →			\$6,660	\$							
B. Fringe Benefits (If charged as Direct Costs)			\$								
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →			\$6,660	\$							
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)			\$								
E. Materials and Supplies			\$2,600	\$							
F. Travel			\$2,000	\$							
1. Domestic (Including Canada)			\$								
2. Foreign (List destination and amount for each trip.)			\$								
G. Publication Costs/Page Charges			\$								
H. Computer (ADPE) Costs			\$								
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Photocopying (\$475); Typing, editing, and graphics (\$2,000); CD duplication (\$1,000); Computer maintenance (\$440)			\$3,915	\$							
J. Total Direct Costs (C through I) →			\$15,175	\$							
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)			\$								
L. Total Direct and Indirect Costs (J plus K) →			\$15,175	\$							
M. Other →			\$								
N. Total Amount of This Request →			\$15,175	\$							
O. Cost Sharing (If Required Provide Details)		\$4,070									

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

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

BUDGET

ORGANIZATION AND ADDRESS Purdue Research Foundation Office of Sponsored Programs West Lafayette, IN 47907-1021			USDA AWARD NO. Year 2: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) LaDon Swann			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			\$		
1. No. of Senior Personnel					
			CSREES FUNDED WORK MONTHS		
			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. <u>1</u> Prebaccalaureate Students				\$4,160	
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →				\$4,160	
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				\$4,160	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies				\$1,400	
F. Travel				\$1,000	
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Photocopying (\$200), Computer maintenance (\$440)				\$640	
J. Total Direct Costs (C through I) →				\$7,200	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →				\$7,200	
M. Other →					
N. Total Amount of This Request →				\$7,200	\$
O. Cost Sharing (If Required Provide Details)			\$4,765		
NOTE: Signatures required only for Revised Budget			This is Revision No. →		
NAME AND TITLE (Type or print)		SIGNATURE		DATE	
Principal Investigator/Project Director					
Authorized Organizational Representative					

BUDGET EXPLANATION FOR PURDUE UNIVERSITY

(Swann)

Objectives 1-4

- A. Salaries and Wages.** Year 1: \$4,160 for student help for AquaNIC, \$2,000 for technical help for Aquaculture Business Plan Guide; and \$500 for student help for NCID. Year 2: \$4,160 for student help for AquaNIC.
- E. Materials and Supplies.** Year 1: general office supplies such as paper, toner, and computer software upgrades (\$1,400) and resource materials for Aquaculture Business Plan Guide (\$700) and NCID (\$500). Year 2: general office supplies such as paper, toner, and computer software upgrades (\$1,400).
- F. Travel.** Year 1: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Indiana Aquaculture Association at a destination to be determined by the aquaculture association (\$500); a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500); planning meetings for the Aquaculture Business Plan Guide at destinations to be determined within the North Central Region (\$500); and a planning meeting for NCID at a destination to be determined (\$500). Year 2: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Indiana Aquaculture Association at a destination to be determined by the aquaculture association (\$500) and a 1-day meeting of another state aquaculture association within the North Central Region at a destination to be determined (\$500).
- I. All Other Direct Costs.** Year 1: photocopying (\$475); typing, editing, and graphics (\$2,000); CD duplication (\$1,000); computer maintenance (\$440). Year 2: photocopying (\$200) and computer maintenance (\$440).

PROPOSED ACTIVITIES FOR OHIO STATE UNIVERSITY

(Tiu)

Major Actions for Each Objective

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

BUDGET

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

BUDGET

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

BUDGET EXPLANATION FOR OHIO STATE UNIVERSITY

(Tiu)

Objectives 1-4

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

PROPOSED ACTIVITIES FOR NORTH DAKOTA STATE UNIVERSITY

(Unnamed)

Major Actions for Each Objective

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Economics and Marketing Research Work Group and Extension Work Group.
 - b. Participating in Research Work Group meetings to provide input on design and feedback based on documented industry needs.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the annual in-state aquaculture meeting to assist state aquaculture associations.
 - b. Attending one additional state aquaculture meeting in the region to interact with other state extension personnel as well as aquaculture industry representatives.
 - c. Providing 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.
3. Provide in-service training for CES, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate in CES and Sea Grant agent training sessions with other NCRAC Extension personnel.
4. Develop and implement aquaculture education programs and materials for the NCR.
 - a. Provide a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in North Dakota and the region.

BUDGET

ORGANIZATION AND ADDRESS Carrington Research Extension Center North Dakota State University Carrington, ND 58421			USDA AWARD NO. Year 1: Objectives 1-4	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed			FUNDS REQUESTED by PROPOSER	
A. Salaries and Wages			FUNDS APPROVED BY CSREES (If Different)	
1. No. of Senior Personnel			\$	
a. ___ (Co)-PI(s)/PD(s)				
b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty)				
a. ___ Research Associates-Postdoctorates				
b. ___ Other Professional				
c. ___ Graduate Students				
d. ___ Prebaccalaureate Students				
e. ___ Secretarial-Clerical				
f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies			\$350	
F. Travel			\$1,000	
1. Domestic (Including Canada)				
2. Foreign (List destination and amount for each trip.)				
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$75), Postage (\$50), Photocopying (\$25)			\$150	
J. Total Direct Costs (C through I) →			\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$1,500	
M. Other →				
N. Total Amount of This Request →			\$1,500	
O. Cost Sharing (If Required Provide Details)			\$	

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

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

BUDGET

ORGANIZATION AND ADDRESS Carrington Research Extension Center North Dakota State University Carrington, ND 58421			USDA AWARD NO. Year 2: Objectives 1-4		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed					
A. Salaries and Wages			CSREES FUNDED WORK MONTHS		
1. No. of Senior Personnel			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					\$
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies				\$350	
F. Travel				\$1,000	
1. Domestic (Including Canada)					
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.) Telephone (\$75), Postage (\$50), Photocopying (\$25)				\$150	
J. Total Direct Costs (C through I) →				\$1,500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →				\$1,500	
M. Other →					
N. Total Amount of This Request →				\$1,500	\$
O. Cost Sharing (If Required Provide Details)				\$	
NOTE: Signatures required only for Revised Budget			This is Revision No. →		
NAME AND TITLE (Type or print)		SIGNATURE		DATE	
Principal Investigator/Project Director					
Authorized Organizational Representative					

BUDGET EXPLANATION FOR NORTH DAKOTA STATE UNIVERSITY

(Unnamed)

Objectives 1-4

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

PROPOSED ACTIVITIES FOR UNIVERSITY OF NEBRASKA-LINCOLN

(Unnamed)

Major Actions for Each Objective

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

BUDGET

ORGANIZATION AND ADDRESS Department of Forestry, Fisheries and Wildlife University of Nebraska-Lincoln Lincoln, NE 68583-0814			USDA AWARD NO. Year 1: Objective 2	
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)
A. Salaries and Wages 1. No. of Senior Personnel	CSREES FUNDED WORK MONTHS			\$
	Calendar	Academic	Summer	
a. ___ (Co)-PI(s)/PD(s) b. ___ Senior Associates				
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates b. ___ Other Professional c. ___ Graduate Students d. ___ Prebaccalaureate Students e. ___ Secretarial-Clerical f. ___ Technical, Shop and Other				
Total Salaries and Wages →				
B. Fringe Benefits (If charged as Direct Costs)				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)				
E. Materials and Supplies				
F. Travel				
			\$500	
G. Publication Costs/Page Charges				
H. Computer (ADPE) Costs				
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)				
J. Total Direct Costs (C through I) →			\$500	
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)				
L. Total Direct and Indirect Costs (J plus K) →			\$500	
M. Other →				
N. Total Amount of This Request →			\$500	\$
O. Cost Sharing (If Required Provide Details)		\$		

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

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

BUDGET

ORGANIZATION AND ADDRESS Department of Forestry, Fisheries and Wildlife University of Nebraska-Lincoln Lincoln, NE 68583-0814			USDA AWARD NO. Year 2: Objective 2		
			Duration Proposed Months: <u>12</u>	Duration Awarded Months: _____	
PRINCIPAL INVESTIGATOR(S)/PROJECT DIRECTOR(S) Unnamed			FUNDS REQUESTED by PROPOSER	FUNDS APPROVED BY CSREES (If Different)	
A. Salaries and Wages			\$		
1. No. of Senior Personnel					
			CSREES FUNDED WORK MONTHS		
			Calendar	Academic	Summer
a. ___ (Co)-PI(s)/PD(s)					
b. ___ Senior Associates					
2. No. of Other Personnel (Non-Faculty)					
a. ___ Research Associates-Postdoctorates					
b. ___ Other Professional					
c. ___ Graduate Students					
d. ___ Prebaccalaureate Students					
e. ___ Secretarial-Clerical					
f. ___ Technical, Shop and Other					
Total Salaries and Wages →					
B. Fringe Benefits (If charged as Direct Costs)					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) →					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)					
E. Materials and Supplies					
F. Travel					
1. Domestic (Including Canada)			\$500		
2. Foreign (List destination and amount for each trip.)					
G. Publication Costs/Page Charges					
H. Computer (ADPE) Costs					
I. All Other Direct Costs (Attach supporting data. List items and dollar amounts. Details of Subcontracts, including work statements and budget, should be explained in full in proposal.)					
J. Total Direct Costs (C through I) →			\$500		
K. Indirect Costs If Applicable (Specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					
L. Total Direct and Indirect Costs (J plus K) →			\$500		
M. Other →					
N. Total Amount of This Request →			\$500	\$	
O. Cost Sharing (If Required Provide Details)			\$		

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

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

BUDGET EXPLANATION FOR UNIVERSITY OF NEBRASKA-LINCOLN

(Unnamed)

Objective 2

- F. **Travel.** Annual costs: transportation, lodging, and meal expenses for the PI to attend a 1-day annual meeting of the Nebraska Aquaculture Association at a destination to be determined by the aquaculture association (\$500).

BUDGET SUMMARY FOR EACH PARTICIPATING INSTITUTION

Year 1

	UW-Milw	MSU	UMD	KSU	ISU	UMC	Purdue	OSU	NDSU	UNL	TOTALS
Salaries and Wages	\$0	\$1,742	\$0	\$0	\$14,031	\$0	\$6,660	\$0	\$0	\$0	\$22,433
Fringe Benefits	\$0	\$133	\$0	\$0	\$1,719	\$0	\$0	\$0	\$0	\$0	\$1,852
Total Salaries, Wages, and Fringe Benefits	\$0	\$1,875	\$0	\$0	\$15,750	\$0	\$6,660	\$0	\$0	\$0	\$24,285
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,200
Materials and Supplies	\$0	\$250	\$250	\$500	\$1,125	\$500	\$2,600	\$500	\$350	\$0	\$4,875
Travel	\$0	\$2,400	\$1,000	\$1,000	\$4,750	\$1,000	\$2,000	\$500	\$1,000	\$500	\$14,150
All Other Direct Costs	\$500	\$250	\$250	\$0	\$2,375	\$0	\$3,915	\$500	\$150	\$0	\$7,940
TOTAL PROJECT COSTS	\$500	\$4,775	\$1,500	\$1,500	\$24,000	\$1,500	\$15,175	\$1,500	\$1,500	\$500	\$52,450

Year 2

	UW-Milw	MSU	UMD	KSU	ISU	UMC	Purdue	OSU	NDSU	UNL	TOTALS
Salaries and Wages	\$0	\$0	\$0	\$0	\$14,031	\$0	\$4,160	\$0	\$0	\$0	\$18,191
Fringe Benefits	\$0	\$0	\$0	\$0	\$1,719	\$0	\$0	\$0	\$0	\$0	\$1,719
Total Salaries, Wages, and Fringe Benefits	\$0	\$0	\$0	\$0	\$15,750	\$0	\$4,160	\$0	\$0	\$0	\$19,910
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Materials and Supplies	\$0	\$200	\$250	\$500	\$1,125	\$500	\$1,400	\$500	\$350	\$0	\$4,825
Travel	\$0	\$2,400	\$1,000	\$1,000	\$4,750	\$1,000	\$1,000	\$500	\$1,000	\$500	\$13,150
All Other Direct Costs	\$500	\$250	\$250	\$0	\$2,375	\$0	\$640	\$500	\$150	\$0	\$4,665
TOTAL PROJECT COSTS	\$500	\$2,850	\$1,500	\$1,500	\$24,000	\$1,500	\$7,200	\$1,500	\$1,500	\$500	\$42,550

RESOURCE COMMITMENT FROM INSTITUTIONS¹

Institution	Year 1	Year 2
Michigan State University		
Salaries and Benefits: SY @ 0.10 FTE (Garling)	\$9,180	\$9,500
Supplies and waiver of overhead (Garling)	\$5,605	\$4,883
Salaries and Benefits: SY @ 0.20 FTE (Kinnunen)	\$13,000	\$13,200
Total	\$27,785	\$27,583
University of Minnesota-Duluth		
Salaries and Benefits: SY @ 0.25 FTE	\$1,915	\$1,915
Iowa State University		
Salaries and Benefits: SY @ 0.05 FTE	\$3,125	\$3,200
Waiver of Overhead	\$10,080	\$10,080
Total	\$13,205	\$13,280
University of Missouri-Columbia		
Salaries and Benefits: SY @ 0.05 in Year 1; 0.10 in Year 2	\$2,250	\$4,500
Waiver of Overhead	\$700	\$1,400
Total	\$2,950	\$5,900
Purdue University		
Salaries and Benefits: SY @ 0.05	\$1,985	\$2,085
Waiver of Overhead	\$2,085	\$2,680
Total	\$4,070	\$4,765
Ohio State University		
Salaries and Benefits: SY @ 0.05 FTE	\$2,228	\$2,228
Waiver of Overhead	\$150	\$150
Total	\$2,378	\$2,378
Total per Year	\$52,303	\$55,821
GRAND TOTAL	\$108,124	

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

SCHEDULE FOR COMPLETION OF OBJECTIVES

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

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

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

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

LIST OF PRINCIPAL INVESTIGATORS

Fred P. Binkowski, University of Wisconsin-Milwaukee

Donald L. Garling, Michigan State University

Jeffrey L. Gunderson, University of Minnesota-Duluth

Ronald E. Kinnunen, Michigan State University

Charles D. Lee, Kansas State University

Joseph E. Morris, Iowa State University

Robert A. Pierce II, University of Missouri-Columbia

LaDon Swann, Purdue University

Laura G. Tiu, Ohio State University

Unnamed, North Dakota State University

Unnamed, University of Nebraska-Lincoln

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EDUCATION

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POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
World Aquaculture Society

SELECTED PUBLICATIONS

- Letcher, B.H., J.A. Rice, L.B. Crowder, and F.P. Binkowski. 1996. Size-dependent effects of continuous and intermittent feeding on starvation time and mass loss in starving yellow perch larvae and juveniles. *Transactions of the American Fisheries Society* 125:14-26.
- Binkowski, F.P., and L.G. Rudstam. 1994. The maximum daily ration of Great Lakes bloater. *Transactions of the American Fisheries Society* 123:335-343.
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- Binkowski, F.P., and S.I. Doroshov, editors. 1985. *Proceedings of North American sturgeons: biology and aquaculture potential*. Kluwer Academic Publications, Dordrecht, Netherlands.

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EDUCATION

B.S. University of Dayton, 1970
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Ph.D. Mississippi State University, 1975

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Sampson, T. and D.L. Garling. In press. Common parasites of sunfish. North Central Regional Aquaculture Center.
- Garling, D.L. In press. Fee-fishing pond management. North Central Regional Aquaculture Center.
- Ramseyer, L.J., and D.L. Garling. 1997. Fish nutrition and aquaculture waste management. Pages 57-62 *in* Proceedings of the 1997 North Central Aquaculture Conference, Indianapolis, Indiana, February 6-7, 1997. Illinois-Indiana Sea Grant Program, Publication CES-305.
- Garling, D.L. 1995. Generally accepted agricultural and management practices for fish. *In*: Michigan Right to Farm Task Force on Farm Animal Care. Generally accepted agricultural and management practices for farm animals. Michigan Department of Agriculture, Lansing, Michigan.
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- Cain, K., and D. Garling. 1993. Trout culture in the north central region. NCRAC Fact Sheet Series #18, NCRAC Publications Office, Iowa State University, Ames.

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EDUCATION

B.S. University of Wisconsin-Stevens Point, 1975
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POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society (Minnesota Chapter: President 1991-1992)
International Association of Astacology (current Board member)
International Association for Great Lakes Research
Sea Grant Advisor Service Association (Great Lakes Network)
Minnesota Association of Extension Agents (President of the MACENRDP Section 1989-1990)
Sea Grant Advisory Service Association -- Great Lakes Network

SELECTED PUBLICATIONS

- 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. Technical Bulletin Series #112, NCRAC Publications Office, Iowa State University, Ames, Iowa.
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- Gunderson, J., C. Richards, and M. McDonald. 1996. Soft crayfish production by eyestalk ablation: can it be profitable. Pages 567-576 in W. Momot, editor. *Freshwater Crayfish XI*.
- Gunderson, J. 1996. Three-state exotic species boater survey: what do boaters know and do they care? Pages 24-26 in *Proceedings of Five Regional Citizen Education Workshops on Lake Management 1994-1995*. U.S. EPA Region 5 Citizen Education Grant.
- Richards, C., J. Gunderson, P. Tucker, and M. McDonald. 1995. Crayfish and baitfish culture in wild rice paddies. Tech Rep No. NRRI/TR-95/39.

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EDUCATION

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Ph.D. Michigan Technological University, 1997

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Kinnunen, R.E. 1996. Walleye fingerling culture in undrainable ponds. Pages 135-145 *in* R. C. Summerfelt, editor. Walleye culture manual. NCRAC Culture Series #101, NCRAC Publications Office, Iowa State University, Ames.
- Kinnunen, R.E. 1994. Upper Peninsula of Michigan Lake Superior 1992 transient boater marketing and economics survey. Michigan Sea Grant College Program (MICHU-SG-94-204).
- Kinnunen, R.E. 1994. A comparison of the Escanaba 1988 and 1992 transient boater marketing and economics survey. Michigan Sea Grant College Program (MICHU-SG-94-205).
- Kinnunen, R.E. 1992. North Central Region 1990: Salmonid egg and fingerling purchase, production, and sales. NCRAC Technical Bulletin Series #103. NCRAC Publications Office, Iowa State University, Ames..
- Kinnunen, R.E., and E.M. Mahoney. 1989. 1987 Upper Michigan charter fishing study. Michigan Sea Grant Extension (MICHU-SG-89-501).
- Kinnunen, R., J. Lempke, and T. Sundstrom. 1987. Behavior patterns of divers visiting the Alger Underwater Preserve. Michigan Sea Grant Extension (MICHU-SG-87-505).
- Peterson, J., T. Sundstrom, and R. Kinnunen. 1987. 1986 Recreational diving activity in Michigan bottomland preserves. Michigan Sea Grant Extension (MICHU-SG-87-506).

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EDUCATION

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POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

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

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POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

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

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EDUCATION

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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
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EDUCATION

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Ph.D. Purdue University, Expected 1998

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

Swann, D.L., C. Bidwell, and P. Collodi. 1998. Fish reproduction in aquaculture. IL-IN-SG-98-20. CD-ROM

Swann, D.L., J. Brown, S. Katz, T. Luba, and R. Merzdorf. 1998. Getting started in freshwater aquaculture. IL-IN-SG-97-4 and CD-AS-2. CD-ROM.

Swann, D.L., and A. Macbride. 1997. Testing dissolved oxygen using the Winkler method. IL-IN-SG-97-3 and CD-AS-1. CD-ROM.

Swann, D.L. 1997. Fish farmers guide to understanding water quality. IL-IN-SG-97-2 and AS-503.

Swann, D.L. 1997. Smallmouth bass. IL-IN-SG-96-18 and AS-508

Swann, D.L., J.E. Morris, J.R. Riepe, and D. Selock. 1995. Cage culture of fish in the North Central Region. NCRAC Technical Bulletin Series #110, NCRAC Publications Office, Iowa State University, Ames.

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POSITIONS

Research and Extension Associate (1998-present), Ohio State University
Co-Investigator for Aquaculture (1992-1998), Kentucky State University
Research Assistant for Aquaculture (1991-1992), Kentucky State University
Technical Assistant (1990), Mississippi State University
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

Kentucky Chapter of the American Fisheries Society
U.S. Chapter World Aquaculture Society
World Aquaculture Society

SELECTED PUBLICATIONS

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