

NORTH CENTRAL REGIONAL AQUACULTURE CENTER EXTENSION PROJECT

Chairperson: Fred P. Binkowski, University of Wisconsin-Milwaukee

Administrative Advisor: David C. Petritz, Purdue University

Funding Request: \$110,179

Duration: 2 Years (September 1, 1993 - August 31, 1995)

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, Sea Grant Advisory Service, and other landowner assistance personnel.
4. Develop and implement aquaculture educational programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:
 - a. Hybrid Striped Bass Workshop/Proceedings
 - b. Walleye Workshop/Culture Guide
 - c. Yellow Perch Workshop/Extension Materials
 - d. Video, Marketing Aquaculture Products in the NCR and the U.S.

Proposed Budgets:

Institution	Principal Investigator(s)	Objective(s)	Year 1	Year 2	Total
University of Wisconsin-Milwaukee	Fred P. Binkowski	1-4	\$2,430	\$2,430	4,860
Ohio State University	James E. Ebeling	1-4	\$1,550	\$300	1,850
Michigan State University	Donald L. Garling	1,2,&4	\$7,850	\$2,750	10,600
University of Minnesota	Jeffrey L. Gunderson	1 & 2	\$1,500	\$250	1,750
Kansas State University	F. Robert Henderson	2 & 4	\$3,175	\$6,525	9,700
Univ. of Nebraska-Lincoln	Terrence B. Kayes	1-4	\$13,691	\$6,340	20,031
Michigan State University	Ronald E. Kinnunen	1,2,&4	\$1,750	\$250	2,000
Iowa State University	Joseph E. Morris	1-4	\$10,500	\$11,250	21,750
University of Missouri	Robert A. Pierce II	2 & 4	\$2,250	\$1,500	3,750
Southern Illinois University	Daniel A. Selock	1-4	\$11,150	\$15,600	26,750
Purdue University	LaDon Swann	1-4	\$4,169	\$2,919	7,088
TOTALS			60,015	50,114	110,129

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BACKGROUND

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 1982 world fishery production was 77 million metric tons. In 1989 the world's commercial fisheries harvest increased to 99.5 million metric tons. World fish harvests have risen for the last 12 consecutive years and, over that time, have increased 44 percent. If this trend continues, experts predict that there will be a serious shortfall of sea food products by the year 2000.

A potential strategy to balance the shortfall is food production through aquaculture technology. More than 10% of the world's fish products are produced through aquaculture (Hougart 1988a). In 1960 aquaculture produced 1.0 million metric tons of fishery products. In 1978 this increased to 5.0 million metric tons and by 1982 it had risen to 7.7 million metric tons. Aquaculture is now growing at an annual rate of more than 8% per year (Avault 1986) and the international production figure for aquaculture in 1988 is 14.5 million metric tons.

The increase in the world population and the increase in the demand for fish products has caused fish prices to increase significantly. For example, since 1967 in the United States the price for fish products has risen faster than any other commodity. Almost all the channel catfish and rainbow trout consumed in the U.S. are produced through aquaculture. Trout sales in the U.S. in 1990 equaled \$76.9 million and catfish sales were valued at \$323 million in 1990. Total sales value of all aquaculture produced seafood products in the U.S. in 1990 was \$760 million. This represents a growth rate of 265% between 1980 and 1990. World experts estimate that aquaculture technology could produce between 20 to 25 million metric tons by the year 2000. As Americans became more health conscious, the demand for fisheries production has increased; per capita consumption has grown from 12.8 lbs. in 1980 to a record of 15.9 lbs. in 1989. The goal of some organizations in the seafood industry is to increase consumption another 25% over the coming decade so that by 2000 it would reach 20 lbs. per capita. If this goal is achieved, it would mean that 1.0 to 1.2 billion more pounds of seafood would be consumed annually in the United States.

The United States imported about \$6.6 billion dollars of seafood products in 1985 versus \$1.1 billion exported for a trade deficit of \$5.5 billion. This deficit continued to increase over the past several years (Hougart 1988b). However, in 1989 a gradual decline began and in 1990 the deficit dropped to 3.4 billion. 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, a viable aquaculture industry utilizing these resources would have a substantial economic impact on the region and the entire United States. This region has 25% of the country's population but produces less than 1% of the fish production.

Aquaculture-related business in the North Central Region has increased dramatically in the past several years. Activity in this industry is on the verge of making a leap forward. This is evident in the interest in and the requests for information channeled through the USDA and NCRAC extension. The 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 fin fish.

Since 1980, following the passage of the national aquaculture plan, many attempts have been made to promote aquaculture in the United States. Many regional states have signed into law state aquaculture plans which are expected to set the policy and guidelines for aquaculture in the region.

North Central Region aquaculture resource conditions are ideally suited for both coldwater and coolwater species, which include trout, salmon, whitefish, ciscos, walleye, perch, hybrid striped bass, and northern pike, all of which are marketable. Some states in this region (Missouri, Kansas, Illinois, Indiana) have established channel catfish operations similar to the southern states. However, due to climatic conditions in the North Central Region we believe it is necessary to consider cool water and cold water species as alternatives. Species like walleye and yellow perch are already considered desirable species in the regional markets. Culture of warmer water species in our region is likely to be largely confined to indoor recirculating systems. With the losses of some important rural industries in the region this infant business may be an excellent catalyst for increasing entrepreneurship and jobs. Aquaculture may be one alternative to stimulate rural economics within the North Central Region.

We feel aquaculture can be the catalyst for new industries and enhance the competitiveness of regional businesses while maintaining the quality of living that regional residents have become accustomed to. Over the next 10 years aquacultural production in the region will come to equal, if not surpass, the wild production of fish utilized for human consumption. Undoubtedly commercial fishing will be strictly regulated by quotas and out-competed by recreational fishing thus reducing the amount of fish for retail sales. Consequently, seafood products including fin fish will become more dependent on aquaculture. In addition, with the increasing problem of contaminants, the quality of food fish aquaculturally produced will exceed that of the wild produced fish.

For the North Central Region 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.

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 North Central Regional Aquaculture Center (NCRAC).

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 State and Federal agencies.

With the growing interest in aquaculture regionwide the need for more public outreach by the Cooperative Extension Service, Sea Grant specialists and researchers has become apparent. The site visits, hands-on assistance and personal interviews were the fundamental components of the NCRAC extension over the past years. Initially these activities received a significant portion of our program efforts. Because of the continued increase in these requests we feel it is essential to modify our present advisory services mechanism to meet the needs of the clients and maintain a productive and cost effective aquaculture extension program.

In the North Central Region, opportunities exist for aquaculture to provide significant long-term economic development. 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.

To realize these opportunities interested parties need access to sound advice concerning the development and operation of aquaculture ventures. This is where NCRAC extension program can play a vital role.

Hundreds of inquiries by persons interested in the potential of regional species for aquaculture are referred to us each year. Persons requesting information have diverse backgrounds with levels of interest ranging from operating 4-m plastic pools for backyard aquaculture, to wanting advice on small ponds which they own, to bait dealers with ponds, to sea food dealers, to restaurant owners interested in producing fresh fish on their own, to representatives of Native American groups interested in starting self-contained aquaculture operations on tribal lands, and even to aquacultural consultants representing serious entrepreneurs with financial backing.

This need for advice is also clearly evident by the high level of participation that occurred during previous aquaculture lecture/seminar series that have been presented throughout the region. 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.

We have provided on-site aquaculture advisory service to many clients. We continue to receive information requests from throughout the region.

Future emphasis will be placed on packaging this program in video formats that could be circulated and used throughout the region by the various advisory service specialists. "How to" manuals and workbooks would be developed for regionally-specific aquaculture practices. Practical aquaculture demonstrations

would be organized at both academic and private industry sites. Audio-visual materials for group lectures or traveling exhibits would be included.

A program of hands-on workshops to provide training and consultation would also be developed for those individuals with a serious interest in developing aquaculture facilities, and to assist in problem solving relative to existing fish farm operations.

In addition to the technical videos, Work Group participants will produce a marketing video. Marketing is often a major problem cited by fish farmers. This problem is often addressed in one to one consultations between the aquaculture specialist and fish farmers. A few Extension publications have been published on the subject of marketing aquaculture products. While more research is needed and currently being conducted; the basics of marketing is understood and to our knowledge, no video tape exists on this subject showing and explaining the basics of marketing aquaculture products in the North Central Region. This proposed video tape could serve a useful purpose in extending and expanding opportunities for fish growers to learn information helpful in expanding their markets and increasing their incomes.

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 Cooperative Extension Service (CES) designated contacts has been established to help maximize efficiency of education programs in the 12-state North Central Region.

In spite of the limited number of aquaculture FTEs (less than 4 FTEs) in this North Central Region, substantial progress in the previously described objectives has been made. In 1992 multiple extension liaisons have evolved for several research projects (economics, hybrid striped bass, walleye and yellow perch). This increase number of extension liaisons will help to improve the information transfer from research work groups to the public.

As a result of networking, all state extension contacts have up-to-date lists of regional and state publications. In 1993 a directory of regional aquaculture researchers, extension specialists and state associations will be compiled and made available to the public.

In-service training has taken place in Illinois, Indiana and Wisconsin. Multiple state representation has been noted at all sites and subsequent evaluation of these presentations have been completed. A satellite aquaculture conference is being planned for April 10, 1993 that will, in part, consist of extension efforts from Iowa, Illinois, Indiana, Michigan, and Nebraska personnel.

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, and (6) survey of salmonid producers. A video entitled "Something Fishy: Hybrid Striped Bass in Cages" has been distributed to regional extension contacts. Additional publications on the culture of hybrid striped bass, channel catfish and trout will soon be available in 1992-93. Initial drafts of publications on cage culture and recycle aquaculture will be completed in 1992. The use of these publications has helped to supplement individual states' publications in this region.

Beyond the above publications, numerous workshops have been held concerning such topics as recycle aquaculture and crawfish culture. In 1993, additional conferences on pond construction, general aquaculture and waste management have been planned.

ANTICIPATED BENEFITS

The North Central Regional Aquaculture Center Extension Work Group will continue and expand its efforts to promote and advance commercial aquaculture in a responsible fashion through an organized education/training outreach program. The primary benefits are: increase in public awareness through publications, short courses, and conferences regarding the potential of aquaculture as a viable agricultural enterprise in the North Central Region; technology transfer to enhance current and future production methodologies for selected species, such as walleye, hybrid striped bass, yellow perch, salmonids, and sunfish, through hands-on workshops and field demonstration projects; improve lines of communication between interstate aquaculture extension specialists and associated industry contacts; and enhance the legal and socioeconomic atmosphere for aquaculture in the North Central Region.

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). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:
 - a. Hybrid Striped Bass Workshop/Proceedings
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 - c. Yellow Perch Workshop/Extension Materials
 - d. Video, Marketing Aquaculture Products in NCR and the U.S.

PROCEDURES

Strengthen linkages between NCRAC Research and Extension Work Groups (Objective 1)

At least one extension Work Group member has been assigned to each research group. Multiple extension liaisons have been assigned to some research groups with the goal of increasing the amount of information coming out of research projects.

Research Work Group	Extension Liaison(s)	State(s)
Baitfish	Dan Selock*	IL
Crayfish	Jeff Gunderson*	MN
Economics	Don Garling Terry Kayes* Dan Selock LaDon Swann	MI NE IL IN
Effluents	LaDon Swann*	IN
Hybrid Striped Bass	Joe Morris* Dan Selock LaDon Swann	IA IL IN-IL
Salmonids	Jim Ebeling*	OH
Sunfish	Fred Binkowski*	WI
Walleye	Ron Kinnunen* Joe Morris	MI IA
Yellow Perch	Fred Binkowski Jim Ebeling Don Garling* Terry Kayes	WI OH MI NE

*Lead Liaison Person

Enhance the NCRAC extension network for aquaculture information transfer (Objective 2)

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

Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel (Objective 3)

Extension Work Group members Terry Kayes of the University of Nebraska-Lincoln (UN-L) and Joe Morris of Iowa State University (ISU) are presently planning a pilot multi-state in-service workshop on aquaculture-related topics, to be held in February 1993 at the Ak-Sar-Ben Aquarium in Gretna, Nebraska. As soon as the workshop program is decided (November 1992), the NCRAC State Extension Contacts for South Dakota, Missouri and Kansas will be asked to identify and extend invitations to potential participants from their respective states. Announcements in Nebraska and Iowa will be made through the normal extension channels.

The impact and benefits of the Ak-Sar-Ben workshop will be evaluated through questionnaires to assess the knowledge of participants at the beginning and end of the workshop and by a follow-up survey in Autumn 1993 of the use of knowledge gained. After the survey, the feasibility of holding multi-state aquaculture in-service training activities on a regular basis in the western part of the North Central Region will be examined by Kayes in consultation with the NCRAC State Extension Contacts of South Dakota, Iowa, Missouri and Kansas. As part of this effort, the Cooperative Extension Service administrators of these states will be polled for their willingness to co-sponsor and foster participation in such activities.

Kayes of the UN-L in 1993-1995 will develop and (when appropriate) implement mechanisms for inviting South Dakota, Iowa, Missouri and Kansas professionals to Nebraska aquaculture in-service training activities. Invitations to potential participants from outside Nebraska will be subject to administrative review by the UN-L Cooperative Extension Service and will be extended through the appropriate NCRAC State Extension Contacts.

Aquaculture in-service training activities in Nebraska will be coordinated by Kayes of the UN-L, and, depending on topic and facility requirements, will normally be conducted at the Ak-Sar-Ben Aquarium and adjacent (historic) Gretna Fish Hatchery near Gretna; the Calamus State Fish hatchery near Burwell; the Grove Trout Rearing Station near Royal; the Valentine State Fish hatchery near Valentine; the University of Nebraska West Central Research and Extension Center and adjacent North Platte State Fish Hatchery near North Platte; Coldwater Fish Farms, Inc. near Lisco; Sandhills Aquafarm near Keystone; Red Hook Fisheries, Inc. in David City; Midwest Fish Processors, Inc. in Humphrey; the Nebraska Center for Continuing Education in Lincoln; the UN-L Food Processing Center; or the UN-L East Union. All the necessary facilities and equipment to conduct aquaculture in-service training activities are available, or can be provided. When appropriate, in-service training sponsored by the UN-L Cooperative Extension Service will be done in cooperation with the Nebraska Game and Parks Commission, the Nebraska Department of Agriculture, and Nebraska Department of Economic Development, the UN-L Food Processing Center, and various industry participants or groups.

LaDon Swann (Purdue University) will develop Aquaculture Handbooks for 20 (CES) or Sea Grant field staff per state and hold ten copies in reserve. The three ring notebooks will be divided into 26 sections with each section containing a collection of fact sheets relevant to the section topic. The source for the adult education type fact sheets and bulletins will be selected to follow as close as possible the needs of the potential or practicing aquaculturists. NCRAC publications will be used where possible. New NCR specific publications will replace publications from other sources as they are developed and as per annual review of handbooks. Illinois and Indiana have distributed a series to every county Extension office in those states. The format used for the NCRAC Aquaculture Handbooks will closely follow the Illinois and Indiana series model. NCRAC Extension personnel will be contacted for input on the format and content of publications. State specific information will be solicited to substitute for general topic information. Examples of such a substitution will be the use of state directories in place of general information in the suppliers section and state specific information on regulations and aquatic weed control measures. This will allow more personalized handbook contents better suited for each NCR state.

Handbooks will be compiled at Purdue University and distributed to NCRAC Extension personnel. Identification of field staff and their in-service training on the use of the Aquaculture Handbook will be the responsibility of each Extension Contact.

Develop and implement aquaculture education programs and materials for the North Central Region (Objective 4)

At the 1992 NCRAC Program Planning Meeting held February 14-16, in Columbus, Ohio, the Industrial Advisory Council expressed a need for more tangible technique-centered educational tools to help farmers rear high priority fish species.

To meet this need the NCRAC Extension Work Group will focus its educational program efforts toward the following specific sub-objectives.

a. Hybrid Striped Bass Workshop/Proceedings

A planning committee consisting of Dan Selock of Southern Illinois University at Carbondale (SIU) as chairperson), Joe Morris (ISU), LaDon Swan (Purdue), Terry Kayes, (UN-L) and Chris Kohler (SIU) would organize and conduct a workshop on rearing hybrid striped bass.

This workshop would present concepts and examples of culture methods on the producer level. The committee would select topics and their order of presentation, manufacture audio and visual aids and printed materials, arrange for speakers, organize registration, promote and advertise via trade magazines and mailings, secure conference site and exhibit space, contact local hotels, and manage the conference budget.

Three ring binders containing fact sheets, descriptive slide sets, and very specific videos would be developed as tangible educational resources for the hybrid striped bass workshops.

The initial workshop would be located at Southern Illinois University in Carbondale, Illinois, in the fall of 1993 or 1994. The sessions would fill two days over a three day period -- afternoon, full day, morning.

Also, in 1993-94, Kayes (UN-Lincoln) and Morris (ISU) in cooperation with appropriate Extension Work Group members will initiate one or more hybrid bass workshops in the western part of the North Central Region (including South Dakota, Nebraska, Iowa, Missouri and Kansas) to be held in 1995-1997.

b. Walleye Workshop/Culture Guide

A walleye culture guide will be produced consisting of various chapters on all phases of walleye 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, and economics and marketing.

Video footage concerning broodstock collection, egg and sperm collection, general hatchery operations, intensive fry culture and pond culture will be collected for editing into future video productions.

Each chapter will also have a 2-4 page synopsis consisting of bullet 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 (SC), a managing editor and the chapter authors.

This committee will consist of:

1. NCRAC Associate Director - Joe Morris
2. Managing Editor - Bob Summerfelt (Iowa State University)
3. Extension Liaison - Ron Kinnunen (Michigan State University Sea Grant)
4. NCRAC Walleye Research Group Representative - Jeff Malison (University of Wisconsin-Madison)
5. Industry Representative - John Ringle (Leech Lake Tribal Council)
6. Minnesota Representative - Jeff Gunderson (University of Minnesota 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
5. Approve final copy of chapters

The Managing Editor will:

1. Communicate to NCRAC regarding project progress
2. Organize meetings of the SC
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
6. Be responsible for hiring of staff and technical editor.

Calendar for Walleye Culture Workshop/Guide

Date	Action
September 1993	Peer reviewers selected; chapters, authors discussed and selected
October 1993	Authors notified of their selection
May 1994	Authors submit first draft
June 1994	Manuscripts sent out for review
August 1994	Reviews returned and sent back to authors
November 1994	Authors' revision returned to managing editor
January 1995	First Technical editing. Manuscripts returned to authors.
March 1995	Manuscripts returned to managing editor - 1/2 day meeting at Minnesota Aquaculture Conference
May 1995	Second technical review
August 1995	ABSOLUTE DEADLINE

A half-day walleye culture workshop will be held in conjunction with the Minnesota Aquaculture Conference in March 1995. The conference with Jeff Gunderson as facilitator will cover the costs for conference literature and speakers' travel. This workshop would introduce the walleye culture guide to the public.

c. Yellow Perch Workshop/Extension Materials

The development and implementation of educational programs on yellow perch aquaculture will be done collaboratively by Don Garling of Michigan State University (MSU) and Terry Kayes (UN-L), working in concert with extension liaisons and researchers of the NCRAC Yellow Perch Work Group. Particular emphasis will be placed on the production of extension publications (fact sheets and bulletins) and instructional audio-visual materials (photographic slide sets and video tapes) that complement one another and can be used as teaching aids in interactive workshops. Researchers of University of Wisconsin-Madison (UW-Madison) will assist with the production of selected extension publications and video tapes, depending on interests and needs.

In general, the UN-L will lead or assist in the development of a minimum of three fact sheets or bulletins on yellow perch broodstock management and spawning, artificial propagation techniques, egg incubation and hatching, fingerling production in ponds, procedures for training fingerlings to formulated feeds, and possibly "grow-out" and pond harvesting technologies, and will lead in the development of photographic slide sets and three techniques-centered video tapes with combined durations of 20-30 min that will complement these publications. UW-Madison personnel will provide technical information and assistance for the production of the publications, slide sets and videotapes, when appropriate and needed.

MSU will be responsible for the development of at least one fact sheet or bulletin and a video tape on the production of yellow perch to market size by intensive culture in flow-through tanks.

University of Wisconsin-Milwaukee (UW-Milwaukee) will be responsible for the development of at least one fact sheet or bulletin on the intensive culture of yellow perch from fry to fingerlings. UN-L and MSU personnel will coordinate their efforts, to ensure that the various video tapes produced complement one another. To the extent possible, all video taping will be done at the field trial sites or research facilities of the NCRAC Yellow Perch Work Group and will be conducted in a manner that minimizes costs while maintaining quality.

The production of instructional audio-visual materials (photographic slide sets and video tapes) on yellow perch aquaculture by the UN-L will be coordinated by Kayes, and done in cooperation with extension professionals and researchers at UW-Milwaukee, MSU, and UW-Madison. The field production (including video taping), tape editing, and video-graphics production will be performed by professional staff of the UN-L Institute of Agriculture and Natural Resources (IANR) Communications and Computing Services, which has all the equipment necessary to perform these functions. The three video tapes produced by the UN-L will be scripted by Kayes, working collaboratively with an assigned IANR Communications video

tape producer. To the extent possible, all video taping will be performed at the field trial sites or research facilities of the NCRAC Yellow Perch Work Group.

The video taping done by the UN-L will provide an opportunity to show and compare the yellow perch culture techniques used at different facilities across the North Central Region. Probable video taping sites, plus relevant subject matter that may be video taped at each site, are as follows:

Pleasant Valley Fish Farm McCook, Nebraska	Broodstock management and spawning, artificial propagation, fingerling production in ponds, pond harvesting technologies, "grow-out" of perch in open ponds.
Red Hook Fisheries, Inc. David City, Nebraska	Fingerling production in ponds, "grow-out" of perch in flow-through tanks and in large net-pens.
Sandhills Aquafarm Keystone, Nebraska	"Grow-out" of perch in flow-through and in raceways (examining the importance of water quality).
Valentine State Fish Hatchery Valentine, Nebraska	Broodstock management and spawning, artificial propagation, egg incubation and hatching.
Coolwater Farms Dousman, Wisconsin	Broodstock management and spawning, fingerling production in ponds, training fingerlings to formulated feeds, "grow-out" of perch in flow-through tanks, small net-pens, and open ponds.
UW-Madison Aquaculture Research Facility Lake Mills State Fish Hatchery Lake Mills, Wisconsin	Artificial propagation, egg incubation and hatching, fingerling production in ponds, pond harvesting technologies, training fingerlings to formulated foods
UW-Milwaukee Center for Great Studies Milwaukee, Wisconsin	Intensive culture of perch from fry to fingerlings.

Interactive workshops on yellow perch aquaculture that utilize the extension publications and audio-video materials produced will be held in Michigan and Nebraska in 1993-95. UW-Milwaukee, UN-L, and UW-Madison personnel will collaborate in the planning and conduct of the Michigan workshop.

In 1995, Kayes of the UN-L will take the lead on hosting a day-long yellow perch workshop in eastern Nebraska, possibly in Lincoln or at the Ak-Sar-Ben Aquarium near Gretna, followed immediately by a field day and a second day-long workshop at the University of Nebraska West Central Research and Extension Center and adjacent North Platte State Fish Hatchery near North Platte. The first workshop will be targeted at fish farmers and potential fish farmers in eastern South Dakota, Nebraska and Kansas, Iowa, Missouri, and southern Minnesota. The workshop in North Platte will be targeted at fish farmers and potential fish farmers in western South Dakota, Nebraska and Kansas, Wyoming and Colorado. The Nebraska field day will be open to workshop participants from both targeted groups, and will tour a number of fish farms, including two Nebraska-based field trial sites of the NCRAC Yellow Perch Work Group. All three events will be co-sponsored by the UN-L Cooperative Extension Service. The Western Regional Aquaculture Center and Region 6 of the U.S. Fish and Wildlife Service will be invited to co-sponsor the field day and North Platte Workshop. Purdue University, MSU, UW-Madison and UW-Milwaukee personnel will collaborate in the planning and conduct of the two workshops.

d. Video, Marketing Aquaculture Products in NCR and the U.S.

Bob Henderson (KSU) and Bob Pierce (U-Missouri) will produce a video tape explaining the basics of marketing aquaculture products in the North Central Region. This will address a major problem cited by regional farmers and often addressed in one to one consultations between aquaculture specialists and fish farmers.

Pierce will be responsible for seeking volunteers willing to serve on the script writing committee. Due to low funding, these people will need to serve without pay or any reimbursement for their participation on this committee.

Pierce will be responsible for conducting literature search of Extension and research materials on the subject of marketing aquaculture products produced in the North Central Region.

Henderson and Pierce will serve on the committee and act as co-chairmen. Committee business will be conducted during at least two face-to-face meetings. Business will be conducted by use of conference calls, letters, FAX or computer generated messages. The coverage given to the subject of marketing will be determined by the committee. The video tape's length will be set at a goal of 20 minutes. The species included will be generic in scope and limited to the Northeast region of the United States.

The committee size will be kept as small as possible. Other than Pierce, the persons contacted so far and willing to participate include the following: Sue Kohler, Southern Illinois University, Office of Economics and Regional Development; Terry Kayes, Aquaculture Specialist, University of Nebraska-Lincoln; David L. Lange, Food Marketing Specialist, University of Nebraska-Lincoln; Ken Boughton, Kansas Board of Agriculture; Kathleen Ward, Extension Marketing Specialist, Kansas State University; Ron Frank, TV and Video Producer, Kansas State University and Gary Bruch, Kansas fish grower.

Pierce will send script for approval. Ron Frank will edit, narrate or make other arrangements for the narration, obtain footage of video tape needed for this video through contacts with other Cooperative Extension Service personnel and with cooperation of NCRAC Extension Committee members.

The office of Extension Communications at KSU will produce and distribute the video. The deadline for the finished product will be September 30, 1994.

The Kansas Regents Educational Communications Center (ECC) will provide facilities for this production. The ECC is the product of federal, state and institutional efforts to extend the resources of the state of Kansas to the midwest and nation through the use of communications technology. The ECC was designated a Regents facility by the Kansas Board of regents in June of 1986 and the physical plant was made possible by a \$5.915 million grant from the U.S. Department of Education.

The mission and purpose of the ECC is to develop and enrich the human resources within the state by providing increased access for residents of Kansas, the nation and the world to educational opportunity at all levels, through the appropriate utilization of technology. This technology can deliver audio, video and data to homes, schools, work places, and learning centers, in both traditional and non-degree formats, including continuing education, professional development and "lifelong learning" settings. Operational responsibility has been assigned to Kansas State University; the facility is located on the K-State campus and basic operations are provided through the K-State budget. The ECC operates within regents policy, which is established and interpreted through the Regents Council system.

The heart of the ECC operation is Bob Dole Hall, a 32,000 square foot educational program production and distribution facility with six studios, an educational development laboratory, four editing suites, a fixed KU-Bank uplink, and numerous offices, conference rooms and special purpose centers. Also at the ECC are two fully equipped mobile units -- one for production of live or taped instructional television programs from any location and the other to uplink via satellite, also from any location.

Ultimately, the ECC will be capable of producing material in a wide range of formats, including live broadcasts via satellite, compressed video, or fiber optics, interactive video-discs, computer-assisted instructional modules, ITFS and low-power TV, and distribution to public TV stations and CATV systems nation-wide.

REFERENCES

- Avualt, J.W. 1986. Aquaculture potential in the United States. *Aquaculture Magazine* 12(5):43-45.
- Hougart, B. 1988a. Aquaculture may produce 25% of all seafood. *Water Farming Journal* 3(1):5.
- Hougart, B. 1988b. U.S. Seafood Trade Deficit: \$6 Billion and Growing. *Water Farming Journal* 3(1):5.

PROJECT LEADERS

<u>State</u>	<u>Name</u>	<u>Institution</u>
Illinois/Indiana	LaDon Swann	Purdue University
Illinois	Daniel A. Selock	Southern Illinois University- Carbondale
Iowa	Joseph E. Morris	Iowa State University
Kansas	F. Robert Henderson	Kansas State University
Michigan	Donald L. Garling Ronald E. Kinnunen	Michigan State University
Minnesota	Jeffrey L. Gunderson	University of Minnesota
Missouri	Robert A. Pierce II	University of Missouri
Nebraska	Terrence B. Kayes	University of Nebraska-Lincoln
Ohio	James M. Ebling	Ohio State University
Wisconsin	Fred P. Binkowski	University of Wisconsin-Milwaukee

PARTICIPATING INSTITUTIONS AND PRINCIPAL INVESTIGATORS

University of Wisconsin-Milwaukee (UW-MIL)

Fred P. Binkowski

Ohio State University (OSU)

James E. Ebeling

Michigan State University (MSU)

Donald L. Garling

University of Minnesota (MINN)

Jeffrey L. Gunderson

Kansas State University (KSU)

F. Robert Henderson

University of Nebraska-Lincoln (UN-L)

Terrence B. Kayes

Michigan State University (MSU)

Ronald E. Kinnunen

Iowa State University (ISU)

Joseph E. Morris

University of Missouri

Robert A. Pierce II

Southern Illinois University-Carbondale (SIUC)

Daniel A. Selock

Purdue University

LaDon Swann

**PROPOSED EXTENSION ACTIVITIES FOR
UNIVERSITY OF WISCONSIN-MILWAUKEE**

(Binkowski)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Sunfish Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Yellow Perch Research 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 Work Group.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Wisconsin to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Wisconsin.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate with other NCRAC Extension personnel in developing a basic aquaculture information core program and materials.
 - b. 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 North Central Region.
 - c. Yellow Perch Workshop/Extension Materials
 - Participate in the Yellow Perch Workshops planning group
 - Develop educational materials (Fact Sheet) on intensive larval culture of perch for the Yellow Perch Workshops, and participate as an invited expert at the workshops conducted by Garling and Kayes.

**PROPOSED EXTENSION BUDGET FOR
UNIVERSITY OF WISCONSIN-MILWAUKEE**

(Binkowski)

Objectives 1-4

					Year 1	Year 2
					Year 1	Year 2
					No.	FTEs
					No.	FTEs
A.	Salaries and Wages					
1.	No. of Senior Personnel & FTEs ¹					
a.	(Co)-PI(s)	1	0.10	1	0.10	\$0 \$0
b.	Senior Associates					
2.	No. of Other Personnel (Non-Faculty) & FTEs					
a.	Research Assoc./Postdoc . . .					
b.	Other Professionals	1	0.10	1	0.10	\$0 \$0
c.	Graduate Students					
d.	Prebaccalaureate Students . .					
e.	Secretarial-Clerical	1	0.08	1	0.08	\$1,755 \$1,755
f.	Technical, Shop, and Other . .					
	Total Salaries and Wages					1,755 1,755
B.	Fringe Benefits (38% of 2e)					\$675 \$675
C.	Total Salaries, Wages and Fringe Benefits					2,430 2,430
D.	Nonexpendable Equipment					\$0 \$0
E.	Materials and Supplies					\$0 \$0
F.	Travel - Domestic (<i>Including Canada</i>)					\$0 \$0
G.	Other Direct Costs					\$0 \$0
	TOTAL PROJECT COSTS PER YEAR (C through G)					2,430 2,430
						TOTAL PROJECT COSTS 4,860

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
UNIVERSITY OF WISCONSIN-MILWAUKEE**

(Binkowski)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
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, Sea Grant Advisory Service, and other landowner assistance personnel.		
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
a. Hybrid Striped Bass Workshop/Proceedings		
b. Walleye Workshop/Culture Guide		
c. Yellow Perch Workshop/Extension Materials		
d. Video, Marketing Aquaculture Products in the NCR and the U.S.		
	\$2,430	\$2,430
Salaries, Wages and Fringe Benefits (As chair of the NCRAC Extension Work Group there will be one month of secretarial support for each year of the project)		
TOTAL PROJECT REQUEST	4,860	

**PROPOSED EXTENSION ACTIVITIES FOR
OHIO STATE UNIVERSITY**

(Ebeling)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Salmonid Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Yellow Perch Research 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 Salmonids Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in 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.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.

Conduct a seminar on aquaculture for Extension personnel.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - Frank Lichtkoppler and Ebeling will serve as reviewers of educational materials under development to be sure they are understandable by individuals who lack a basic knowledge about aquaculture.
 - Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Ohio and the region.

**PROPOSED EXTENSION BUDGET FOR
OHIO STATE UNIVERSITY**

(Ebeling)

Objectives 1-4

					Year 1	Year 2		
					Year 1		Year 2	
A. Salaries and Wages	No.	FTEs	No.	FTEs				
1. No. of Senior Personnel & FTEs ¹								
a. (Co)-PI(s)	1	0.10	1	0.10	\$0	\$0		
b. Senior Associates								
2. No. of Other Personnel (Non-Faculty) & FTEs								
a. Research Assoc./Postdoc								
b. Other Professionals								
c. Graduate Students								
d. Prebaccalaureate Students								
e. Secretarial-Clerical								
f. Technical, Shop, and Other								
Total Salaries and Wages					0	0		
B. Fringe Benefits					\$0	\$0		
C. Total Salaries, Wages and Fringe Benefits					0	0		
D. Nonexpendable Equipment					\$0	\$0		
E. Materials and Supplies					\$50	\$50		
F. Travel - Domestic (<i>Including Canada</i>)					\$1,250	\$0		
G. Other Direct Costs					\$250	\$250		
TOTAL PROJECT COSTS PER YEAR (C through G)					1,550	300		
TOTAL PROJECT COSTS					1,850			

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
OHIO STATE UNIVERSITY**

(Ebeling)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$100	\$100
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.		
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$100	\$100
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). In-state courses will be presented in summer of 1994 and 1995. Regional activities will be coordinated with NCRAC Extension Work Group personnel from Illinois and Indiana, as well as West Virginia and Kentucky.		
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$50	\$50
TOTAL PER YEAR	1,550	300
TOTAL PROJECT REQUEST	1,850	

**PROPOSED EXTENSION ACTIVITIES FOR
MICHIGAN STATE UNIVERSITY**

(Garling)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Yellow Perch Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Economics/Marketing Research 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/Marketing Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - c. Yellow Perch Workshop/Extension Materials
 - Prepare a fact sheet on yellow perch aquaculture in flowing water systems (1994).
 - Plan and implement Yellow Perch Management Workshops in Michigan (lead) and Nebraska with Kayes. The Michigan workshop will be held in fall 1994 and will include:
 - Target Audiences: Individuals interested in perch culture and CES and Sea Grant Information Transfer Specialist In-Service
 - Workshop sessions (Tentative):
 - General Overview of Perch Culture in Michigan (Garling)
 - Spawning and Incubation (Kayes)
 - Intensive Larval Culture (Binkowski)
 - Pond Culture (Malison)
 - Flowing Water Culture (Garling)
 - Field trip to Bayport Aquaculture Systems, Inc. for on-site visit to working yellow perch culture facility using flowing water culture.

**PROPOSED EXTENSION BUDGET FOR
MICHIGAN STATE UNIVERSITY**

(Garling)

Objectives 1, 2, and 4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.05	1	0.05	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc						
b. Other Professionals						
c. Graduate Students						
d. Prebaccalaureate Students						
e. Secretarial-Clerical						
f. Technical, Shop, and Other						
Total Salaries and Wages					0	0
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					0	0
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$1,850	\$1,050
F. Travel - Domestic (<i>Including Canada</i>)					\$5,300	\$1,250
G. Other Direct Costs					\$700	\$450
TOTAL PROJECT COSTS PER YEAR (C through G)					7,850	2,750
TOTAL PROJECT COSTS					10,600	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
MICHIGAN STATE UNIVERSITY**

(Garling)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies, modem for E-mail)	\$350	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
c. Yellow Perch Workshop/Extension Materials		
Materials and Supplies (announcements for workshop; pamphlets; video tape supplies)	\$1,500	\$1,000
Travel		
To workshops for speakers (Binkowski, Kayes, and Malison) to Michigan	\$3,550	\$750
To collect video tape file footage	\$500	\$500
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$500	\$250
TOTAL PER YEAR	7,850	2,750
TOTAL PROJECT REQUEST	10,600	

**PROPOSED EXTENSION ACTIVITIES FOR
UNIVERSITY OF MINNESOTA**

(Gunderson)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Crayfish 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.
 - c. Assisting NCRAC Crayfish researchers with survey of crayfish producers in the North Central Region.
 - d. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Crayfish Work Group.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Minnesota to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Minnesota.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.

**PROPOSED EXTENSION BUDGET FOR
UNIVERSITY OF MINNESOTA**

(Gunderson)

Objectives 1 and 2

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.05	1	0.05	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc ...						
b. Other Professionals						
c. Graduate Students						
d. Prebaccalaureate Students ..						
e. Secretarial-Clerical						
f. Technical, Shop, and Other ..						
Total Salaries and Wages					0	0
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					0	0
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$50	\$50
F. Travel - Domestic (<i>Including Canada</i>)					\$1,250	\$0
G. Other Direct Costs					\$200	\$200
TOTAL PROJECT COSTS PER YEAR (C through G)					1,500	250
TOTAL PROJECT COSTS					1,750	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
UNIVERSITY OF MINNESOTA**

(Gunderson)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies, modem for E-mail)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
TOTAL PER YEAR	1,500	250
TOTAL PROJECT REQUEST	1,750	

**PROPOSED EXTENSION ACTIVITIES FOR
KANSAS STATE UNIVERSITY**

(Henderson)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Kansas to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Kansas.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - d. Video, Marketing Aquaculture Products in the North Central Region and the U.S.
 - Contact volunteers to serve on a committee to develop a script for the "Marketing Aquaculture Products" video.
 - Complete script and obtain approval from North Central Regional Aquaculture Extension and Aquaculture Economics Marketing Committees.
 - Tape and edit video using narration of approved script.
 - Distribute 100 finished videos at no cost through the North Central Regional Aquaculture Center network.
 - Additional video tapes would be sold by Kansas State University Extension Communications Department.

**PROPOSED EXTENSION BUDGET FOR
KANSAS STATE UNIVERSITY**

(Henderson)

Objectives 2 and 4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.05	1	0.05	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc ...						
b. Other Professionals	1	0.05	1	0.05	\$0	\$0
c. Graduate Students						
d. Prebaccalaureate Students ..						
e. Secretarial-Clerical						
f. Technical, Shop, and Other ..						
Total Salaries and Wages					0	0
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					0	0
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$300	\$300
F. Travel - Domestic (<i>Including Canada</i>)					\$975	\$675
G. Other Direct Costs					\$1,900	\$5,550
TOTAL PROJECT COSTS PER YEAR (C through G)					3,175	6,525
TOTAL PROJECT COSTS					9,700	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
KANSAS STATE UNIVERSITY**

(Henderson)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
d. Video, Marketing Aquaculture Products in the NCR and the U.S.		
Materials and Supplies (general office supplies; video tape supplies)	\$250	\$250
Travel (for script and video development; meeting with committee members)	\$225	\$675
Other Direct Costs		
Video tape editing (obtaining video footage through normal CES contacts, splicing, producing graphics, etc.); narration of video tape; video tape duplication	\$1,550	\$5,150
Telecommunications, photocopying and duplication, and mailing costs	\$150	\$200
TOTAL PER YEAR	3,175	6,525
TOTAL PROJECT REQUEST	9,700	

**PROPOSED EXTENSION ACTIVITIES FOR
UNIVERSITY OF NEBRASKA-LINCOLN**

**(Kayes)
Page 1 of 2**

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Economics/Marketing Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Yellow Perch Research 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/Marketing Work Groups (particularly in relation to yellow perch aquaculture and walleye fingerling production).
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Nebraska to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Nebraska.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Develop and (when appropriate) implement administratively approved mechanisms for inviting South Dakota, Iowa, Missouri and Kansas professionals to Nebraska aquaculture in-service training activities.
 - b. Explore the feasibility of holding multi-state aquaculture in-service training activities on a regular basis in the western part of the North Central Region -- including South Dakota, Nebraska, Iowa, Missouri, and Kansas.

**PROPOSED EXTENSION ACTIVITIES FOR
UNIVERSITY OF NEBRASKA-LINCOLN**

**(Kayes)
Page 2 of 2**

MAJOR ACTIONS (continued)

4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - c. Yellow Perch Workshop/Extension Materials
 - Lead or assist in the development of a minimum of three extension publications (fact sheets or bulletins) on yellow perch broodstock management and spawning, artificial propagation techniques, egg incubation and hatching, fingerling production, procedures for training fish to formulated feeds, and possibly "grow-out" and harvesting technologies -- to be done in cooperation with extension professionals and researchers at MSU, the UW-Madison and the UW-Milwaukee.
 - Lead in the development of photographic slide sets and three techniques-centered video tapes with combined durations of 20-30 minutes that will complement the extension publications produced on yellow perch aquaculture and can be used as teaching aides for workshops on that subject -- to be done in cooperation with extension professionals and researchers at MSU, and UW-Madison.
 - Collaborate with MSU, UW-Madison and UW-Milwaukee personnel in the planning and conduct of a workshop on yellow perch aquaculture in Michigan and in Wisconsin in 1994-95.
 - Coordinate and host a day-long yellow perch workshop in eastern Nebraska, followed immediately by a field day and a second day-long perch workshop in North Platte, Nebraska, all targeted at fish farmers and potential fish farmers in South Dakota, Minnesota, Iowa, Missouri, Nebraska, Kansas, Wyoming, and Colorado -- to be done in cooperation with appropriate members of the NCRAC Extension Work Group and the NCRAC Yellow Perch Work Group.
 - Initiate planning of one or more workshops in 1995-97 on yellow perch aquaculture and hybrid striped bass aquaculture in the western part of the North Central Region (including South Dakota, Nebraska, Iowa, Missouri and Kansas) -- to be done in cooperation with appropriate members of the NCRAC Extension Work Group.
 - Serve as a resource person for NCRAC educational activities on yellow perch aquaculture and walleye reproduction and fingerling production.

**PROPOSED EXTENSION BUDGET FOR
UNIVERSITY OF NEBRASKA-LINCOLN**

(Kays)

Objectives 1-4

					Year 1	Year 2		
					Year 1		Year 2	
A. Salaries and Wages	No.	FTEs	No.	FTEs				
1. No. of Senior Personnel & FTEs ¹								
a. (Co)-PI(s)	1	0.17	1	0.08	\$0	\$0		
b. Senior Associates								
2. No. of Other Personnel (Non-Faculty) & FTEs								
a. Research Assoc./Postdoc ...								
b. Other Professionals								
c. Graduate Students								
d. Prebaccalaureate Students ..								
e. Secretarial-Clerical								
f. Technical, Shop, and Other ..	1	0.08	1	0.04	\$1,433	\$752		
Total Salaries and Wages					1,433	752		
B. Fringe Benefits (25% of 2f)					\$358	\$188		
C. Total Salaries, Wages and Fringe Benefits					1,791	940		
D. Nonexpendable Equipment					\$0	\$0		
E. Materials and Supplies					\$300	\$200		
F. Travel - Domestic (<i>Including Canada</i>)					\$4,950	\$4,350		
G. Other Direct Costs					\$6,650	\$850		
TOTAL PROJECT COSTS PER YEAR (C through G)					13,691	6,340		
TOTAL PROJECT COSTS					20,031			

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
UNIVERSITY OF NEBRASKA-LINCOLN
(Kayes)**

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$1,000	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
c. Yellow Perch Workshop/Extension Materials		
Salaries, Wages and Fringe Benefits (Year 1 - technician to assist with coordination, set-up, and staging of field operations for video taping at several demonstration sites in Nebraska and Wisconsin; Year 2 - technician to assist in workshop and field day that will be held in Nebraska)	\$1,791	\$940
Materials and Supplies (general office supplies, film, video tape supplies, binders)	\$250	\$150
Travel		
To produce video footage at demonstration sites in Nebraska and Wisconsin	\$3,200	\$0
Expenses for out-of-state speakers collaborating on the workshop and field day that will be held in Nebraska (Paul Brown, Don Garling, Jeff Malison, and Fred Binkowski) and fleet vehicle rental	\$0	\$4,350
Other Direct Costs		
Production of videos: staff time and equipment use for field production (at \$30/hr) - \$3,600; writing, editing, and video-graphics production (at \$45/hr) - \$2,600	\$6,200	\$0
Telecommunications, photocopying and duplication, mailing costs, and video footage development	\$250	\$650
TOTAL PER YEAR	13,691	6,340
TOTAL PROJECT REQUEST	20,031	

**PROPOSED EXTENSION ACTIVITIES FOR
MICHIGAN STATE UNIVERSITY**

(Kinnunen)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Walleye 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.
 - c. Leading or assisting in the development of extension publications (fact sheets or bulletins) on knowledge gained from research by the Walleye Work Group.
 - d. Attend Annual Great Lakes Fish Disease Control Committee meetings as NCRAC representative.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Michigan to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Michigan.
 - d. Compile aquaculture extension information for use by Great Lakes Sea Grant agents and Cooperative Extension Service personnel.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - b. Walleye Workshop/Culture Guide
 - Work with the committee to develop the Walleye Culture Guide
 - Conduct programs for Native American fishery programs, state agencies, and private aquaculturists on current walleye culture practices in Minnesota, Wisconsin and Michigan (Kinnunen, Morris, Binkowski, Summerfelt).

**PROPOSED EXTENSION BUDGET FOR
MICHIGAN STATE UNIVERSITY**

(Kinnunen)

Objectives 1, 2, and 4

				Year 1	Year 2
				No.	FTEs
A.	Salaries and Wages				
				Year 1	Year 2
				No.	FTEs
	1. No. of Senior Personnel & FTEs ¹				
	a. (Co)-PI(s)	1	0.25	1	0.25
	b. Senior Associates				
	2. No. of Other Personnel (Non-Faculty) & FTEs				
	a. Research Assoc./Postdoc				
	b. Other Professionals				
	c. Graduate Students				
	d. Prebaccalaureate Students				
	e. Secretarial-Clerical				
	f. Technical, Shop, and Other				
	Total Salaries and Wages			0	0
B.	Fringe Benefits			\$0	\$0
C.	Total Salaries, Wages and Fringe Benefits			0	0
D.	Nonexpendable Equipment			\$0	\$0
E.	Materials and Supplies			\$50	\$50
F.	Travel - Domestic (<i>Including Canada</i>)			\$1,500	\$0
G.	Other Direct Costs			\$200	\$200
	TOTAL PROJECT COSTS PER YEAR (C through G)			1,750	250
				TOTAL PROJECT COSTS	2,000

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
MICHIGAN STATE UNIVERSITY**

(Kinnunen)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
b. Walleye Workshop/Culture Guide		
Travel (planning meeting to develop walleye culture practices workshop)	\$250	\$0
TOTAL PER YEAR	1,750	250
TOTAL PROJECT REQUEST	2,000	

**PROPOSED EXTENSION ACTIVITIES FOR
IOWA STATE UNIVERSITY**

**(Morris)
Page 1 of 2**

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Hybrid Striped Bass Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Walleye Research 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 Hybrid Striped Bass and Walleye Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Iowa to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Iowa.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Participate with other NCRAC Extension personnel in developing a basic aquaculture information core program and materials.
 - b. 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 North Central Region.
 - a. Hybrid Striped Bass Workshop/Proceedings
 - Cooperate with Dan Selock in the development and presentation of the regional hybrid striped bass workshop/proceedings to be held fall 1994 at Southern Illinois University-Carbondale.
 - Assist Selock in preparing the proceedings from the hybrid striped bass workshop.

**PROPOSED EXTENSION ACTIVITIES FOR
IOWA STATE UNIVERSITY**

**(Morris)
Page 2 of 2**

MAJOR ACTIONS (continued)

4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - d. Walleye Workshop/Culture Guide
 - Assist Bob Summerfelt in the development of a regional walleye culture guide.
 - Participate in the walleye culture work shop to be held in Minnesota March 1995.

**PROPOSED EXTENSION BUDGET FOR
IOWA STATE UNIVERSITY**

(Morris)

Objectives 1-4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.10	1	0.10	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc ...						
b. Other Professionals			1	0.10	\$0	\$2000
c. Graduate Students						
d. Prebaccalaureate Students ..						
e. Secretarial-Clerical	1	0.20	1	0.20	\$5000	\$5000
f. Technical, Shop, and Other ..						
Total Salaries and Wages					5,000	7,000
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					5,000	7,000
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$500	\$500
F. Travel - Domestic (<i>Including Canada</i>)					\$3,750	\$2,500
G. Other Direct Costs					\$1,250	\$1,250
TOTAL PROJECT COSTS PER YEAR (C through G)					10,500	11,250
TOTAL PROJECT COSTS					21,750	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
IOWA STATE UNIVERSITY**

(Morris)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$100	\$100
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$150	\$150
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
b. Walleye Workshop/Culture Guide		
Salaries, Wages and Fringe Benefits [costs associated with the editorial office (secretarial-clerical) and technical editor (0.10 FTE)]	\$5,000	\$7,000
Materials and Supplies (general office supplies; video tape supplies)	\$400	\$400
Travel (expenses for steering committee to meet once per year)	\$2,500	\$2,500
Other Direct Costs (telecommunications, photocopying and duplication, mailing costs, and video footage development)	\$1,100	\$1,100
TOTAL PER YEAR	10,500	11,250
TOTAL PROJECT REQUEST		21,750

**PROPOSED EXTENSION ACTIVITIES FOR
UNIVERSITY OF MISSOURI**

(Pierce)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Missouri to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Missouri.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - d. Video, Marketing Aquaculture Products in the NCR and the U.S.
 - Contact volunteers to serve on a committee to develop a script for the "Marketing Aquaculture Products" video.
 - Complete script and obtain approval from North Central Regional Aquaculture Extension and Aquaculture Economics Marketing Committees.
 - Tape and edit video using narration of approved script.
 - Distribute 100 finished videos at no cost through the North Central Regional Aquaculture Center network.
 - Additional video tapes would be sold by Kansas State University Extension Communications Department.

**PROPOSED EXTENSION BUDGET FOR
UNIVERSITY OF MISSOURI**

(Pierce)

Objectives 2 and 4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.05	1	0.10	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc						
b. Other Professionals						
c. Graduate Students						
d. Prebaccalaureate Students						
e. Secretarial-Clerical						
f. Technical, Shop, and Other						
Total Salaries and Wages					0	0
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					0	0
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$100	\$100
F. Travel - Domestic (<i>Including Canada</i>)					\$1,550	\$800
G. Other Direct Costs					\$600	\$600
TOTAL PROJECT COSTS PER YEAR (C through G)					2,250	1,500
TOTAL PROJECT COSTS					3,750	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
UNIVERSITY OF MISSOURI**

(Pierce)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
d. Video, Marketing Aquaculture Products in the NCR and the U.S.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (for script and video development; meeting with committee members)	\$800	\$800
Other Direct Costs (obtain aquaculture marketing information and videos)	\$400	\$400
TOTAL PER YEAR	2,250	1,500
TOTAL PROJECT REQUEST	3,750	

**PROPOSED EXTENSION ACTIVITIES FOR
SOUTHERN ILLINOIS UNIVERSITY-CARBONDALE**

**(Selock)
Page 1 of 2**

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Bait Fish Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Hybrid Striped Bass and Economics/Marketing Research 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 Bait Fish, Hybrid Striped Bass, and Economics/Marketing Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Illinois to the extension chairperson for distribution to all state contacts once annually.
 - c. Providing a link between NCRAC and public and private aquaculturists and other appropriate individuals or groups in Illinois.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
 - a. Develop educational materials designed to help extension professionals respond to routine aquaculture questions. Add these materials to the three-ring binders distributed previously. Specifically, videos, slide sets, and hand-outs on fish cage culture, aquatic plant identification and control, and tank recycle systems will be developed.
 - b. Continued in CES "aquaculture update" meetings each year to inform, re-train, and answer questions.

**PROPOSED EXTENSION ACTIVITIES FOR
SOUTHERN ILLINOIS UNIVERSITY-CARBONDALE**

**(Selock)
Page 2 of 2**

MAJOR ACTIONS (continued)

4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - a. Hybrid Striped Bass Workshop/Proceedings
 - Organize and hold a North Central Hybrid Striped Bass Conference targeted at the producer. Extensive conference materials will be developed for use in various regional locations, beginning at Southern Illinois University in Carbondale.
 - Participate with regional extension personnel in the North Central Aquaculture Series Conference, one per year.
 - Provide aquaculture information to meet industry needs determined by interaction with state and regional aquaculturists and associations such as the Illinois Aquaculture Industry Association, Missouri Aquaculture Council, and Indiana Fish Farmers Association.

**PROPOSED EXTENSION BUDGET FOR
SOUTHERN ILLINOIS UNIVERSITY-CARBONDALE**

(Selock)

Objectives 1-4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.20	1	0.20	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc ...						
b. Other Professionals						
c. Graduate Students						
d. Prebaccalaureate Students ..	1	0.03	1	0.03	\$350	\$350
e. Secretarial-Clerical						
f. Technical, Shop, and Other ...						
Total Salaries and Wages					350	350
B. Fringe Benefits					\$0	\$0
C. Total Salaries, Wages and Fringe Benefits					350	350
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$550	\$2,050
F. Travel - Domestic (<i>Including Canada</i>)					\$2,050	\$5,000
G. Other Direct Costs					\$8,200	\$8,200
TOTAL PROJECT COSTS PER YEAR (C through G)					11,150	15,600
TOTAL PROJECT COSTS					26,750	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
SOUTHERN ILLINOIS UNIVERSITY-CARBONDALE
(Selock)**

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
4. Develop and implement aquaculture education programs and materials for the North Central Region (NCR). With special emphasis on the production of instructional video tapes and interactive workshops with complementing extension fact sheets or bulletins for the following:		
a. Hybrid Striped Bass Workshop/Proceedings		
Salaries, Wages, and Fringe Benefits (student worker)	\$350	\$350
Materials and Supplies (general office supplies, blank video tapes, film, binders)	\$500	\$2,000
Travel (video and photography sites, guest speakers, attending conference planning meeting)	\$800	\$5,000
Other Direct Costs Development of conference materials: (1) video taping - \$60/hr, generally one minute of finished product per hour of taping; (2) video tape editing - \$500/day at rate of one day per 10 to 15 minutes of finished product; and (3) video graphic composition - \$150/day at rate of one day per 10 to 15 minutes of finished product.	\$8,000	\$8,000
Telecommunications, photocopying and duplication, and mailing costs)		
TOTAL PER YEAR	11,150	15,600
TOTAL PROJECT REQUEST	26,750	

**PROPOSED EXTENSION ACTIVITIES FOR
PURDUE UNIVERSITY**

(Swann)

MAJOR ACTIONS

Participate in the following objectives of the Extension Work Group:

1. Strengthen linkages between NCRAC Research and Extension Work Groups by:
 - a. Serving as lead liaison between the NCRAC Effluents Research Work Group and Extension Work Group.
 - b. Serving as a liaison between the NCRAC Hybrid Striped Bass and Economics/Marketing Research 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 Effluents, Hybrid Striped Bass, and Economics Work Groups.
2. Enhance the NCRAC extension network for aquaculture information transfer by:
 - a. Attending the biennial extension work group meeting.
 - b. Providing 15 copies of aquaculture extension related materials produced in Indiana 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 Indiana.
 - d. Identifying and updating lists of key state contacts (legislators, government administrators, agency personnel, business leaders, and practicing or potential fish farmers) to receive the NCRAC newsletter and other pertinent materials.
 - e. Becoming active in the use of electronic mail (E-mail) using Internet.
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.
 - Develop and distribute aquaculture handbook for 20 CES and/or Sea Grant personnel per state for the 12 states in the North Central Region and hold ten copies in reserve.
4. Develop and implement aquaculture education programs and materials for the North Central Region.
 - d. Hybrid Striped Bass Workshop/Proceedings
 - Assist Morris and Selock with the planning for a hybrid striped bass workshop at Southern Illinois University at Carbondale. The workshop will be a hands-on workshop which incorporates state-of-the-art production techniques for hybrid striped bass in ponds, cages and raceways.

**PROPOSED EXTENSION BUDGET FOR
PURDUE UNIVERSITY**

(Swann)

Objectives 1-4

					Year 1	Year 2
					Year 1	Year 2
A. Salaries and Wages	No.	FTEs	No.	FTEs		
1. No. of Senior Personnel & FTEs ¹						
a. (Co)-PI(s)	1	0.05	1	0.05	\$0	\$0
b. Senior Associates						
2. No. of Other Personnel (Non-Faculty) & FTEs						
a. Research Assoc./Postdoc ...						
b. Other Professionals						
c. Graduate Students						
d. Prebaccalaureate Students ..	1	0.05	1	0.05	\$600	\$600
e. Secretarial-Clerical						
f. Technical, Shop, and Other ...						
Total Salaries and Wages					600	600
B. Fringe Benefits (on 2d)					\$19	\$19
C. Total Salaries, Wages and Fringe Benefits					619	619
D. Nonexpendable Equipment					\$0	\$0
E. Materials and Supplies					\$300	\$300
F. Travel - Domestic (<i>Including Canada</i>)					\$1,250	\$0
G. Other Direct Costs					\$2,000	\$2,000
TOTAL PROJECT COSTS PER YEAR (C through G)					4,169	2,919
TOTAL PROJECT COSTS					7,088	

¹FTEs = Full Time Equivalents based on 12 months.

**BUDGET JUSTIFICATION FOR
PURDUE UNIVERSITY**

(Swann)

Major Action (Objective) and Line Item Requests	Year 1	Year 2
1. Strengthen linkages between North Central Regional Aquaculture Center (NCRAC) Research and Extension Work Groups.		
Travel (transportation, lodging, and meal expenses for the PI to attend the research Work Group meetings)	\$500	\$0
2. Enhance the NCRAC extension network for aquaculture information transfer.		
Materials and Supplies (general office supplies)	\$50	\$50
Travel (transportation, lodging and meal expenses to attend biennial Extension Work Group meeting)	\$750	\$0
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$200	\$200
3. Provide in-service training for Cooperative Extension Service, Sea Grant Advisory Service, and other landowner assistance personnel.		
Salaries, Wages and Fringe Benefits (one student to assist in compilation of aquaculture handbook)	\$619	\$619
Materials and Supplies (general office supplies, binders)	\$250	\$250
Other Direct Costs (telecommunications, photocopying and duplication, and mailing costs)	\$1,800	\$1,800
TOTAL PER YEAR	4,169	2,919
TOTAL PROJECT REQUEST	7,088	

EXTENSION PROJECT

Budget Summary for Each Participating Institution at \$60K for the First Year

	UW-MIL	OSU	MSU	MINN	KSU	UN-L	ISU	MIS-SOURI	SIUC	PUR-DUE	TOTALS
Total Salaries and Wages	\$1,755	\$0	\$0	\$0	\$0	\$1,433	\$5,000	\$0	\$350	\$600	9,138
Fringe Benefits	\$675	\$0	\$0	\$0	\$0	\$358	\$0	\$0	\$0	\$19	1,052
Total Salaries, Wages and Benefits	2,430	0	0	0	0	1,791	5,000	0	350	619	10,190
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0
Materials and Supplies	\$0	\$50	\$1,900	\$50	\$300	\$300	\$500	\$100	\$550	\$300	4,050
Travel	\$0	\$1,250	\$6,800	\$1,250	\$975	\$4,950	\$3,750	\$1,550	\$2,050	\$1,250	23,825
Other Direct Costs	\$0	\$250	\$900	\$200	\$1,900	\$6,650	\$1,250	\$600	\$8,200	\$2,000	21,950
TOTAL PROJECT COSTS	2,430	1,550	9,600	1,500	3,175	13,691	10,500	2,250	11,150	4,169	60,015

Budget Summary for Each Participating Institution at \$50K for the Second Year

	UW-MIL	OSU	MSU	MINN	KSU	UN-L	ISU	MIS-SOURI	SIUC	PUR-DUE	TOTALS
Total Salaries and Wages	\$1,755	\$0	\$0	\$0	\$0	\$752	\$7,000	\$0	\$350	\$600	10,457
Fringe Benefits	\$675	\$0	\$0	\$0	\$0	\$188	\$0	\$0	\$0	\$19	882
Total Salaries, Wages and Benefits	2,430	0	0	0	0	940	7,000	0	350	619	11,339
Nonexpendable Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0
Materials and Supplies	\$0	\$50	\$1,100	\$50	\$300	\$200	\$500	\$100	\$2,050	\$300	4,650
Travel	\$0	\$0	\$1,250	\$0	\$675	\$4,350	\$2,500	\$800	\$5,000	\$0	14,575
Other Direct Costs	\$0	\$250	\$650	\$200	\$5,550	\$850	\$1,250	\$600	\$8,200	\$2,000	19,550
TOTAL PROJECT COSTS	2,430	300	3,000	250	6,525	6,340	11,250	1,500	15,600	2,919	50,114

RESOURCE COMMITMENT FROM INSTITUTIONS¹

Institution/Item	Year 1	Year 2
University of Wisconsin-Milwaukee		
Salaries and Benefits: SY @ 0.28	\$9,100	\$9,555
Supplies, Expenses, and Equipment	\$250	\$1,000
Total	9,350	10,555
Ohio State University		
Salaries and Benefits: SY @ 0.10	\$8,641	\$9,073
Supplies, Expenses, and Equipment	\$600	\$700
Overhead Waived	\$4,250	\$3,590
Total	13,491	13,363
Michigan State University		
Salaries and Benefits: SY @ 0.30	\$15,000	\$16,400
Overhead Waived	\$6,300	\$6,888
Total	21,300	23,288
University of Minnesota		
Salaries and Benefits: SY @ 0.05	\$2,666	\$2,666
Overhead Waived	\$250	\$250
Total	2,916	2,916
Kansas State University		
Salaries and Benefits: SY @ 0.10	\$0	\$0
Overhead Waived	\$0	\$0
Total	0	0
University of Nebraska-Lincoln		
Salaries and Benefits: SY @ 0.25 in Year 1; 0.12 in Year 2	\$11,458	\$5,664
Supplies, Expenses, and Equipment	\$22,536	\$6,564
Total	33,994	12,228
Iowa State University		
Salaries and Benefits: SY @ 0.10	\$4,356	\$4,756
Overhead Waived	\$2,250	\$2,750
Total	6,606	7,506
University of Missouri		
Salaries and Benefits: SY @ 0.05 in Year 1; 0.10 in Year 2	\$2,250	\$4,500
Overhead Waived	\$700	\$1,400
Total	2,950	\$5,900
Southern Illinois University-Carbondale		
Salaries and Benefits: SY @ 0.20	\$3,174	\$3,333
Overhead Waived	\$7,997	\$8,397
Total	11,171	23,530
Purdue University		
Salaries and Benefits: SY @ 0.05	\$1,985	\$2,085
Overhead Waived	\$2,085	\$2,680
Total	4,070	4,765
Total per Year	105,848	98,151
GRAND TOTAL	203,999	

¹Since cost sharing is not a legal requirement some universities chose not to provide resource commitments.

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

- a. Initiated in Year 1 and completed in Year 2.
- b. Initiated in Year 1 and completed in Year 2.
- c. Initiated in Year 1 and completed in Year 2.
- d. Initiated in Year 1 and completed in Year 2.

LIST OF PRINCIPAL INVESTIGATORS

Fred P. Binkowski, University of Wisconsin-Milwaukee

James E. Ebeling, Ohio State University

Donald L. Garling, Michigan State University

Jeffrey L. Gunderson, University of Minnesota

F. Robert Henderson, Kansas State University

Terrence B. Kayes, University of Nebraska-Lincoln

Ronald E. Kinnunen, Michigan State University

Joseph E. Morris, Iowa State University

Robert A. Pierce II, University of Missouri

Daniel A. Selock, Southern Illinois University-Carbondale

LaDon Swann, Purdue University

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EDUCATION

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

POSITIONS

Senior Scientist (1991-present) and Associate Scientist (1987-1990), Center for Great Lakes Studies/University of Wisconsin Great Lakes Research Facility (GLRF)
Senior Fisheries Biologist (1984-1986), Associate Fisheries Biologist (1981-1983), and Assistant Fisheries Biologist (1978-1980), Center for Great Lakes Studies/University of Wisconsin GLRF
Research Specialist, Fisheries, Dept. of Zoology, University of Wisconsin-Milwaukee (1975-1978)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society: Early Life History and Fish Culture Sections
International Association for Great Lakes Research (Associate Editor)
World Aquaculture Society

SELECTED PUBLICATIONS

- Miller, T., L. Crowder, J. Rice, and F.P. Binkowski. 1992. Body size and the ontogeny of the functional response in fishes. *Canadian Journal of Fisheries and Aquatic Sciences* 49:805-812.
- Miller, T., L. Crowder, and F.P. Binkowski. 1990. Zooplankton size dynamics and recruitment success of bloater in Lake Michigan. *Transactions of the American Fisheries Society* 119:484-491.
- Luecke, C. J.A. Rice, L.B. Crowder, S.E. Yeo, and F.P. Binkowski. 1990. Recruitment mechanisms of bloater in Lake Michigan: an analysis of the predatory gauntlet. *Canadian Journal of Fisheries and Aquatic Sciences* 47:524-532.
- Seale, D.B., and F.P. Binkowski. 1988. Vulnerability of early life intervals of *Coregonus hoyi* to predation by a freshwater mysid, *Mysis relicta*. *Environmental Biology of Fishes* 21:117-125.
- Rice, J.A., L.B. Crowder, and F.P. Binkowski. 1987. Evaluating potential sources of mortality for larval bloater (*Coregonus hoyi*): starvation and vulnerability to predation. *Canadian Journal of Fisheries and Aquatic Sciences* 44:467-472.
- Sommer, C.V., F.P. Binkowski, M.A. Schalk, and J.M. Bartos. 1986. Stress factors that can affect studies of drug metabolism in fish. *Veterinary and Human Toxicology* 28 (Supplement 1):45-54.
- Stewart, D.J., and F.P. Binkowski. 1986. Dynamics of consumption and food conversion by Lake Michigan alewives: an energetics-modeling synthesis. *Transactions of the American Fisheries Society* 115:643-661.

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EDUCATION

B.A. Albion College, 1971
M.S. Washington State University, 1974
M.S. Washington State University, 1977

POSITIONS

Research and Extension Associate, Piketon Research and Extension Center, Ohio State University (1991-present)
Project Manager, Recirculation Aquaculture Demonstration Project, North Carolina State University (1990-1991)
Research Coordinator, Mariculture Research & Training Center, University of Hawaii (1988-1990)
Research Assistant, Department of Agricultural Engineering, University of California-Davis (1983-1988)
Research Technologist II, Department of Agricultural Engineering, Washington State University (1981-1983)
Technical Specialist, Washington Energy Extension Service-Cooperative Extension Service (1979-1981)
Research Technologist II, Department of Agricultural Engineering, Washington State University (1977-1979)
American Peace Corps Volunteer, Secondary Education Program, Ghana (1971-1972)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Society of Agricultural Engineers
Sigma XI
World Aquacultural Society

SELECTED PUBLICATIONS

Ebeling, J.M. 1991. A computer based water quality monitoring and management system for pond aquaculture. Pages 233-248 *in* Proceedings from the Aquaculture Symposium, Cornell University, Ithaca, New York, NRAES-49.

Ebeling, J.M., and T.M. Losordo. 1989. Continuous environmental Monitoring systems for aquaculture. Pages 54-70 *in* J.A. Wyban and E. Antill, editors. Instrumentation in aquaculture. Proceedings of the World Aquaculture Society, January, Los Angeles, California.

Losordo, T.M., R.H. Piedrahita, and J.M. Ebeling. 1988. An automated water quality data acquisition system for use in aquaculture ponds. *Aquacultural Engineering* 7:265-278.

VITA

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EDUCATION

B.S. University of Dayton, 1970
M.S. Eastern Kentucky University, 1972
Ph.D. Mississippi State University, 1976

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, Department of Fisheries and Wildlife, Michigan State
University (1980-present)
Assistant Professor of Fisheries Science, Department of Fisheries and Wildlife Sciences, Virginia Institute
and State University (1976-1980)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society (Sections: Fish Culture and Fisheries Educators)
Beta Beta Beta
Sigma Xi
Gamma Sigma Delta

SELECTED PUBLICATIONS

- Cain, K, and D. Garling. 1993. Trout culture in the North Central Region. Fact Sheet Series #108. North
Central Regional Aquaculture Center.
- Garling, D.L. 1992. Making plans for commercial aquaculture in the North Central Region. Fact Sheet
Series #101. North Central Regional Aquaculture Center.
- Belal, J.E., D.L. Garling, and H. Assem. 1992. Evaluation of a practical tilapia feed using a saturation
kinetic model. *Comparative Biochemistry and Physiology* 102A:785-790.
- Dean, J.C., L.A. Nielsen, L.A. Helfrich, and D.L. Garling. 1992. Replacing fish meal with seafood
processing wastes in channel catfish diets. *Progressive Fish-Culturist* 54:7-13.
- Garling, D. L. 1991. NCRAC research programs to enhance the potential of yellow perch aquaculture in
the region. Pages 253-255 *in* Proceedings of the North Central Aquaculture Conference, Kalamazoo,
Michigan, March 18-21, 1991. Michigan Department of Natural Resources, Wolf Lake Fish Hatchery,
Mattawan, Michigan.
- Machado, J. P., T. G. Bell, D. L. Garling, Jr., N. R. Kevern, and A. L. Trapp. 1989. Effect of carbon
monoxide and exposure on gas-bubble trauma in rainbow trout (*Salmo gairdneri*). *Canadian Journal
of Fisheries and Aquatic Sciences* 46:74-80.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

McDonald, M., P. DeVore, C. Richards, J. Skurla, and J. Gunderson. 1992. Economic and technologic developments for the crayfish industry in Minnesota. Natural Resources Research Institute Technical Report, Duluth, Minnesota.

Gunderson, J.L., and A. Kapuscinski. 1992. Crayfish aquaculture demonstration in Minnesota wild rice paddies. Legislative Commission on Minnesota Resources Report.

Gunderson, J.L., and G. Kreeg. 1991. Estimated economic impact of recreational fishing on Minnesota waters of Lake Superior. Minnesota Sea Grant Extension Publication.

Gunderson, J.L. 1990. Northern crayfish: an update. Minnesota Sea Grant Extension Publication.

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EDUCATION

B.S. Fort Hays State University, 1956
M.S. Fort Hays State University, 1956

POSITIONS

Professor and Extension Specialist, Animal Damage Control, Kansas State University (1983-present)
Associate Professor and State Leader for Extension Wildlife Damage Control, Kansas State University (1977-1983)
Assistant Professor, Extension Specialist, Wildlife Damage Control, Kansas State University, Cooperative Extension Service, Manhattan, KS (1968-1977)
District Game Manager, South Dakota Game, Fish and Parks Dept., Kakoka, SD (1961-1968)
Research Assistant, Kansas Biological Survey, University of Kansas, Lawrence, KS (1959-1960)
Executive Secretary, Kansas Wildlife Association, Salina, KS (1957-1958)
Manager of Private Fish and Wildlife Area, Eureka, KS (1956-1958)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

Epsilon Sigma Phi
Kansas Chapter of the Wildlife Society
Kansas Fish Farmers Association
National Rifle Association
Wildlife Committee of the Great Plains Agriculture Council (since 1980)
Wildlife Society (Certified Biologist)

SELECTED PUBLICATIONS

Henderson, F. Robert (editor). 1986. Increasing wildlife on farms and ranches. Kansas State University, Manhattan.

Henderson, F. Robert (technical advisor). 1991. Aquatic plant control. Video (35 minutes). U.S. Fish and Wildlife Service, Kansas State University, Manhattan.

Henderson, F. Robert (executive producer). 1992. Native grass planting interspersed with food plots. Video (16 minutes). U.S. Fish and Wildlife Service, Kansas State University, Manhattan.

Henderson, F. Robert (executive producer). 1992. Wildlife habitat evaluation contest. Video (17 minutes). U.S. Fish and Wildlife Service, Kansas State University, Manhattan.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Malison, J.A., T.B. Kayes, J.A. Held, T.P. Barry, and C.H. Amundson. In press. Manipulation of ploidy in yellow perch (*perca flavescans*) by heat shock, hydrostatic pressure shock, and spermatozoa inactivation. *Aquaculture*.
- Kebus, M.J., M.T. Collins, M.S. Brownfield, C.H. Amundson, T.B. Kayes, and J.A. Malison. 1992. Effects of rearing density on the stress response and growth of rainbow trout. *Journal of Aquatic Animal Health* 4:1-6.
- Malison, J.A., T.B. Kayes, J.A. Held, and C.H. Amundson. 1990. Comparative survival, growth and reproductive development of juvenile walleye (*Stizostedion vitreum*), sauger (*S. canadense*) and their hybrids reared under intensive culture conditions. *The Progressive Fish-Culturist* 52:73-82.
- Malison, J.A., T.B. Kayes, B.C. Wentworth, and C.H. Amundson. 1988. Growth and feeding responses of male versus female yellow perch (*Perca flavescens*) treated with estradiol-17 β . *Canadian Journal of Fisheries and Aquatic Sciences* 45:1942-1948.
- Kim, K.I., T.B. Kayes, and C.H. Amundson. 1987. Effects of dietary tryptophan levels on growth, feed/gain, carcass composition and liver glutamate dehydrogenase activity in rainbow trout (*Salmo gairdneri*). *Comparative Biochemistry and Physiology* 88B:737-741.

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EDUCATION

B.S. Michigan State University, 1976
M.S. Michigan State University, 1979

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Kinnunen, R.E. 1992. North Central Region 1990: salmonid egg and fingerling purchase, production, and sales. Technical Bulletin Series #103. North Central Regional Aquaculture Center.
- Kinnunen, R.E., and E.M. Mahoney. 1989. 1987 Upper Michigan charter fishing study. Michigan Sea Grant Extension (MICHU-SG-89-501).
- Kinnunen, R., J. Lempke, and T. Sundstrom. 1987. Behavior patterns of divers visiting the Alger Underwater Preserve. Michigan Sea Grant Extension (MICHU-SG-87-505).
- Peterson, J., T. Sundstrom, and R. Kinnunen. 1987. 1986 Recreational diving activity in Michigan bottomland preserves. Michigan Sea Grant Extension (MICHU-SG-87-506).
- Kinnunen, R., and H. Johnson. 1986. Pathology of sea lamprey inflicted wounds on rainbow trout. Technical Report No. 48, Great Lakes Fishery Commission, Ann Arbor, Michigan.
- Kinnunen, R., J. Peterson, S. Stewart, and C. Swinehart. 1986. Sea Grant research and community development make Michigan's bottomland preserves a reality. *In* Marine Parks and Conservation: Challenge and Promise, Vol. II, International Experiences, National and Provincial Parks Association of Canada.
- Kinnunen, R., and H. Johnson. 1985. Impact of sea lamprey parasitism on the blood features and hemopoietic tissues of rainbow trout. Technical Report No. 46, Great Lakes Fishery Commission, Ann Arbor, Michigan.

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EDUCATION

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

POSITIONS

Fisheries and Aquaculture 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, Mississippi State University (1986-1988)
Aquaculture manager, Stiles Farm Foundation (1982-1986)
Graduate Research Assistant, Texas A&M University (1981-1982)
Research Technician I, Texas A&M University (1980-1981)
Fisheries Biologist Aide, Indiana Department of Natural Resources (1979)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

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

SELECTED PUBLICATIONS

- Harding, L., C. Clouse, R. Summerfelt, and J. Morris. 1992. Pond culture of walleye fingerlings. Fact Sheet Series #102. North Central Regional Aquaculture Center.
- Bettoli, P.W., J. E. Morris, and R. L. Noble. 1991. Changes in the abundance of two atherinid species following vegetation removal. Transactions of the American Fisheries Society 120:90-97.
- Morris, J.E., L.R. D'Abramo, and R.J. Muncy. 1990. An inexpensive marking technique to assess ingestion of artificial feeds by larval fish. Progressive Fish-Culturist 52:121-122.
- Morris, J. E. 1989. Supplemental feeding of hybrid striped bass fry. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 43:96-105.
- Morris, J.E. 1988. Influence of artificial feeds upon striped bass (*Morone saxatilis*) X white bass (*M. chrysops*) hybrid fry survival. Doctoral dissertation. Mississippi State University, Starkville.
- Campbell, J. M., J. E. Morris, and R. L. Noble. 1983. Spatial variability and community structure of littoral microcrustacea in Lake Conroe, Texas. 86th Annual Meeting Texas Academy of Science, Stephen F. Austin University, Nacodoches, Texas.

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EDUCATION

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

POSITIONS

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

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
Arkansas Association of Extension 4-H Agents
Soil and Water Conservation Society
Wildlife Society, Associate Wildlife Biologist, Missouri Chapter

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EDUCATION

B.A. Monmouth College, 1970
M.S. Western Illinois University, 1974

POSITIONS

Aquaculture Technology Transfer Specialist, Southern Illinois University at Carbondale (1989-present)
Division Manager, Marion Fish Company, Division of Timberline Fisheries, Inc. (1988-89)
Fish Culturist, self-employed, channel catfish cage culture farm (1978-1988)
Instructor, Shawnee Junior College, Ullin, Illinois (1980-1981)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
Beta Beta Beta
Illinois Aquaculture Advisory Committee, 1985
Illinois Aquaculture Industry Association
Union County 4-H Aquaculture Club Leader

SELECTED PUBLICATIONS

- Selock, D., and R. Heidinger. 1992. Cage culture of rainbow trout in Illinois. SIUC Fisheries Bulletin No. 13. Illinois Aquaculture Research and Demonstration Center, Carbondale.
- Selock, D., and R. Heidinger. 1992. Cage culture in Illinois: some pros and cons. SIUC Fisheries Bulletin No. 11. Illinois Aquaculture Research and Demonstration Center, Carbondale.
- Kohler, S.T., and D. Selock. 1991. Organizational structures available to aquaculture businesses. SIUC Fisheries Bulletin No. 12. Illinois Aquaculture Research and Demonstration Center, Carbondale.
- Selock, D.A., and R.C. Heidinger. 1990. Permits and regulations affecting Illinois aquaculturists. SIUC Fisheries Bulletin No. 10. Southern Illinois University at Carbondale.
- Selock, D.A., and R.C. Heidinger. 1990. An assessment of aquaculture in Illinois: is it for you? SIUC Fisheries Bulletin No. 8. Southern Illinois University at Carbondale.
- Selock, D.A., and R.C. Heidinger. 1990. Aquaculture in the U.S. and Illinois: an introduction. SIUC Fisheries Bulletin No. 7. Southern Illinois University at Carbondale.
- Selock, D.A. (ed.) 1987-1992. Illinois Aquaculture Association Newsletter.
- Selock, D.A. 1974. Effects of feed supplements on the growth of channel catfish using tank culture. Master's thesis, Western Illinois University, Macomb, Illinois.

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EDUCATION

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

POSITIONS

Aquaculture Extension Specialist, Illinois-Indiana Sea Grant, Purdue University (1989-present)
Aquaculture Trainer, Peace Corps Stateside Training Program, University of South Carolina (1989)
Farm Technician, Fish Acres Tropical Fish Farm, Lake Worth, FL (1989)
Assistant Project Leader, Non-native Fish Research Lab, Florida Fish and Game, Boca Raton (1988-1989)
Aquaculture Extensionist, Tongolese Ministry of Rural Development/U.S. Peace Corps, Togo, West Africa (1985-1987)
Research and Teaching Assistant, Tennessee Technological University, Cookeville (1982-1985)

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Society of Animal Scientists
Illinois Aquaculture Industry Association
Indiana Aquaculture Association
National Aquaculture Association
World Aquaculture Society

SELECTED PUBLICATIONS

- Swann, L. 1992. A basic overview of aquaculture: history, water quality, types of aquaculture, production methods. Technical Bulletin Series #102. North Central Regional Aquaculture Center.
- Swann, L. 1992. Transportation of fish in bags. Fact Sheet Series #104. North Central Regional Aquaculture Center.
- Swann, L., and S. Fitzgerald. 1992. The use and application of salt in aquaculture. Fact Sheet Series #105. North Central Regional Aquaculture Center.
- Swann, D.L., editor. 1991 Proceedings of the regional workshop on commercial fish culture using water reuse systems. Indiana Cooperative Extension Service, CES-240, West Lafayette.
- Swann, D.L., L.E. Rider, and F.J. Bulow. 1991. Age, growth and summer foods of four centrarchid species in a Big South Fork National River and Recreation Area stream fish community. Journal Tennessee Academy of Sciences 66:23-28.
- Swann, D.L., and P. Brown, editors. 1990. Proceedings midwest regional cage culture workshop. August 24-25, 1990. Southern Indiana Purdue Agriculture Center, Dubois, IN. Indiana Cooperative Extension Service, CES-234, West Lafayette.
- Swann, D.L., and S. Fitzgerald. 1990. Diagnosis and treatment of "ich" or white spot disease in fish. Indiana Cooperative Extension Service, AS-459, West Lafayette.