COMPREHENSIVE OUTREACH AND TRAINING PROGRAM TO EXPAND DEVELOPMENT OF NCR AQUACULTURE

Theme Area C TEA-1: Producer Education

Chairperson: Mr. D. Allen Pattillo

Industry Advisory Council Liaison(s): Bill Lynch, Mill Creek Perch Farm

Extension Liaison(s): Dr. Christopher T. Weeks

Funding Request: $158,963

Duration: July 1, 2017 to June 30, 2019 (2 year)

Objectives:
1. Develop a comprehensive training program that addresses subject priorities critical to the advancement of NCR aquaculture.
2. Identify a core team of subject experts who can develop and deliver high quality presentations and demonstrations throughout the NCR.
3. In cooperation with NCR states, deliver workshops and training region-wide.
4. Develop a comprehensive evaluation plan to assess the adoption/integration of information to the target audience.

Deliverables:
1. Six comprehensive outreach and training workshops held in the NCR.
2. Electronic learning materials dealing with workshop topics.
3. Distance learning opportunities for industry personnel.
4. Evaluation results.

Proposed Budgets:

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<th>Institution</th>
<th>Principle Investigator</th>
<th>Objective(s)</th>
<th>Year 1</th>
<th>Year 2</th>
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<td>University of Minnesota (UMN)</td>
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Non-funded Collaborators:

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<tr>
<td>Michigan State University</td>
<td>Christopher T. Weeks</td>
</tr>
<tr>
<td>The National Aquaculture Association</td>
<td>Paul W. Zajicek</td>
</tr>
</tbody>
</table>
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PROJECT SUMMARY

The North Central Regional Aquaculture Center (NCRAC) extension base project continues to be highly desired by the private industry stakeholders; however, lack of funding and aquaculture extension full time employees (FTEs) in the North Central Region (NCR) creates challenges for dissemination of applied research findings. In 2015, the NCR extension base workgroup began the NCRAC Aquaculture Webinar Series by creating an interactive component to the NCR online learning community to extend the reach and impact of their information transfer efforts. The webinar series to date has reached over 1,000 viewers globally, but remains limited in effectiveness because of a lacking hands-on learning component. This project proposal will complement the webinar series, and enhance learning outcomes for participants by providing multiple hands-on, advanced aquaculture techniques workshops throughout the NCR. Topical areas for these fee-based workshops will include but not be limited to culture techniques for important NCR aquaculture species, advanced aquaculture systems design and management, aquaculture business and marketing, water quality maintenance, advanced fish health diagnostics and aquaculture regulatory issues. Additionally, workshop presentations and materials will be posted on the NCRAC website for archival and dissemination. The workshops will be evaluated for quality of content and delivery as well as their effectiveness in improving farmer knowledge, profitability and sustainability. This evaluation data will help refine future NCRAC endeavors optimize the leveraging of funding and learning outcomes and impacts.

JUSTIFICATION

Project Relevance — University Extension programs provide the essential linkage between research and stakeholders. Traditionally, information industry gained much of their aquaculture information through the extension network and printed fact sheets. The NCRAC extension base project continues to be highly desired by the private industry stakeholders; however, lack of funding and aquaculture extension FTEs in the NCR creates challenges for dissemination of applied research findings. New information transfer technology include digital publications, YouTube-style instructional videos, webinars, web forums, social media, etc. The NCR online learning community is currently supported by both the NCRAC website, where one can download a variety of educational materials, and the NCRAC list serve, an email tool that allows timely sharing of information pertinent to the industry. Although useful, feedback in recent years from the industry suggest that there is significant need for hands-on learning to enhance information transfer for both newcomers and seasoned growers while accommodating for those limited by time and travel constraints.

Who will benefit? Where will it be applied? — The current project will serve to continue and complement the 1-year webinar series trial, and enhance learning outcomes for participants by providing multiple hands-on, advanced aquaculture techniques workshops to be held throughout the NCR. Additionally, the webinar and workshop series combination will bring together the cumulative knowledge and experience of the NCRAC community, engaging extension specialists, researchers and industry representatives in this effort.

Potential collaborations — This project will be a collaboration of three Land Grant Universities as well as multiple state aquaculture associations and natural resource agencies in the NCR. Workshops will be designed to work in conjunction with State Association and NCRAC meetings whenever possible. This project is designed to work closely with the National Aquaculture Association, a nationally recognized aquaculture industry advocacy group. These partnerships will help ensure the relevancy and timeliness of the information presented.

Relevance to NCRAC mission — “The mission of the Regional Aquaculture Centers is to support aquaculture research, development, demonstration, and extension education to enhance viable and profitable U.S. aquaculture which will benefit consumers, producers, service industries, and the American economy.” The workshops will supply extension education opportunities to the aquaculture industry to enhance their knowledge, technical knowledge and operational efficiency. The expected outcome of this work is the continued development and expansion of aquaculture in the NCR.
RELATED CURRENT AND PREVIOUS WORK

The extension service was initiated out of the Smith-Lever Act of 1914 “In order to aid in diffusing among the people of the United States useful and practical information on the subjects relating to agriculture, home economics, and rural energy…to be carried on in cooperation with the United States Department of Agriculture” (Smith-Lever Act 2016). Extension programming seeks to foster positive change in American society by creating a network of educational resources that improve our quality of life. In the early days this was accomplished through demonstration activities like farm field days during which the learner obtained hands-on experience with new and proven technology. More recently, the traditional extension format has evolved because of 1) decreases in funding, 2) increasing diversity of clientele, 3) increased demand for variety in information delivery methods, and 4) changes in clientele perception of once generally accepted practices (Hildreth and Armbruster 1981). This shift in extension has led to an increased adoption of technology to aid in information transfer to a diverse audience in an easily and permanently accessible format for self-paced learning. Additionally, this has created a shift from many generalized county extension agents to fewer, specialized extension professionals. Fewer extension professionals can create fewer learning opportunities for US citizens; therefore extension has adopted a train-the-trainer format of program delivery such that local volunteer subject educators can be developed. Although dwindling in numbers and funds, extension has proven its worth through effectively fostering a 50% increase of agricultural productivity in the private sector due to Land-Grant University Research and Extension activities (Hildreth and Armbruster 1981). Within NCRAC, Weeks (2014) documented that access to extension specialists and the programs they develop are highly valued by private industry producers. An increased emphasis on extension program evaluation and broader dissemination of extension information through electronic outlets like websites and social media has helped in reaching a younger and more diverse audience and provide the most relevant, timely, and useful information. However, it has been indicated through the NCRAC network that producers, educators, and regulators all value hands-on, workshop-style learning opportunities. Extension remains a complex process of education that combines the art of anticipating the client’s needs, the best delivery method, and the best available science to provide the best learning opportunities and generate the greatest possible socioeconomic impact.

Colyn and Boersen (2015) identified aquaculture production of food fish as the fastest growing field of agriculture and the greatest potential area for growth in the North Central Region (NCR). It is estimated that a 160-300% increase in seafood production from aquaculture will be required to satisfy global demand by the year 2030. Seafood is currently the 2nd largest imported product into the United States and the current annual trade deficit is nearly $12 billion. Additionally, aquaculture has far-reaching economic benefits because it supports associated industries like transportation, processing, retail stores, etc. This means that there is substantial opportunity of aquaculture industry growth and a great need for extension support of this chronically fledgling industry.

Based on the 2014 NCRAC Needs Assessment Survey (Weeks et al. 2014) it is clear that the industry finds value in NCRAC extension efforts. The survey revealed that the most helpful services that NCRAC provides to gain the information needed to optimize private industry aquaculture operations are 1) opportunities to speak with their fellow industry counterparts (i.e. workshops, conferences, aquaculture associations, list serves, social media, etc.), 2) aquaculture informational websites (e.g., Regional Aquaculture Center, state aquaculture extension, USDA, eXtension.org, etc.) and 3) state/regional aquaculture extension contacts. In fact, the recent Originz NCRAC Needs Assessment Report (Colyn and Boersen 2015) suggests that a renewed focus on extension will be required to advance the aquaculture industry forward in the NCR.

Weeks et al. (2014) reported that the top issues identified by the industry as impediments to industry advancement were: 1) regulations that inhibit interstate transport of live fish for sale as sportfish and baitfish for pond stocking and for the live markets located a population centers like Chicago, New York, Toronto, and others; 2) feed costs that are so high that it is cost-prohibitive to feed fish high quality diets for optimized growth rates; and 3) lack of government support for private industry production of fish. Prevention of aquatic invasive species, disease transmission/spread, and environmental pollution are the regulatory foci of state and federal government that affect aquaculture. These issues are particularly controversial because many of the water resources in the NCR are multiple-use public waterways like rivers and lakes. These regulations are particularly prohibitive in the Great Lakes region, containing 20% of the world’s freshwater supply, which would be suitable for the culture of salmonids and other food fish in net pens.

Compliance with the Clean Water Act through the United States’ Environmental Protection Agency is a major
inhibitor to the siting of aquaculture operations because of effluent discharge issues. For example, National Pollution Discharge Elimination System (NPDES) permits are required for aquaculture operations above a certain production capacity [coldwater: 9,072 kg (20,000 lbs) annually; warmwater: 45,360 kg (100,000 lbs) annually] that are discharging into a natural water body to help mitigate potential eutrophication issues related to aquaculture discharges (EPA 2013). Because of such regulations, much of aquaculture production will continue to be forced into intensive indoor recirculating aquaculture (RAS) systems because of their water efficiency and high yielding capacity as well as biosecurity and containment for the prevention of disease and invasive species escapement. However, these systems are costly and typically cost-prohibitive for food fish producers.

Research conducted through the extension service in Arkansas found that more than 1,300 laws apply to U.S. aquaculture producers in the areas of environmental management, food safety, legal and labor standards, interstate transport of aquatic products, fish health, and culture of commercially harvested species (Engle and Stone 2013). Engle and Stone (2013) suggest a considerable amount of time and labor go into regulatory compliance, with an average annual cost per aquaculture farm of nearly $150,000, which can be cost-prohibitive for many small farmers. Additionally, aquaculture permits can be difficult to obtain, thus preventing the scaling-up of aquaculture operations that would otherwise be able to serve the growing markets of the US. Potential aquacultures will need technical expert support to effectively comply with regulations.

An additional barrier to entry for aquaculture is the steep learning curve for intensive aquaculture production. Direct extension support and educational opportunities for these incoming producers is critical for their success. The 2014 NCRAC conference in Toledo, OH was the first major NCR aquaculture conference to combine the NCRAC research meeting with a State Aquaculture Association meeting to disseminate beginning and advanced level aquaculture information to current and potential producers, as well as create opportunities for social interaction between producers, academics, natural resource agencies. The concurrent sessions covered everything from aquaculture production systems and management to species production techniques to business planning and marketing to aquaponics and more. This event was extremely well received by the attendees according to the post-program evaluations conducted by the Ohio Aquaculture Association. Of all the program areas, the most valued were the Ask-the-Expert session and the networking opportunities provided. The 2016 NCRAC and Wisconsin Aquaculture Association Conference in Milwaukee, WI was also a great success because of expanded learning opportunities and farmer networking.

A drawback of the regional conference format is that many would-be attendees did not have access to the conference due to travel constraints or lack of knowledge about the event. Increasing resistance to travel for state and federal agencies as well as producers has become a major inhibitor to the impact of these valuable programs. To circumvent the travel issue, the NCRAC Extension Base Workgroup developed a proposal in 2014 to create an aquaculture webinar series that would be available online in perpetuity. The currently active 2015 NCRAC extension project is a partnership with the National Aquaculture Association and the United States Aquaculture Society to provide educational opportunities to industry professionals. Thus far, 15 webinars were conducted, with over 1,500 participants and the recorded versions have been viewed over 2,000 times to date through the NCRAC website (http://www.ncrac.org/) under the “videos” tab and on the NCRAC vimeo channel (https://vimeo.com/channels/958980). Participants in the webinars gained knowledge and shared it, improved their on-farm practices, anticipated more jobs and more profitability for their farm.

- Knowledge Gained - 64% above average knowledge post-webinar
- Knowledge Shared - 1,018-2,313+ estimated shares
- Action Taken - 50% added or enhanced on-farm measures
- Jobs Created - 140 – 200+ current or future jobs created
- Economic Impact - $600,019 - $988,981+ estimated annual value to farmers

Producers benefit by gaining information and improving their networks without a huge expense, time or travel obligations. These monthly webinars are designed to provide credible information on topics timely and relevant to industry growth. However, this webinar format is limited because of the lack of hands-on learning and networking opportunities as well as lack of internet access for some producers. The goal of this project is to build upon the current extension project by developing outreach materials in partnership with both extension and research staff.

The 2014 NCRAC Needs Assessment Survey and the work group members have identified the need for workshops in the areas of advanced culture techniques, water quality management, intermediate and advanced fish health
diagnostics, NCR aquaculture regulations, aquaculture business development and marketing, and advanced planning and production techniques for ponds, RAS, and aquaponics. These workshops will provide a knowledge base and resources for beginning and experienced aquaculturists that will help them become more efficient and profitable. Additionally, this series is an opportunity for inter-state collaboration as it can benefit producers in all 12 states who may otherwise be limited by distance from attending other NCRAC programs.

**ANTICIPATED BENEFITS**

Hands-on learning is critical to meaningful changes in industry operations; workshops can provide these quality learning opportunities. This comprehensive outreach and training program is designed to blend the benefits of the online and in-person learning opportunities by building on both by supplementing learning opportunities with hands-on, intensive training for serious aquaculturists, while still providing additional in-depth training opportunities for online users. Topical areas for these fee-based workshops will include culture techniques for important NCR aquaculture species, advanced aquaculture systems design and management, water quality management, aquaculture business and marketing, advanced fish health diagnostics and aquaculture regulatory issues. Local learning opportunities from high caliber subject experts for prospective and experienced aquaculturists are expected to have a positive impact on aquaculture production in the NCR with regard to increased production, increased efficiency, and increased farm profitability.

These workshops will provide a knowledge base and resources for beginning and experienced aquaculturists that will help them become more efficient and profitable. Additionally, this series is an opportunity for inter-state collaboration as it can benefit producers, extension, and agency personnel in all 12 states who may be limited by distance from attending other NCRAC programs and catalyze NCR state association functions. Workshop materials and educational videos will be posted on the NCRAC website for archiving and dissemination. Training materials from the intensive workshops will be archived online to extend their impact, while simultaneously creating momentum for future extension programs that will be provided through NCRAC. The workshops will be evaluated for quality of content and delivery as well as their effectiveness in improving farmer knowledge, profitability and sustainability. This evaluation data will help refine future NCRAC endeavors optimize the leveraging of funding and learning outcomes and impacts. Knowledge gained, knowledge shared, action taken, jobs created, and economic impact are areas of focus for evaluation of benefits in this program. Table 1 expresses the anticipated benefits of this project.

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<th>Goals</th>
<th>Outcomes</th>
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<tr>
<td>Train current and potential aquaculture producers, academics, and agency personnel in the areas of important NCR aquaculture species, advanced aquaculture systems design and management, aquaculture business and marketing, advanced fish health diagnostics and aquaculture regulatory issues</td>
<td>Improve knowledge of the workshop participants to enhance their production efficiency.</td>
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<table>
<thead>
<tr>
<th>Goals</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Alter workshop participant thinking and behavior to incorporate the learning outcomes of the workshop into their operation.</td>
<td>Improve production efficiency and profitability of workshop participant aquaculture operations.</td>
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</table>

<table>
<thead>
<tr>
<th>Goals</th>
<th>Impacts</th>
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<td>Total adoption and integration of the workshop learning outcomes into workshop participant operations as well as the NCR aquaculture industry as a whole.</td>
<td>Expand the development of NCR the Aquaculture industry in terms of growth and profitability.</td>
</tr>
</tbody>
</table>

**Table 1. Anticipated benefits of the comprehensive training program in the short, medium, and long term.**
OBJECTIVES

1. Develop a comprehensive training program that addresses subject priorities critical to the advancement of NCR aquaculture.
2. Identify a core team of subject experts who can develop and deliver high quality presentations and demonstrations throughout the NCR.
3. In cooperation with NCR states, deliver workshops and training region-wide.
4. Develop a comprehensive evaluation plan to assess the adoption/integration of information to the target audience.

DELIVERABLES

1. Six comprehensive outreach and training workshops held in the NCR.
2. Electronic learning materials dealing with workshop topics.
3. Distance learning opportunities for industry personnel.
4. Evaluation results.

Three aquaculture workshops will be held per year in strategic locations to maximize attendance and learning outcomes. Each workshop will feature presentations from various subject area experts covering topics relevant for the region. Suggested workshop topical areas include baitfish and water quality management (OSU), fish health and aquaculture regulatory issues (UMN) and advanced production techniques for pond, RAS, biofloc and aquaponics as well as aquaculture business and marketing (ISU). These intensive, multi-day, hands-on workshops (n=3 per year) will target beginner and/or advanced fish farmers, depending on topic and format, and may be held in conjunction with a state or regional aquaculture conference. A series of short (3-5 minute) training videos will be produced on the subject areas covered in the workshops. All presentations will be recorded and archived on the NCRAC.org website for distance education. A program evaluation that describes changes in knowledge, practices and conditions will be administered and the results will be delivered in the final project report. Knowledge gained, knowledge shared, action taken, jobs created, and economic impact are areas of focus for evaluation of benefits in this program.

PROCEDURES

OBJECTIVE 1: The proposed project will provide in-depth, hands-on workshops on NCR relevant aquaculture topics and enhance state association meetings and regional aquaculture conferences by bringing in subject area experts. This project is designed to blend the benefits of the online and in-person learning opportunities by building on both the NCRAC conference and webinar format by creating more local learning opportunities from high caliber subject experts for prospective and experienced aquaculturists. These workshops will provide a knowledge base and resources for beginning and experienced aquaculturists that will help them become more efficient and profitable. All of these events will be video-recorded and uploaded to NCRAC.org for remote access by users. Additionally, this series is an opportunity for inter-state collaboration as it can benefit producers, extension, and agency personnel in all 12 states who may be limited by distance from attending other NCRAC programs and catalyze NCR state association functions. Through the Brenton Center services at ISU, training videos, recorded presentations and workshop materials will be digitized and archived on NCRAC.org to extend their impact, while simultaneously creating momentum for future extension programs that will be provided through NCRAC. This will provide NCRAC the optimum leveraging of funding and learning outcomes through dissemination of NCRAC research-generated knowledge. Workshop topics, presenters, format, and content will be vetted through a collaborative effort amongst the PIs (Pattillo, Phelps and Smith) and the collaborators (Weeks and Zajicek) and industry liaison (Lynch) as well as representatives from the NCR aquaculture industry (to be determined). This program committee will also assist with advertisement of the events for broader impact.

Because of the breadth of aquaculture production techniques, species used, producer skill level, and information needs within the NCR, a multi-pronged approach to program delivery must be used. A comprehensive outreach and training program should include a combination of remotely accessible audiovisual learning opportunities such as YouTube-style training videos, in addition to hands-on workshops, and supplemental digital print materials such as fact sheets. Additionally, advertisement of the events must be done through a variety of methods, such as email,
flyers, social media, and word of mouth advertising to ensure a broad reach to potential participants. Learning outcomes must be developed based on the clientele’s needs, which will require a needs-assessment for the NCR aquaculture community. Needs data collected by Weeks (2014) as well as information requests solicited from each of the PIs in their respective extension programs have been used to develop an initial list of workshop topics. As the programs develop, the program committee will assist in directing the program content and methodologies to best serve the target audience. In general, NCR aquaculturists can be divided into beginner and advanced levels of skill and expertise. Beginner aquaculturists have little to no experience in aquaculture, but have a vested interest in obtaining information that would culminate in an aquaculture production business. Advanced aquaculturists have considerable experience producing aquaculture products and require continuing education programs to address specific farm issues to enhance production efficiency and/or profitability. Participant applications will be accepted and candidates will be screened to ensure that the funds and program impact are optimized.

**Beginner Track**

*NCR Aquaculture Regulations*

Regulations have been identified as a major impediment to aquaculture advancement in the NCR. Disease issues and concerns over the spread of aquatic invasive species have caused agencies to tighten regulations in an attempt to limit their spread and impact on the natural ecosystem. Additionally, water usage from limited aquifers and aquaculture effluents are regulated at the state level to comply with the Clean Water Act. Compliance with these regulations can be time consuming and costly to the farmer. Navigating these regulations, particularly with the differences in regulations amongst NCR states, can be difficult. Training in this area is needed to improve farm profitability and environmental sustainability.

Learning outcomes may include: 1) identify the state regulatory bodies, 2) navigating the NCRAC regulations website, 3) familiarity with regulations associated with interstate transport of fish and fish health certifications.

*Aquaculture Business and Marketing*

Aquaculture is a business and profitability is vital to the sustainability of the industry. Business planning and marketing are areas of concern for all farmers, but are often not given proper attention in the startup phases of an aquaculture business, which has led to considerable failure for farmers. An example of an identified business strategy is for farmers to utilize and form cooperatives in order to reach a goal that is unattainable on their own. Also, many beginning farmers are not able to self-fund their operations and must apply for funding from a bank or credit union; institutional funding is difficult to obtain without a viable business plan. Education in business plan development and marketing techniques will be extremely relevant and timely for enhancing aquaculture profitability and sustainability.

Learning outcomes may include: 1) identifying a specie(s) for production and potential markets, 2) development of a business plan, 3) identifying potential lending agencies for capital investment.

*Water Quality Management*

Proper water quality is known to be at the forefront in proper fish husbandry. Without adequate knowledge and hands-on experience farmers are unlikely to sustain their operation. Many believe that if the fish are not dying then the system must be doing its job. Unfortunately, even a seemingly rudimentary concept such as proper oxygen concentration alludes many. Recent research has shown that oxygen concentrations in ponds that are at the lower end of acceptable leads to substantially poorer yields in comparison to identical ponds that were held at a minimum of 2 mg/L higher. Knowledge and hands-on experience far exceeds oxygenation of culture systems and this topic will focus on all necessary parameters which will include system specific considerations, reliability of available test kits, and ample hands-on experience utilizing commercial available water quality test kits. Additionally, emphasis on how poor water quality affects stress, growth, fish health, and ultimately the bottom line will be addressed.

Learning outcomes may include: 1) understanding the importance of and how to use a water quality probe, 2) understanding the importance of and how to use a water chemistry kit, 3) understanding the importance of and how to keep proper water quality records, 4) identifying emergencies based on water quality data.
Aquaculture Production Systems

According to the 2014 NCRAC Needs Assessment survey, the most common productions systems for aquaculture are 1) Ponds, 2) Recirculating Aquaculture Systems, 3) Flow-through Systems, 4) Aquaponics and 5) Cages. Management techniques required to operate these facilities effectively and economically is critical to beginning aquaculture producers. A course in design considerations and culture techniques for each of the major production areas with a particular emphasis on ponds, RAS, biofloc, and aquaponic systems is timely and appropriate. Live demonstrations will be used where appropriate to enhance the participant’s learning experience.

Learning outcomes may include: 1) understanding the general functioning and components of multiple aquaculture production systems, 2) identifying a system that will be used in the participant’s operation, 3) identifying production goals, 4) understanding how to manage the system to achieve their production goals.

Advanced Track

Fish Health

Fish health is of utmost importance for farmers because healthy fish grow fast and are the most marketable. Sick fish are very difficult to keep alive, and treatment options may be cost prohibitive. Early recognition of disease symptoms can allow for some less expensive and invasive treatments to be effective and proactive culling of the sick fish can occur, saving the farmer a great deal of money. Additionally, highly virulent diseases like viral hemorrhagic septicemia (VHS) have resulted in massive mortality events in wild fish stocks in the Great Lakes Region, which has led to strict regulations being applied to fish that are to be hauled live between facilities and particularly across state lines. Fish health testing can be a very expensive process and certifications are temporary. This essentially creates an ongoing cost that small and diversified farms may not be able to afford, thus limiting the expansion of aquaculture production in the NCR. Applied and hands on training in the area of fish health clinical signs, treatment options, and navigating fish health regulations, and choosing the appropriate fish health monitoring plan for the individual farmer will have great impact of aquaculture profitability and sustainability.

Learning outcomes may include: 1) understanding the potential diseases relevant for aquaculture in the NCR, 2) identifying specific diseases to monitor for in the participant’s operation, 3) recognizing signs of disease and establishing a monitoring protocol, 4) identifying one or more fish health specialists for their operation.

Advanced Aquaculture Production Systems

Experienced aquaculture producers have a firm grasp on the operation of the systems they use in their operation. However, scale-up or regulatory concerns of specific species or discharge practices, or entering new markets may require the adoption of a new technology. An up and coming focus in some NCR states is the use of biofloc technology as a zero-discharge means of producing marine shrimp. Given the regulatory climate and concerns over sustainability, closed systems like RAS, aquaponics, and biofloc systems are considered among the most important systems to the future of aquaculture production. A course in advanced design considerations and culture techniques for each of the major production areas with a particular emphasis on in-pond raceways, RAS, biofloc, and aquaponic systems is timely and appropriate. Live demonstrations will be used where appropriate to enhance the participant’s learning experience.

Learning outcomes may include: 1) understanding the general functioning and components of multiple aquaculture production systems, 2) identifying a system that will be used in the participant’s operation, 3) identifying production goals, 4) understanding how to manage the system to achieve their production goals.

OBJECTIVE 2:

A team of regionally-relevant subject area experts from academia, agency, private industry and extension and outreach will be identified to deliver presentations and workshops to current and prospective aquaculture producers throughout the NCR. Workshop topics, presenters, format, and content will be vetted through a collaborative effort amongst the PIs (Pattillo, Phelps and Smith) and the collaborators (Weeks and Zajicek) and industry liaison (Lynch) as well as representatives from the NCR aquaculture industry (to be determined).

Mr. Smith will lead workshops and deliver presentations in the areas of water quality maintenance, and alternative production techniques. Dr. Phelps will lead workshops and deliver presentations in the areas of fish health and
aquaculture regulatory issues. Mr. Pattillo will lead workshops and deliver presentations in the areas of advanced production techniques, including in-pond raceways, aquaponics, recirculating aquaculture systems, and marine shrimp production methods including biofloc, as well as aquaculture business and marketing. Additional presenters (n=4 per workshop) will be identified to assist the topic leaders. Individuals will be selected based on subject matter expertise, geographic proximity to workshop location, and a mix of academic, industry, and agency personnel.

<table>
<thead>
<tr>
<th>Workshop Topic (tentative)</th>
<th>Potential Subject Experts as Workshop Presenters (tentative)</th>
</tr>
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<tbody>
<tr>
<td>Water Quality</td>
<td>Claude Boyd, Auburn University</td>
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<td></td>
<td>Craig Tucker, Mississippi State University</td>
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<td></td>
<td>Joseph Morris, Iowa State University</td>
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<tr>
<td></td>
<td>Matthew Smith, The Ohio State University</td>
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<tr>
<td>Aquaculture Production Systems</td>
<td>Luke Roy, Auburn University</td>
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<td></td>
<td>Andrew Ray, Kentucky State University</td>
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<td></td>
<td>Allen Pattillo, Iowa State University</td>
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<tr>
<td></td>
<td>Greg Fischer, Northern Aquaculture Demonstration Facility</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish Health</td>
<td>Nicholas Phelps, University of Minnesota</td>
</tr>
<tr>
<td></td>
<td>Andrew Goodwin, US Fish &amp; Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>Kathleen Hartman, USDA APHIS Veterinary Services</td>
</tr>
<tr>
<td></td>
<td>Roy Yanong, University of Florida</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>NCR Aquaculture Regulations</td>
<td>Chris Weeks, Michigan State University</td>
</tr>
<tr>
<td></td>
<td>Nicholas Phelps, University of Minnesota</td>
</tr>
<tr>
<td></td>
<td>Alan Johnson, Iowa Dept. of Natural Resources</td>
</tr>
<tr>
<td></td>
<td>Carole Engle, Engle-Stone Aquatic$</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Aquaculture Systems</td>
<td>Tzachi Samocha, Texas A&amp;M</td>
</tr>
<tr>
<td></td>
<td>Ryan Chatterson, Chatterson Farms</td>
</tr>
<tr>
<td></td>
<td>Steven Summerfelt, Freshwater Institute</td>
</tr>
<tr>
<td></td>
<td>Jesse Chappell, Auburn University</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquaculture Business and Marketing</td>
<td>Carole Engle, Engle-Stone Aquatic$</td>
</tr>
<tr>
<td></td>
<td>Matthew Parker, University of Maryland</td>
</tr>
<tr>
<td></td>
<td>Kwamena Quagrainie, Purdue University</td>
</tr>
<tr>
<td></td>
<td>Terry Hansen, Auburn University</td>
</tr>
</tbody>
</table>

**OBJECTIVE 3:** This project is designed to support and integrate with both the NCRAC conference and webinar format by creating more local learning opportunities from high caliber subject experts for prospective and experienced aquaculturists. These workshops will provide a knowledge base and resources for beginning and experienced aquaculturists that will help them become more efficient and profitable. Additionally, this series is an opportunity for inter-state collaboration as it can benefit producers, extension, and agency personnel in all 12 states.
who may be limited by distance from attending other NCRAC programs and catalyze NCR state association functions. These training programs will be delivered based on a multi-pronged approach that will maximize participation and extend impact. Through the Brenton Center services at ISU, training videos, recorded presentations and workshop materials will be digitized and archived on NCRAC.org to extend their impact, while simultaneously creating momentum for future extension programs that will be provided through NCRAC.

It is known that workshop participation and value to the participant is directly related to the cost of the workshop, thus these workshops will be operated on a cost-recovery basis. Although the goal of the workgroup is to minimize the cost to participants, it is imperative to the quality and success of the workshops, and long term sustainability of the workshop series to charge participants. Charges to the attendees and participant limitations will be appropriate for the nature of the workshop and the cost of supplies and facility rentals. For example, workshops on aquaculture business and marketing and regulations will likely have less expense for setup and relatively simple hands-on activities, whereas water chemistry, fish health diagnostics, and system construction will have more cost associated for materials. Workshop cost to participants will likely range from $50 to $300 per participant depending on the subject, materials and duration of the workshop. Participant attendance will be capped to a level that is as inclusive as would be feasible for the delivery of the highest quality learning experience for participants. Workshop attendance will likely be capped at 10 to 50 participants depending on the subject and workshop coordinator. For the future sustainability of this program, funds generated (minimal) from these workshops will be used to invest into future extension programming opportunities for aquaculture. These funds will be used at the discretion of the PIs to provide timely programming to suit the needs of their aquaculture clientele.

OBJECTIVE 4: The workshops will be evaluated for content quality and delivery as well as their effectiveness in improving the knowledge of the farmer in a way that helps them become more profitable and sustainable in the long term. Evaluation of these programs will allow for refinement of the series for future endeavors. This will provide NCRAC the optimum leveraging of funding and learning outcomes through dissemination of NCRAC research-generated knowledge. Knowledge gained, knowledge shared, action taken, jobs created, and economic impact are areas of focus for evaluation of benefits in this program.

With the development and implementation of webinars and face-to-face workshops on various topics related to aquaculture production, we intend to increase the knowledge and stimulate the adoption of skills related to aquaculture production provided in these educational efforts. Participants’ level of knowledge will be measured prior to the event at the time of registration (table 2) a minimum of 2 weeks before the event to help direct the activities and content provided during the event.

Learning during the workshop can be enhanced using polling technology for real-time feedback. For example, as the presentation begins, a short pre-test polling of the participants will be conducted anonymously using classroom response system or “clicker” technology. A series of multiple choice and true/false questions will be presented in the PowerPoint presentation that the participants will respond to using their clickers. Once all participants have submitted their answers, the clicker computer software will tabulate the answers and create a histogram displaying the distribution of participant answers. The instant feedback from this exercise helps to direct participant learning outcomes by giving them instant correction, but also they are more apt to listen for more information regarding these questions (particularly if the participant initially chose incorrectly). This data will be saved and the test will be administered again at the end of the workshop to evaluate changes in knowledge resulting from the workshop. Upon completion of the workshop, the attendees will receive a certificate of completion that may be used as continuing education credits for professional development.

Changes in knowledge will be assessed immediately following the event (table 3) using the Pre-then-Post Survey technique. Survey questions will be used to evaluate the quality of the workshop venue, meals, presentation effectiveness, presenter effectiveness, usefulness of the supplemental materials, and the overall acceptance of the workshop. This information will be used to guide future workshop events.

Changes in behavior will be assessed through follow-up surveys (table 4) 6 months after participation in the webinars and workshops will be conducted. Post-workshop evaluation will be completed online by the ISU Brenton Center using the Qualtrics survey platform and follow up with traditional paper survey methods where needed. Evaluation surveys will be delivered through email or postal mail to the workshop participants. This evaluation will
help determine how the skills and knowledge were put to use and the decisions and actions that were taken by participants toward establishing an aquaculture operation or managing an existing operation. These outcomes and impacts will be recorded in the final report of this project.

Table 2. Potential pre-workshop survey questions.

<table>
<thead>
<tr>
<th>Aquaculture and Aquaponics System Production Workshop Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate your response to the following questions in the columns to the right.</td>
</tr>
<tr>
<td>1. I currently own/operate an aquaculture operation.</td>
</tr>
<tr>
<td>2. I currently own/operate an aquaponics operation.</td>
</tr>
<tr>
<td>3. I am a commercial-scale producer.</td>
</tr>
<tr>
<td>4. I am a hobby-scale producer.</td>
</tr>
<tr>
<td>5. I am a current/aspiring private industry producer.</td>
</tr>
<tr>
<td>6. I am an academic research or extension employee.</td>
</tr>
<tr>
<td>7. I am a natural resource agency employee.</td>
</tr>
<tr>
<td>1. I have significant experience in aquaculture.</td>
</tr>
<tr>
<td>2. I have significant experience in aquaponics.</td>
</tr>
<tr>
<td>3. I want to learn about aquaponics production as a business.</td>
</tr>
<tr>
<td>4. I want to learn about aquaculture production as a business.</td>
</tr>
<tr>
<td>5. I want to learn about new aquaculture species.</td>
</tr>
<tr>
<td>6. I want to learn about different aquaculture systems.</td>
</tr>
<tr>
<td>7. Increasing profitability is a major concern for my business.</td>
</tr>
</tbody>
</table>
Table 3. Potential post-workshop survey questions.

Aquaculture and Aquaponics System Production Workshop Survey

Please indicate your response to each of the following statements in the column to the right.

<table>
<thead>
<tr>
<th>Changes in Knowledge</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I learned useful information about aquaculture production.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I learned useful information about aquaponic production.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3. I plan begin/expand my operation using knowledge gained from this workshop.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>4. I believe my new knowledge will improve my production efficiency/profitability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I want to learn about new aquaculture species.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I want to learn about different aquaculture systems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Increasing profitability is a major concern for my business.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8. Overall this workshop was valuable to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9. I would recommend this workshop to others.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality of Venue and Services Provided</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The breakfast provided met/exceeded my expectations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The lunch provided met/exceeded my expectations.</td>
<td></td>
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<tr>
<td>3. The venue was easy to find.</td>
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<tr>
<td>4. The venue was of acceptable quality.</td>
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<tr>
<td>5. The workshop delivery was executed in a professional manner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The workshop overall was of high quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality of Speakers and Supplemental Resources Provided</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Speaker #1 was of expert quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Speaker #1 presented quality information in an easy-to-understand, attractive format.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Speaker #2 was of expert quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Speaker #2 presented quality information in an easy-to-understand, attractive format.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. I will contact the speakers for more information in the future.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>6. The workbook provided was useful and of high quality.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7. The supplemental flash drive provided contained high-quality, useful information.</td>
<td></td>
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</tr>
<tr>
<td>8. The hands-on learning exercises were useful and of high quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. The written learning exercises were useful and of high quality</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Table 4. Potential 6-month post-workshop survey questions.

Aquaculture and Aquaponics System Production Workshop Survey

<table>
<thead>
<tr>
<th>Please indicate your response to the following questions in the columns to the right.</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I currently own/operate an aquaculture operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I currently own/operate an aquaponics operation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I am a commercial-scale producer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I am a hobby-scale producer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I am a current/aspiring private industry producer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I am an academic research or extension employee.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I am a natural resource agency employee.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I joined a state aquaculture association since the workshop.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I started a business as a result of the workshop I attended.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

| 1. I have pursued aquaculture because of the workshop.                   |      |       |
| 2. I have pursued aquaponics because of the workshop.                   |      |       |
| 3. I shared the knowledge I gained at the workshop with others.         |      |       |
| 4. My operation is more efficient because of the workshop.              |      |       |
| 5. My business is more profitable because of the workshop.             |      |       |
| 6. I would like to learn more about this aquaculture topic.             |      |       |
| 7. I would like to attend workshops on other aquaculture topics.        |      |       |
LOGIC MODEL for a COMPREHENSIVE OUTREACH AND TRAINING PROGRAM TO EXPAND DEVELOPMENT OF NCR AQUACULTURE

Goal: Expand development of North Central Region (NCR) aquaculture in the North Central Region of the U.S.
Objective: Develop and provide hands-on learning programs to enhance information transfer for both newcomers to the aquaculture industry and established growers.

**Inputs**
- Faculty & staff from North Central Region LGUs who have an investment in aquaculture (ISU, OSU, UMN)
- Industry leaders
- Collaborating aquaculture growers
- Natural Resource Agency personnel
- Potential aquaculture producers

**Outputs**
- Online learning modules, educational materials, videos, webinars
- Face-to-face and online learning modules, meetings, field day demonstrations, workshops, media
- Evaluation of participants’ actions following learning programs

**Participation**
- State Association and NCRAC collaboration
- Aquaculture growers, State Aquaculture Associations Extension educators, industry leaders, rural and urban citizens

**Learning**
- Awareness created, knowledge gained, attitudes changed, skills learned, and incentives created regarding aquaculture production, marketing and promotion
- Extension educators, industry leaders will include learning activities regarding aquaculture production in their programming
- Collaborating growers will provide models for field visits

**Outcomes**
- Identification of growers as role models & mentors
- Incentives created to explore career options in aquaculture
- Risk management plans created

**Conditions**
- Aquaculture professionals will provide a resource base for education regarding aquaculture sustainability
- Growers will enter the market to establish aquaculture operations to provide sustainable fish to consumers
- Growers will increase profitability in rural and urban areas

**Assumptions:**
- Growers are interested in learning about alternatives to conventional agriculture
- Infrastructure and markets will be available for aquaculture products
- Federal and state policies will encourage investment

**External Factors**
- Lack of a market and/or infrastructure for aquaculture products
- Producer aversion to risk of alternative crops
- Lack of venture capital
**FACILITIES**

These intensive, multi-day, hands-on workshops (n=3 per year) and training opportunities (n=2 per year) from subject area experts (n=4 per conference) will be held in conjunction with a state (i.e., 2017 or 2018 WI/MI/OH/MO/IA/IN Aquaculture Association Meeting) and/or regional aquaculture conference (i.e. 2018 NCRAC Conference). More in-depth, hands-on workshops may be held at the on-campus research and demonstrations facilities of OSU, UMN, and ISU. All recorded presentations and training videos will be archived on the NCRAC.org website. Evaluation of the events will be completed by project PIs and specialists at ISU.

The Brenton Center at Iowa State University provides practical and cost effective educational delivery services. The Brenton Center's state-of-the-art educational facilities can serve as an on-campus location for conferences, or as the origination site for online education offering. The staff of the Brenton Center deals with the technology concerns, allowing instructors to focus on the content and learning. Specific services listed below include development, production, delivery, and evaluation services.

**Development**
- Digitizing visuals
- Still images
- Animated images
- Web materials
- Multi-media CD-ROM / DVD
- Digitizing video

**Production**
- Planning and Scripting
- Videotaping on-location and in the Brenton Center
- Audio recording and editing
- Video recording and editing

**Delivery**
- Matching technology to the group's educational needs
- Providing technical assistance during your presentation
- Preparing videotaped, CD-ROM, & DVD curriculums
- Wirecast capture and live streaming
- Adobe Connect or Zoom Web Conferencing

**Evaluation**
- Survey production and delivery
- Qualtrics web-survey technology
- Video featurettes on program delivery and participant interviews

<table>
<thead>
<tr>
<th>Institution</th>
<th>Facilities</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISU</td>
<td>ISU is a world-renowned institution with a proven research history in fisheries, aquaculture, aquaponics as well as home to the NCRAC and Agriculture Marketing Resource Center. ISU’s state-of-the-art research facility includes five research laboratories (water chemistry, fresh and saltwater fish husbandry systems, aquaponic research systems, six 1/10th acre ponds). ISU also has a multitude of workshop training spaces and extension support staff such as the Brenton Center to develop training videos and perform program evaluations.</td>
<td>1) Advanced Aquaculture Systems Workshop 2) Aquaculture Business and Marketing Workshop 3) Training Video Production 4) Program Evaluation 5) Reporting</td>
</tr>
</tbody>
</table>
OSU is a world-renowned institution with a proven research history in aquaculture and fisheries. OSU’s state-of-the art research facility (i.e. water chemistry lab, fish husbandry systems, aquaponic research systems, and earthen production ponds) that provides excellent demonstration sites for the proposed workshops. Additionally, OSU has multiple meeting locations with the appropriate A/V technology to accommodate a workshop for over 50 participants.

1) Advanced Aquaculture Systems Workshop
2) Water Quality Workshop
3) Training Video Production

UMN is a world-renowned institution with a proven research history in aquaculture, fisheries and fish health. The UMN has on-campus aquaculture and aquaponics research facilities and an AAVLD-accredited Veterinary Diagnostic Laboratory. UMN routinely hosts large-scale wet lab and lecture style workshops for a variety of animal species.

1) Fish Health Workshop
2) Aquaculture Regulations Workshop
3) Training Video Production

**STATEMENT OF DUPLICATION**

The principal investigators searched for duplicative work on the themes proposed in this outline, using the USDA Research, Education, and Economics Information System (REEIS http://reeis.usda.gov/) on April 28, 2017. Term searches for previously USDA-funded works on aquaculture extension resulted in the following matches:

- Aquaculture Boot Camp 2012 and 2016 (Ohio State University),
- Northern Aquaculture Demonstration Facility 2006 and 2010 (University of Wisconsin-Extension),
- Red Cliff Tribal Hatchery 2008 and 2009 (University of Wisconsin-Extension), and
- NCRAC-funded projects on extension projects since 1988 when the Center was first developed.

The planned activities planned in this project will build upon these past projects to develop an Extension project for the entire North Central Regions and are not duplication of these earlier projects. In addition, the following NOAA databases were accessed and no previously funded projects similar to this proposed project were identified:
REFERENCES


## PROJECT LEADERS

<table>
<thead>
<tr>
<th>State</th>
<th>Name/Institution</th>
<th>Area of Specialization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>D. Allen Pattillo, Iowa State University, ISU</td>
<td>Aquaculture/Aquaponics Research/Extension</td>
</tr>
<tr>
<td></td>
<td>Nicholas B. D. Phelps, University of Minnesota, UMN</td>
<td>Extension/Fish Health/ Regulations</td>
</tr>
<tr>
<td>Ohio</td>
<td>Matthew A. Smith, The Ohio State University, OSU</td>
<td>Aquaculture Extension</td>
</tr>
</tbody>
</table>
**ORGANIZATION AND ADDRESS**
Iowa State University
339 Science Hall 2
Ames, IA 50011

**PROJECT DIRECTOR(S)**
D. Allen Pattillo

**CSREES FUNDED WORK MONTHS**

<table>
<thead>
<tr>
<th></th>
<th>Calendar</th>
<th>Academic</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>3</td>
<td>14,100</td>
<td></td>
</tr>
</tbody>
</table>

c. __ Paraprofessionals ..............................................
d. __ Graduate Students ..............................................
e. ___ Prebaccalaureate Students....................................
f. ___ Secretarial-Clerical ...........................................
g. ___ Technical, Shop and Other....................................

Total Salaries and Wages .............................................. 19,300

B. Fringe Benefits (If charged as Direct Costs) 11.4% 4,896

C. Total Salaries, Wages, and Fringe Benefits (A plus B) ... 24,196

D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)

E. Materials and Supplies 6,670

F. Travel 9,000

G. Publication Costs/Page Charges

H. Computer (ADPE) Costs

I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)

J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.) 4,456

K. Total Direct Costs (C through I) .................................... 44,322

L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)

M. Total Direct and F&A/Indirect Costs (J plus K) ..............

N. Other .............................................................................

O. Total Amount of This Request Year 1 ......................... 44,322

P. Carryover -- (If Applicable) Federal Funds: $ Non-Federal funds: $ Total $

**NAME AND TITLE** (Type or print)

- Project Director
- Authorized Organizational Representative

**SIGNATURE** (required for revised budget only)

**DATE**

---

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

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Academic</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td>14,100</td>
</tr>
</tbody>
</table>

- c. ___ Paraprofessionals ........................................
- d. __ Graduate Students ...........................................
- e. ___ Prebaccalaureate Students ................................
- f. ___ Secretarial-Clerical .....................................
- g. ___ Technical, Shop and Other ................................

Total Salaries and Wages ........................................... 19,300

B. Fringe Benefits (If charged as Direct Costs) 12.4% 4,896

C. Total Salaries, Wages, and Fringe Benefits (A plus B) .... 24,196

D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)

E. Materials and Supplies 2,950

F. Travel 9,000

G. Publication Costs/Page Charges

H. Computer (ADPE) Costs

I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)

J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.) 2,928

K. Total Direct Costs (C through I) ................................ 39,074

L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)

M. Total Direct and F&A/Indirect Costs (J plus K) ............. 39,074

N. Other .......................................................................... 0

O. Total Amount of This Request ..................................... 39,074

P. Carryover -- (If Applicable)  
   Federal Funds: $  
   Non-Federal funds: $  
   Total $  


---

**NAME AND TITLE**  
(Type or print)  

**SIGNATURE** (required for revised budget only)  

**DATE**  

---

Project Director

Authorized Organizational Representative

Signature (for optional use)

---

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

(Objectives 1-4 and Deliverables)

(Pattillo)

A. SALARIES AND WAGES: TOTAL = $38,600

YEAR 1: = $19,300
• Salaries are requested for 0.25 FTE ($14,100) and fringe benefits (34.5%) for Brenton Center personnel for workshop and video development, program support and evaluation.
• Salary ($5,200) and fringe benefits (0.6%) are requested for one half-time (10 hrs/wk @ $10/hr) undergraduate student assistant for one full year to assist in workshop planning, development, promotion, execution, and evaluation, demonstration project setup and maintenance, and animal husbandry.

YEAR 2: = $19,300
• Salaries are requested for 0.25 FTE ($14,100) and Fringe Benefits (34.5%) for Brenton Center personnel for workshop and video development, program support and evaluation.
• Salary ($5,200) and fringe benefits (0.6%) are requested for one half-time (10 hrs/wk @ $10/hr) undergraduate student assistant for one full year to assist in workshop planning, development, promotion, execution, and evaluation, demonstration project setup and maintenance, and animal husbandry.

B. FRINGE BENEFITS: TOTAL = $9,792

YEAR 1: = $4,896
• Fringe benefits (34.5%) for Brenton Center personnel ($4,865)
• Fringe benefits (0.6%) are requested for one full time (10 hrs/wk) undergraduate student assistant ($31)

YEAR 2: = $4,896
• Fringe benefits (34.5%) for Brenton Center personnel ($4,865)
• Fringe benefits (0.6%) are requested for half time (10hrs/wk) undergraduate student assistant ($31)

C. MATERIALS AND SUPPLIES: TOTAL = $9,620

<table>
<thead>
<tr>
<th>Items</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>General workshop supplies including clickers (n=32) and printed materials and flash drives for the lecture component</td>
<td>$1,290</td>
<td>$2,950</td>
<td>$4,240</td>
</tr>
<tr>
<td>Hands-on workshop supplies (e.g. fish, feed, laboratory supplies, plumbing, water chemistry supplies)</td>
<td>$5,380</td>
<td>$5,380</td>
<td>$5,380</td>
</tr>
<tr>
<td>Total</td>
<td>$6,670</td>
<td>$2,950</td>
<td>$9,620</td>
</tr>
</tbody>
</table>

F. TRAVEL (DOMESTIC): TOTAL = $18,000

YEAR 1: = $9,000
• Transportation ($500), lodging ($200), and meal expenses ($100) for aquaculture production workshop presenters (n=2). Total = $1,600
• Transportation ($600 including baggage fees), lodging ($200), and meal expenses ($100) for Brenton Center Staff to attend workshops outside of Iowa (n=2) and record the presentations and video footage for training videos. Total = $1,800
• Transportation ($500), lodging ($200), and meal expenses ($100) for the PI (Pattillo) to attend the other workshops (n=2) and participate in state and regional aquaculture conferences (n=2). Total = $3,200
• Transportation ($500), lodging ($200), and meal expenses ($100) for the Extension Liaison (Weeks) to attend workshops and participate in state and regional aquaculture conferences (n=3). Total = $2,400

YEAR 2: = $9,000
• Transportation ($500), lodging ($200), and meal expenses ($100) for aquaculture business and marketing workshop presenters (n=2). Total = $1,600
• Transportation ($600 including baggage fees), lodging ($200), and meal expenses ($100) for Brenton Center Staff to attend workshops outside of Iowa (n=2) and record the presentations and video footage for training videos. Total = $1,800
• Transportation ($500), lodging ($200), and meal expenses ($100) for the PI (Pattillo) to attend the other workshops (n=2) and participate in state and regional aquaculture conferences (n=2). Total = $3,200
Transportation ($500), lodging ($200), and meal expenses ($100) for the Extension Liaison (Weeks) to attend the workshops and participate in state and regional aquaculture conferences (n=3). Total = $2,400

J. OTHER DIRECT COSTS: TOTAL = $7,384
YEAR 1: = $4,456
  • $2,556 for meals for workshop attendees (n=30) and $1,900 for meeting room (2 days) and media rentals.
YEAR 2: = $2,928
  • $1,978 for meals for workshop attendees (n=50) and $950 for meeting room (1 day) and media rentals.

Total Year 1: $44,322
Total Year 2: $39,074
TOTAL COST FOR ISU: $83,396
October 3, 2016

Dr. Joseph E. Morris, Director
North Central Regional Aquaculture Center
Iowa State University
339 Science II
Ames, Iowa 50011-3221

SUBJECT: Comprehensive Outreach and Training Program to Expand Development of NCR Aquaculture

Dear Dr. Morris:

As the Authorized Organizational Representative (AOR) I would like to inform you Iowa State University (ISU) wishes to participate in the above referenced project. Mr David Allen Patillo will serve as the Principal Investigator of the subcontract and he will have access to all of the necessary equipment, laboratory, and office space to successfully undertake this project. I also approve the budget as submitted for Mr. David Allen Patillo’s involvement in this project. Upon issuance of approval to the North Central Regional Aquaculture Center for this project, ISU will enter into a formal agreement with your institution.

Sincerely,

/Kirsten Abel

Kirsten Abel
Pre-Award Administrator
**CSREES FUNDED WORK MONTHS**

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Academic</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</table>

**Detailed Budget Breakdown**

- **c. Paraprofessionals**: 1,300
- **d. Graduate Students**: 1,300
- **e. Prebaccalaureate Students**: 1,300
- **f. Secretarial-Clerical**: 1,300
- **g. Technical, Shop and Other**: 1,300

**Total Salaries and Wages**: 5,300

**B. Fringe Benefits (If charged as Direct Costs)**: 1,440

**C. Total Salaries, Wages, and Fringe Benefits (A plus B)**: 6,740

**D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)**: 6,750

**E. Materials and Supplies**: 4,000

**F. Travel**: 4,000

**G. Publication Costs/Page Charges**: 4,000

**H. Computer (ADPE) Costs**: 4,000

**I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)**: 4,000

**J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)**: 4,000

**K. Total Direct Costs (C through I)**: 21,490

**L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)**: 21,490

**M. Total Direct and F&A/Indirect Costs (J plus K)**: 21,490

**N. Other**: 21,490

**O. Total Amount of This Request Year 1**: 21,490

**P. Carryover – (If Applicable)**: 0

**Federal Funds**: 0

**Non-Federal funds**: 0

**Total**: 0

---

**Project Director**

**Authorized Organizational Representative**

---

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0524-0039.
### PROJECT DIRECTOR(S)
Nicholas B. D. Phelps

### CSREES FUNDED WORK MONTHS

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<td>Duration</td>
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<td>Year 2</td>
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<tr>
<td>Funds Requested by Proposer</td>
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#### Non-Federal Cost-Sharing/Matching Funds

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<tr>
<td>Proposed Cost-Sharing/Matching Funds</td>
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#### Duration Proposed Funds

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<tr>
<td>Year 2</td>
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<tr>
<td>Funds Approved by CSREES</td>
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<td>(If different)</td>
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#### Non-Federal Cost-Sharing/Matching Funds

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<td>(If Different)</td>
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#### PROJECT DIRECTOR(S)
Nicholas B. D. Phelps

#### Total Salaries and Wages

<table>
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<th>5,300</th>
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#### Fringe Benefits (If charged as Direct Costs)

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<th>1,440</th>
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#### Total Salaries, Wages, and Fringe Benefits

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<th>6,740</th>
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#### Nonexpendable Equipment

| Attach supporting data. List items and dollar amounts for each item. |

#### Materials and Supplies

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#### Travel

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#### Publication Costs/Page Charges

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#### Computer (ADPE) Costs

| Attach list of items and dollar amounts for each item. |

#### All Other Direct Costs

| In budget narrative, list items and dollar amounts and provide supporting data for each item. |

<table>
<thead>
<tr>
<th></th>
<th>2,000</th>
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#### Total Direct Costs

<table>
<thead>
<tr>
<th>C through I</th>
<th>13,240</th>
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#### F&A/Indirect Costs

| (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.) |

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#### Total Direct and F&A/Indirect Costs

<table>
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<tr>
<th>J plus K</th>
<th>13,240</th>
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</table>

#### Other

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#### Total Amount of This Request

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#### Carryover -- (If Applicable)

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<th>Federal Funds: $</th>
<th>Non-Federal funds: $</th>
<th>Total $</th>
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<table>
<thead>
<tr>
<th></th>
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<th>Non-Federal funds: $</th>
<th>Total $</th>
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#### NAME AND TITLE

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<th>SIGNATURE (required for revised budget only)</th>
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<table>
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<tr>
<th>DATE</th>
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</table>

#### Authorized Organizational Representative

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

Objectives 1-3 & Deliverables

A. SALARIES AND WAGES: TOTAL = $10,600
YEAR 1: = $5,300
• Salaries are requested for one veterinary student ($1,300) to assist with workshop preparation and presentation.
• Salary is requested for workshop leader ($4,000).
YEAR 2: = $5,300
• Salaries are requested for one veterinary student ($1,300) to assist with workshop preparation and presentation
• Salary is requested for workshop leader ($4,000).

B. FRINGE BENEFITS: TOTAL = $2,880
YEAR 1: = $1,440
YEAR 2: = $1,440

E. MATERIALS AND SUPPLIES: TOTAL = $7,250

<table>
<thead>
<tr>
<th>Items</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>General supplies to host hands on fish health workshop, including fish for necropsy, laboratory tools, disposable supplies (i.e. gloves, slides, etc), and miscellaneous</td>
<td>$1,750</td>
<td>$1,750</td>
<td></td>
</tr>
<tr>
<td>Microscopes (n=5) for wet lab</td>
<td>$4,500</td>
<td>$4,500</td>
<td></td>
</tr>
<tr>
<td>Printing of materials for fish health workshop and aquaculture regulation workshop</td>
<td>$500</td>
<td>$500</td>
<td>$1,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$6,750</td>
<td>$500</td>
<td>$7,250</td>
</tr>
</tbody>
</table>

F. TRAVEL (DOMESTIC): TOTAL = $8,000
YEAR 1: = $4,000
• Transportation ($550), lodging ($300), and meal expenses ($150) for aquaculture production workshop presenters (n=4). Total = $4,000
YEAR 2: = $4,000
• Transportation ($550), lodging ($300), and meal expenses ($150) for aquaculture production workshop presenters (n=4). Total = $4,000

J. OTHER DIRECT COSTS: TOTAL = $6,000
YEAR 1: = $4,000
• $2,000 for meals for workshop attendees and $2,000 for production of supplemental videos.
YEAR 2: = $2,000
• $2,000 for meals for workshop attendees.

Total Year 1: $21,490  
Total Year 2: $13,240  
TOTAL COST FOR UMN: $34,730
May 24, 2017

Dr. Joseph E. Morris, Director
North Central Regional Aquaculture Center
Iowa State University
339 Science II
Ames, Iowa 50011-3221

SUBJECT: Project entitled “Comprehensive outreach and training program to expand development of NCR aquaculture”

Dear Dr. Morris:

As the Authorized Organizational Representative (AOR) I would like to inform you the University of Minnesota (UMN) wishes to participate in the above referenced project as a subcontractor to Iowa State University.

Dr. Nicholas Phelps will serve as the Principal Investigator of the subcontract and he has access to all of the necessary equipment, laboratory, and office space to successfully undertake this project. I also approve the budget as submitted for Dr. Phelps’ involvement in this project. Upon issuance of approval to the North Central Regional Aquaculture Center for this project, Iowa State University and UMN will enter into a formal agreement.

Sincerely,

[Signature]

Andrea Marshall, Principal Grant Administrator
Sponsored Projects Administration
ORGANIZATION AND ADDRESS
The Ohio State University
1864 Shyville Road
Piketon, OH 45661

PROJECT DIRECTOR(S)
Matthew A. Smith

CSREES FUNDED WORK MONTHS

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Academic</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.75</td>
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</tbody>
</table>

$7,100

e. Paraprofessionals

c. Graduate Students

d. Prebaccalaureate Students
f. Secretarial-Clerical

g. Technical, Shop and Other

Total Salaries and Wages

$7,100

B. Fringe Benefits (If charged as Direct Costs)

$2,513

C. Total Salaries, Wages, and Fringe Benefits (A plus B)

$9,613

D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)

F. Materials and Supplies

$4,800

F. Travel

$2,888

G. Publication Costs/Page Charges

H. Computer (ADPE) Costs

I. Student Assistance/Support (Scholarships/fellowships, stipends/stuion, cost of education, etc. Attach list of items and dollar amounts for each item.)

J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)

$3,508

K. Total Direct Costs (C through I)

$20,809

L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)

M. Total Direct and F&A/Indirect Costs (I plus K)

$20,809

N. Other

O. Total Amount of This Request

$20,809

P. Carryover -- (If Applicable)

Federal Funds:

Non-Federal funds:

Total $

NAME AND TITLE (Type or print)

Project Director

Authorized Organizational Representative

Signature (required for revised budget only)

DATE

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

#### CSREES FUNDED WORK MONTHS

<table>
<thead>
<tr>
<th>Calendar</th>
<th>Academic</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.75</td>
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</tbody>
</table>

- **Total Salaries and Wages** $7,241

#### B. Fringe Benefits (If charged as Direct Costs)
$2,563

#### C. Total Salaries, Wages, and Fringe Benefits (A plus B)
$9,804

#### D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Material and Supplies</td>
<td>$4,015</td>
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<tr>
<td>Travel</td>
<td>$2,200</td>
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</tbody>
</table>

#### E. Total Direct Costs (C through I)
$20,028

#### F. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)

<table>
<thead>
<tr>
<th>Item Description</th>
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<tbody>
<tr>
<td>Other</td>
<td>$4,009</td>
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</tbody>
</table>

#### G. Total Amount of This Request
$20,028

#### P. Carryover -- (If Applicable) Federal Funds: $ Non-Federal funds: $ Total: $

---

### NAME AND TITLE

**Project Director**

**Authorized Organizational Representative**

**Signature (for optional use)**

---

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

(Smith)

Objectives 1-4 and Deliverables

A. SALARIES AND WAGES:
YEAR 1: = $7,100
• Other Professionals (A&P Staff) PI/PD: Smith $7,100 (14.5% effort) requested for 12 months to assist with the development, coordination, and implementation of hands-on workshops, Extension publications, and web-based deliverables for year 1.
YEAR 2: = $7,241
Other Professionals (A&P Staff) PI/PD: Smith $7,241 (14.4% effort) for 12 months to assist with the development, coordination, and implementation of hands-on workshops, Extension publications, and web-based deliverables for year 2.

B. FRINGE BENEFITS:
YEAR 1: = $2,513
• Fringe rate would be 35.4% ($2,513) for year 1.
YEAR 2: = $2,563
• Fringe rate would be 35.4% ($2,563) for year 2.

E. MATERIALS AND SUPPLIES:

<table>
<thead>
<tr>
<th>Items</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>General workshop supplies including printed materials</td>
<td>$1,190</td>
<td>$1,190</td>
<td>$2,380</td>
</tr>
<tr>
<td>for the lecture component</td>
<td></td>
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</tr>
<tr>
<td>Hands-on workshop materials including fish, feed,</td>
<td>$3,610</td>
<td>$2,825</td>
<td>$6,435</td>
</tr>
<tr>
<td>laboratory tools, plumbing, water chemistry supplies,</td>
<td></td>
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<tr>
<td>disposable supplies (i.e. gloves, paper towels, etc.),</td>
<td></td>
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<td></td>
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<tr>
<td>and miscellaneous</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>$4,800</td>
<td>$4,015</td>
<td>$8,815</td>
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</table>

F. TRAVEL (DOMESTIC):
YEAR 1: = $2,888
• Transportation to and from airport, airport parking, per diem, car rental including insurance and gas, hotel, and flight to the University of Minnesota for hands-on workshop ($1,444).
• Transportation to and from airport, airport parking, per diem, car rental including insurance and gas, hotel, and flight to the Iowa State University for hands-on workshop ($1,444).
YEAR 2: = $2,200
• Transportation to and from airport, airport parking, per diem, car rental including insurance and gas, hotel, and flight to the University of Minnesota for hands-on workshop ($1,100).
• Transportation to and from airport, airport parking, per diem, car rental including insurance and gas, hotel, and flight to the Iowa State University for hands-on workshop ($1,100).

J. OTHER DIRECT COSTS:
Year 1: = $3,508
• $1,500 is requested for meals for workshop attendees and $2,008 for invited speakers.
Year 2: = $4,009
• $2,001 is requested for meals for workshop attendees and $2,008 for invited speakers.

Total Year 1: $20,809
Total Year 2: $20,028
TOTAL COST FOR OSU (Year 1&2): $40,837
October 3, 2016

Dr. Joseph E. Morris, Director
North Central Regional Aquaculture Center
Iowa State University
339 Science II
Ames, Iowa 50011-3221

SUBJECT: Project entitled: “Comprehensive outreach and training program to expand development of NCR aquaculture”

Dear Dr. Morris:

As the Authorized Organizational Representative (AOR), I would like to inform you that The Ohio State University wishes to participate in the above referenced project as a subcontractor to Iowa State University. Mr. Matthew Smith will serve as our Principal Investigator and will have access to all the necessary equipment, laboratory and office space to successfully undertake this project. I also approve the budget as submitted for Mr. Smith’s involvement.

We understand that, upon issuance of approval to the North Central Regional Aquaculture Center for this project, Iowa State University and The Ohio State University will enter into a formal agreement.

The Office of Sponsored Programs is the legal entity authorized to administer grants awarded to faculty and staff at The Ohio State University. Appropriate administrative personnel are aware of this submission and are prepared to manage this grant, if awarded. Any resulting award should be issued to The Ohio State University, Tax I.D. # 31-6025986; DUNS # 832127323.

If you need any additional information, please contact me as administrative contact, Traci Aquara, Sponsored Program Officer. I may be reached at 614-688-1765 or aquara.1@osu.edu.

Sincerely,

Traci Aquara
Sponsored Program Officer
Office of Sponsored Programs
The Ohio State University
## BUDGET SUMMARY

### YEAR 1 (2017-18)

<table>
<thead>
<tr>
<th>Objective #</th>
<th>ISU (Pattillo)</th>
<th>OSU (Smith)</th>
<th>UMN (Phelps)</th>
<th>Project Total</th>
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<tbody>
<tr>
<td>Salaries and Wages</td>
<td>$19,300</td>
<td>$7,100</td>
<td>$5,300</td>
<td>$31,700</td>
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<tr>
<td>Fringe Benefits</td>
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<td>$2,513</td>
<td>$1,440</td>
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<td>Total Salaries, Wages, and Fringe Benefits</td>
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<td>$9,613</td>
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<td>Materials and Supplies</td>
<td>$6,670</td>
<td>$4,800</td>
<td>$6,750</td>
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<tr>
<td>Travel</td>
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<td>$2,888</td>
<td>$4,000</td>
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<tr>
<td>All Other Direct Costs</td>
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### YEAR 2 (2018-19)

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<tr>
<th>Objective #</th>
<th>ISU (Pattillo)</th>
<th>OSU (Smith)</th>
<th>UMN (Phelps)</th>
<th>Project Total</th>
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</thead>
<tbody>
<tr>
<td>Salaries and Wages</td>
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<td>$7,241</td>
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<td>Fringe Benefits</td>
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<td>Total Salaries, Wages, and Fringe Benefits</td>
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<td>$9,804</td>
<td>$6,740</td>
<td>$40,709</td>
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<td>Nonexpendable Equipment</td>
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<tr>
<td>Materials and Supplies</td>
<td>$6,670</td>
<td>$4,800</td>
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<td>Travel</td>
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<td>All Other Direct Costs</td>
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**SCHEDULE FOR COMPLETION OF OBJECTIVES**

Start date: September 1, 2017
Completion date: August 31, 2019

<table>
<thead>
<tr>
<th>Objectives, Tasks, and Deliverables</th>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td><strong>Objective 1:</strong> Develop a comprehensive training program that addresses subject priorities critical to the advancement of NCR aquaculture</td>
<td></td>
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<tr>
<td>Water Quality workshop and video development</td>
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<tr>
<td>Aquaculture Systems and video development</td>
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<td>Fish Health workshop and video development</td>
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<td>M J A S</td>
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<tr>
<td>Aquaculture Regulations workshop and video development</td>
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<td>Advanced Aquaculture Systems workshop and video development</td>
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<td>J F A M</td>
</tr>
<tr>
<td>Aquaculture Business and Marketing workshop and video development</td>
<td>M J</td>
<td>M J</td>
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<tr>
<td><strong>Objective 2:</strong> Identify a core team of subject experts who can develop and deliver high quality presentations and demonstrations throughout the NCR.</td>
<td></td>
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<tr>
<td><strong>Objective 3:</strong> In cooperation with NCR states, deliver workshops and training region-wide.</td>
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<tr>
<td>Water Quality Management workshop</td>
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<tr>
<td>Advanced Aquaculture Systems workshop</td>
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<td>J F A M</td>
</tr>
<tr>
<td>Fish Health workshop</td>
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<td>M J A S</td>
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<tr>
<td>Aquaculture Regulations workshop</td>
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<td>S O N D</td>
</tr>
<tr>
<td>Aquaculture Systems workshop</td>
<td>J F A M</td>
<td>J F A M</td>
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<tr>
<td>Aquaculture Business and Marketing workshop</td>
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<tr>
<td><strong>Deliverables</strong></td>
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<td>Archived presentations and related extension materials associated with the workshops</td>
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<td><strong>Objective 4:</strong> Develop a comprehensive evaluation plan to assess the adoption/integration of information to the target audience.</td>
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<tr>
<td>Develop</td>
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<td>S O N D</td>
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<tr>
<td>Implement</td>
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<td>J F A M</td>
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<tr>
<td>Analyze</td>
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</tr>
<tr>
<td>Report</td>
<td>M J</td>
<td>M J</td>
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</table>
PARTICIPATING INSTITUTIONS AND CO-PRINCIPAL INVESTIGATORS

Iowa State University  
D. Allen Pattillo

The Ohio State University  
Matthew A. Smith

University of Minnesota  
Nicholas B. D. Phelps
VITA

D. Allen Pattillo  
Department of Natural Resource Ecology and Management  
Iowa State University  
339 Science Hall II  
Ames, IA  50011-3221  

Phone: (515) 294-8616  
Fax: (515) 294-2995  
E-mail: Pattillo@iastate.edu

EDUCATION
M.S.  Auburn University, 2010, Aquaculture  
B.S.  The University of Georgia, 2008, Fisheries and Aquaculture

POSITIONS
2011-present  Aquaculture Extension Specialist III, Department of Natural Resource Ecology and Management,  
Iowa State University  
2008-2010  Graduate Research Assistant, Department of Fisheries and Allied Aquacultures,  
Auburn University

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS
American Fisheries Society  
World Aquaculture Society  
United States Aquaculture Society

SELECTED PUBLICATIONS
Accessible: https://store.extension.iastate.edu/Product/Fish-Health-Considerations-for-Recirculating-Aquaculture. (June 2015).


Accessible: https://store.extension.iastate.edu/Product/Feeding-Practices-for-Recirculating-Aquaculture. (June 2015)


Accessible: https://store.extension.iastate.edu/Product/Water-Quality-Management-for-Recirculating-Aquaculture. (June 2015)


http://www.agmrc.org/commodities__products/aquaponics/ (June 2015)
VITA

Nicholas B. D. Phelps

College of Veterinary Medicine, Veterinary Population Medicine Dept

University of Minnesota

1333 Gortner Ave

St. Paul, MN 55108

EDUCATION

Ph.D. University of Minnesota, 2012, Veterinary Medicine

M.S. University of Arkansas at Pine Bluff, 2007, Aquaculture/Fisheries

B.S. Bemidji State University, 2005, Aquatic Biology

POSITIONS

2013-present Assistant Professor, Dept Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota

2009-2013 Instructor, Dept Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota

2009-present Aquaculture Specialist, Extension, U of Minnesota

2009-present Head, Fisheries Diagnostic Service, Veterinary Diagnostic Laboratory, College of Veterinary Medicine, University of Minnesota

2008-2009 Scientist, Veterinary Diagnostic Laboratory, College of Veterinary Medicine, University of Minnesota

2007-2008 Scientist, Veterinary Diagnostic Laboratory, College of Veterinary Medicine, University of Minnesota

2005-2007 Research Assistant, Fish Disease Laboratory, University of Arkansas at Pine Bluff

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society, Sections: Fish Health, Fish Culture

United States Animal Health Association

American Association of Veterinary Laboratory Diagnosticians

SELECTED PUBLICATIONS


VITA
Matthew A. Smith                               Phone: 740-289-2071
1864 Shyville Road                                 FAX: 740-289-4591
Piketon, OH 45661                 E-mail: smith.11460@osu.edu

EDUCATION
M.S. University of Arkansas, Pine Bluff, 2015, Aquaculture/Fisheries, Aquaculture
B.S. Auburn University, 2012, Fisheries/Allied Aquaculture, Fish Mgt.

POSITIONS
2016 – Present  Extension Aquaculture Specialist, Ohio State University, South Centers
2015 – 2016 Extension Fish Health Associate, University of Arkansas at Pine Bluff,
          Lonoke Fish Disease Diagnostics Laboratory
2013 – 2015  Graduate Researcher, University of Arkansas at Pine Bluff
2012   Graduate Researcher assistant, Auburn University, Ireland Center

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS
Ohio Aquaculture Association
World Aquaculture Society
U.S. Aquaculture Society
National Aquaculture Association
Catfish Farmers of Arkansas
Arkansas Bait and Ornamental Fish Growers Association

EXTENSION PUBLICATIONS
Smith M.A. 2016. Growing largemouth bass for foodfish? A general overview for Ohio fish farmers. OSU
          Extension Ohioline Fact Sheet. in press.

PUBLISHED ABSTRACTS
          summer temperatures. Aquaculture America, Annual Meeting of the U.S. Aquaculture Society. Las
          hydrogen sulfide concentrations in commercial Golden Shiner Notemigonus crysoleucas ponds in
          commercial sportfish farms in Arkansas. Aquaculture America, Annual Meeting of the U.S. Aquaculture
          scaup on commercial sportfish farms in Arkansas. Lonoke Aquaculture Workshop. Lonoke, AR.
          February 11, 2016.
VITA

Christopher Weeks
PhD, Michigan State University
Department of Fisheries and Wildlife
East Lansing, Michigan 48824

Phone: (517) 745-1562
E-mail: weekschr@msu.edu

EDUCATION
PhD, Michigan State University, Fisheries and Wildlife – Aquaculture/Fish Nutrition, 2007
M.S. Michigan State University, Fisheries and Wildlife – Fish Population Dynamics, 1997
B.S. San Diego State University, Aerospace Engineering, 1986

POSITIONS
2008 – Present       Regional Aquaculture Extension Specialist, North Central Regional Aquaculture Center
2012       Adjunct Professor, University of Alaska
2007 – 2008       Research Associate / Specialist, Michigan State University Dept. of Fisheries and Wildlife
2003 – 2007       Lab Manager, Michigan State University Aquatic Animal Health Lab
2002 – 2007       Graduate Assistant, Michigan State University
2000 – 2001       Aquaculture Facility Manager, Stoney Creek Fisheries, Harrietta, Michigan
1998 – 2000       Hatchery Manager, Great Black Creek Fish Co., Black Creek, Wisconsin
1989 – 1993       Cade Industries, Engineer, San Diego, California; Lansing, Michigan
1986 – 1989       McDonnell Douglas, Engineer, Long Beach, California

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

PUBLICATIONS/TECHNICAL REPORTS


VITA

Paul W. Zajicek                  www.thenaa.net
The National Aquaculture Association          Tel: (850) 216-2400
PO Box 12759,              Fax: (850) 216-2480
Tallahassee, FL 32317          Email: naa@thenaa.net

EDUCATION

M.S. University of Florida, 1986, Agriculture/Sales and Marketing
B.S. Florida Institute of Technology, 1977, Biology/Marine Biology

POSITIONS

2014 to Present  Development Director, National Aquaculture Association.
2012-2014  Environmental Administrator, Florida Dept of Agriculture and Consumer Services
1999-2012  Biological Administrator, FDACS
1987-1999  Development Representative, FDACS
1978-1986  Manager, The Bait Box
1969-1976  Field Biologist, Caretta Research, Inc.

SCIENTIFIC AND PROFESSIONAL ORGANIZATIONS

American Fisheries Society
Florida Aquaculture Association
North American Sturgeon and Paddlefish Society
U.S. Aquaculture Society
World Aquaculture Society

SELECTED PUBLICATIONS


