

**SUPPORTING AND EXPANDING AQUACULTURE IN THE MIDWEST
THROUGH EXTENSION AND OUTREACH**

Extension: Producer Education

Chairperson: Matthew A. Smith, The Ohio State University
Extension Liaison: Alexander Primus, University of Minnesota
Industry Liaison: Jeni Blackburn, Fresh Harvest Farm, Richwood, Ohio
Funding Request: \$131,432
Duration: 2 years, 11/01/ 2018 – 10/31/2020

Objectives:

1. Build upon previously successful Extension and outreach programs to enhance the established North Central Region (NCR) industry by assisting farmers, educating educators, and assessing and prioritizing the needs of the NCR industry in ways that will not be probable at this time without NCRAC support.
2. Act in a liaison capacity on a variety of collegiate, state, regional, and national committees to ensure the NCR is well-represented when issues or opportunities that can or will affect the NCR aquaculture/aquaponic industry arises.
3. Develop and strengthen partnerships from within the NCR and outside the region among regulatory agencies, industry, academia, and other relevant entities to foster open, meaningful dialog on critical issues and build support for the NCR aquaculture/aquaponic industry.
4. Work closely with the liaisons of every NCRAC funded project to assist in developing and achieving strong deliverables to the industry.
5. Coordinate efforts for seeking non-NCRAC support for NCR aquaculture development; including consumer perception of aquaculture/aquaponics and technology transfer.

Deliverables:

- In-service training for County Agriculture Agents
- Technology transfer of NCRAC funded projects through liaison capacity
- Facilitate the dialogue necessary between NCRAC, state associations, and individuals farmers to start addressing the recommendations put forth in the termination report of the NCRAC project “Assessing the Status of State Aquaculture Associations in the North Central Region”
- Development of an online network to bring together researchers interested in pursuing aquaculture funding from other grant-supporting resources
- Work with Midwest researchers, Extension, and Sea Grant, and Land-Grant administrators in seeking regional extension funding beyond the scope and timeframe of this project
- Regional aquaculture needs survey in 2019
- Assist the Director’s office in coordinating the next North Central Aquaculture Conference (NCAC)
- Revitalize the NCR Fish Culture Listserv and NCRAC’s Fin Clips Newsletter
- Assist new/revitalized aquaculture associations with displaying their value to their membership; attendance at three or more state association meetings, regional, and/or national conferences per year
- Continue information outlet and topical news on the NCR fish culture list-serve, OSU’s four list-serves, OSU’s social media pages, eXtension Ask-an-Expert
- Annual updates to the NCRAC regulation website and regional updates on a public social media account

- Establish partnerships for NCR aquaculture industry development, submitting at least one grant proposal per year as a team member for NCR industry support
- Dialogue/information exchange on policy issues (e.g. Federal Register posts, legislation, and regulation)
- Create a network in which an annual or bi-annual contact list of aquaculture/aquaponic producers and baitfish harvesters can be updated

Proposed Budgets:

Institution	Principal Investigator	Objectives	Year 1	Year 2	Total
The Ohio State University	Matthew A. Smith	1 – 5	\$ 63,324	\$ 68,108	\$ 131,432
Totals			\$ 63,324	\$ 68,108	\$ 131,432

Non-funded Collaborator:

Farm	Farmer	State
Fresh Harvest Farm, LLC	Jeni Blackburn, IAC	Ohio

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PROJECT SUMMARY

The Ohio State University intends to build upon previous successful Midwest Extension and outreach projects. The general focus of this project will be to collaborate with the North Central Regional Aquaculture Center's (NCRAC's) Industry Advisory Council (IAC) to develop a sustainable program that will be beneficial for established farmers throughout the Midwest; which will hopefully increase productivity and decrease costs. The program will assist in increasing the transfer of established and novel technology to the industry through proven models, assist in improving the general public's perception of aquaculture in the Midwest (e.g., creation and distribution of online and printed aquaculture materials geared towards the public), and act as a liaison between NCRAC and the rest of the aquaculture community to ensure that the NCR is well-represented when issues or opportunities that will affect the NCR aquaculture industry arises. It is our intent to show the value of Extension in the Midwest; resulting in the eventual increase in full-time equivalents in aquaculture Extension throughout the region. The PI will also work with NCRAC to address recommendations from two recent termination reports that were developed through a NCRAC-funded project on aquaculture industry leadership training and evaluation of Midwest aquaculture associations.

JUSTIFICATION

Seaman Knapp, understood to be the father of Extension, believed that demonstrations carried out on farms was one of the best ways to effectively communicate important information to the rest of the industry in the late 1880s. While a difficult solution to a problem should ideally be carefully vetted through un-biased science prior to being adopted by farmers, printed/electronic Extension materials, workshops, demonstrations, and on-farm research verification programs involving Extension in the real world assists in the adoption of the latest technology and best management practices; hopefully leading to more profitable and sustainable farms. The transfer of technology is only one example of Extension duties; however, assisting in the transfer of technology to the industry is one of the most important focal points of Extension.

In NCR states, and throughout the country, many counties have an Extension Agent located within each county to help facilitate that transfer to clientele in their counties. Specialization required for aquaculture and aquaponics usually means that even basic aquaculture/aquaponic questions from clients of Extension Agents are forwarded to Specialists in other parts of the state, region, or even country. Due to attrition, partially following retirement of Extension personnel and exodus from the region, the NCR has seen a sharp decrease in Extension full-time equivalents (FTEs) dedicated to aquaculture and aquaponics from over 5 FTEs to less than 4 FTEs just in the last year; making it more difficult to assist not only established farmers but new and beginning farmers as well. Aquaculture Extension FTEs in the NCR are far less than 50% of what they were just four or five years ago. Although the NCR is not the only region to rein in Extension, it is a region that has been extremely affected.

Smith currently addresses regional questions beyond the state of Ohio and is familiar with many of the farmers, researchers, and Extension persons involved in the NCR and will create media to increase the transfer of information through novel methods so that Midwest farmers will still be able to benefit from Extension and outreach activities. Many quality recommendations were developed as part of the outcomes of two recently funded NCRAC projects, and a major goal of this project is for the PI to assist NCRAC in responding to the recent recommendations through this proposed project.

RELATED CURRENT AND PREVIOUS WORK

The PI and Extension Liaison have been in Extension in the Midwest since 2016. Smith also worked in Extension while in Arkansas at the University of Arkansas at Pine Bluff. The PI and Extension Liaison of this proposed project hold responsibilities of approximately 1.5 FTE Extension appointments comparative to the less than 4 FTE for the entire 12 Midwest states. Smith has led over six workshops/meetings/conferences in Ohio and been heavily involved with at least 15-20, including several workshops in other states. Smith and Primus have presented at NCRAC and NCAC conferences/meetings in Missouri, Wisconsin, and Iowa. Smith has also traveled to Minnesota for an aquaponics symposium held by Primus and University of Minnesota (UMN).

We understand that there are many topics and discussions that are more meaningful to the farmers if there is a physical meeting place where discussion can occur. It is also common knowledge that teleconferences, meetings, and webinars are gaining in popularity as internet is becoming more reliable in rural areas. The past NCRAC-funded Extension projects entailed a strong focus on liaison capacity and direct connection to farmers through workshops, e-mails, and in-person communications in a physical meeting place (e.g., Base Extension and Regional

Aquaculture Extension Specialist projects). The proposed project PI finds value in liaisons in the Midwest as well as meeting with farmers and as such is a major component to the project. However, this novel project plans on uplifting the internet platform to attempt to reach a broader audience through the development of aesthetically-pleasing media for distribution to those who are less educated in aquaculture and the positive impacts it has on the Midwest. For example, information on farmers in the Midwest, benefits of farm-raised seafood, and benefits of stock enhancement in relation to projecting our natural ecosystems from aquatic nuisance or invasive species are all potential types of media that will be developed through this project and dispersed throughout the NCR. Additionally, through personal communication, reviewing previously funded projects that may be similar to this proposed project, and an understanding of the Midwest aquaculture industry, researchers, and Extension community, it is evident that there has been an extreme and thorough focus on training the future generation aquaculture workforce in the Midwest.

In order to remain novel and limit duplication this project will focus on in-service training with current Midwest Extension Agents/Educators to enhance the regional extension community. Smith has presented at two in-service workshops in Ohio and the responses from the Agents are always positive. Common questions received have been in regards to invasive species, viral internet videos shaming a particular species or aquaculture in general, feed additive for file color of salmon (astaxanthin), and taste. As Extension Agents, they are interested in the facts and the science. In-service trainings are a great way to offer more in-depth knowledge on a topic and conducting in-service trainings in several Midwest states will create a learning opportunity for the Agents and allow them to better transfer science-based information regarding aquaculture. Mincemoyer and Kelsey (1999) assessed in-service education in Pennsylvania and found that many Agents desired distance trainings. Therefore, the proposed project will also incorporate online materials in addition to the in person trainings. Already developed information will be utilized for an online beginner packet for Agents and novel information will be developed if needed. A key success to in person in-service trainings will be the ability to tour a research facility or industry farm. Due to the limitations of the proposed project, it is a recommendation that NCRAC consider encouraging deliverables that focus on in-service training at Midwest states that will not be covered in this project.

In addition to the “train-the-trainer” workshops, this proposed project will also work closely with established and new/interested state aquaculture associations, NCRAC, and Extension to attempt to implement many of the recommendations found in Dr. Carole R. Engle’s, of Engle-Stone Aquatic\$, termination report (Engle 2017c). Smith was heavily involved in Dr. Engle’s projects. Examples of recommendations from Dr. Engle’s Work Group this project will attempt to address include: 1) creating a network in which an annual or bi-annual contact list of aquaculture/aquaponic producers and baitfish harvesters can be updated; 2) developing infographic(s) for distribution to the general public regarding species, farm-gate value, and overall positive impacts of aquaculture in the NCR; 3) assisting state associations in getting information to the general public and their members; 4) assisting state associations with feed-back surveys for implementation; 5) expanding support for Extension in the NCR; and 6) assisting NCRAC in the development of an Aquaculture/Aquaponic Young Farmer Program.

Since coming to Ohio, PI Smith has received two grants outside of the NCRAC totaling \$645,177. Smith has also received three NCRAC projects, including the “Assessing State Aquaculture Associations” project, totaling \$224,745. Collaboration with others is necessary for this project to succeed and receiving funding from the Ohio Soybean Council as well as being part of an 1890 Capacity Building Grant project shows the ability to collaborate with other disciplines and Land Grant Universities. This project will also continue to build upon previous NCRAC-funded Extension projects to relay other grant-funding opportunities and connect Midwest researchers together.

STATEMENT OF DUPLICATION

USDA Current Research Information System (CRIS or REEport) was accessed to review and related or relevant research and that the proposed work is original research and does not duplicate previously funded projects in CRIS. The NOAA National Sea Grant Office Funding Page (<https://seagrant.noaa.gov/Our-Work>) was also reviewed to ensure the proposed work is original research and does not duplicate and previously funded projects. Search terms used included: extension, aquaculture, in-service, North Central Region, and liaison.

ANTICIPATED BENEFITS

Create or synthesize more online materials related to the benefits of Midwest aquaculture for use in in-service trainings and general public education. This work plan includes in-service trainings, assisting NCRAC in becoming

a more grassroots organization through increased education of NCRAC, increase technology transfer by assisting PIs of NCRAC-funded research projects, and strengthening partnerships through interdisciplinary fields, organizations, and associations. It is also the PI's intent to utilize a significant amount of time in addressing Dr. Engle's Work Group recommendations in regards to how NCRAC can work to better improve and assist state associations in the Midwest.

OBJECTIVES

1. Build upon previously successful Extension and outreach programs to enhance the established North Central Region (NCR) industry by assisting farmers, educating educators, and assessing and prioritizing the needs of the NCR industry in ways that will not be probable at this time without NCRAC support.
2. Act in a liaison capacity on a variety of collegiate, state, regional, and national committees to ensure the NCR is well-represented when issues or opportunities that can or will affect the NCR aquaculture/aquaponic industry arises.
3. Develop and strengthen partnerships from within the NCR and outside the region among regulatory agencies, industry, academia, and other relevant entities to foster open, meaningful dialog on critical issues and build support for the NCR aquaculture/aquaponic industry.
4. Work closely with the liaisons of every NCRAC funded project to assist in developing and achieving strong deliverables to the industry.
5. Coordinate efforts for seeking non-NCRAC support for NCR aquaculture development; including consumer perception of aquaculture/aquaponics and technology transfer.

PROCEDURES

Objective 1: In order to address the concerns that there are fewer Extension Aquaculture Specialists in the NCR now, Smith will coordinate with Extension Liaison Alex Primus from UMN, state aquaculture associations, NCRAC IAC, NCRAC Technical Committees for Extension and Research (TC-E and TC-R, respectively), and the county-specific Educator/Agent to develop at least three in-service trainings during this proposed project. Liaison Primus will be primarily involved as an additional speaker and in-service training coordinator for this project but is also the Extension Liaison. Extension Educators/Agents are county-based and this project will attempt to utilize them when developing these trainings in their respective counties.

These 1-day trainings geared towards County Extension Agents with low commitment and high impact will have the same basics at each workshop (e.g., husbandry, water quality, nutrition, aquaponics, systems/species overview) but will also be tailored to that specific state (e.g., if recirculating aquaculture systems [RASs] are popular in a state, more emphasis will be on RAS specific considerations). Additionally, when possible, the in-service training will either be held at a university aquaculture/aquaponic field site or at a farm to offer tours and answer questions. This training, as the name implies, is specifically for university personnel to help increase their knowledge of aquaculture and aquaponics and decrease the time for dissemination of information to the public. Each participant will receive basic biological and economical knowledge of aquaculture and aquaponics as well as knowledge about where to direct their clientele (university websites, Extension fact sheets, voice-over PowerPoints, etc.) who have aquaculture related questions. We hope that these types of trainings will equip County Extension Agents with the tools necessary to help some of the more new/interested farmers in their counties but also help them find experts (Specialists as well as farmers interested in educating) in their area who can answer more technical aquaculture/aquaponic questions. It is also our desire that these workshops will be "showcases" and increase the allure of aquaculture/aquaponic Extension Specialists in their state and region.

As part of these trainings Smith will develop short surveys which then will be summarized and relayed to the state's Land-Grant University's Department of Extension (if applicable). Surveys will focus on questions such as: How many calls/visits have you received regarding aquaculture/aquaponic in the last 3 years? **number** Have you seen an increase in aquaculture/aquaponic related calls/visits in recent years? **yes/no** Who do you send your clients to when you have an aquaponic/aquaculture call/visit? **Specialist, other Educator/Agent, out of state, other** If you do not have an Extension Specialist in aquaculture, do you have an understanding of the regulations required to produce aquatic crops in your state? **yes/no**. The means to which the surveys will be administered will be through Turning Point Technologies and/or hard copy surveys. PI Smith has experience with this software while at OSU and has developed questionnaires for farmers during an aquaculture economics and marketing workshop. This

software entails clickers which will be passed out to the Educators and “clicks” are recorded during the survey. The survey format is through Microsoft® Office PowerPoint and allows for real-time results to be discussed and recorded for later dissemination. Smith will seek council to ensure surveys are developed following OSU’s human subjects protocols. OSU will conduct the same in-service training in Ohio; although OSU will fund Ohio training so that this project’s funds are focused throughout the region and not funding Smith’s normal duties within the State.

Aquaculture in-service trainings are not completely novel to the Midwest. These trainings are apparent when having conversations with others in the Midwest and when reviewing NCRAC’s previously funded projects. For example, the NCRAC project North Central Regional Aquaculture Center Extension Program from 1991-1993 chaired by Garling referenced three in-service trainings in the Midwest. NCRAC recognized the importance of in-service trainings over 25 years ago, and it is arguably even more important now with the increase in interest in controlled environmental agriculture systems and the recent population of multi-million dollar facilities in the Midwest. With apparently very little aquaculture in-service trainings over the last 25 years, we believe that NCR farmers and new farmers will benefit from these types of educational opportunities.

Smith will also seek council from NCRAC IAC and TC-R and TC-E to help prioritize research and Extension activities so that projects exclusively focus on the needs and opportunities that have significant regional promise. Projects conducted during previous outreach and Extension projects in the Midwest (Smith et al. 2016; Weeks 2016) will be reviewed to help assist in answering pertinent industry questions. According to Weeks (2016) and Colyn et al. (2014), the following items were deemed necessary for improving aquaculture development in the NCR; specifically Michigan: 1) gaining social acceptance and political will, 2) streamlined regulations, 3) expanding aquaculture enterprises along supply chain based on proven species, technologies, and markets, 4) sector leadership and strong associations, 5) investment in research, education and outreach, 6) RAS cost reduction and 7) attracting investment to the region (Colyn et al. 2014). Smith will develop tools to improve social acceptance and work with NCRAC to develop strategies to specifically investigate/answer the questions that arose from Colyn et al. (2014). In addition, the PI will utilize knowledge of needs and opportunities of the NCR industry and apply the principles necessary to expand [NCRAC’s Fin Clips](#) in a way that can be easily incorporated into a state association’s or university’s existing aquaculture newsletter (for example, Indiana Aquaculture Association’s *Tails from the Deep* or Ohio State University’s *Buckeye Aquafarming*). This will increase NCRAC’s presence throughout the Midwest and educate more farmers about the research and Extension activities funded by NCRAC. While it is unrealistic to assume a large shift in perception regarding aquaculture production in the Midwest through the proposed project, it is important to set a precedent in which future funding from a variety of agencies can leverage developed materials (e.g. videos and printed materials) when developing their own deliverables and outcomes.

A follow-up to the 2014 NCRAC Needs Assessment Survey will be developed with input from NCRAC community as needs of the industry change overtime as additional hurdles and opportunities arise. Previous NCRAC Needs Assessment Surveys will be reviewed and updated accordingly in consultation with the NCRAC Director’s office. Well-designed surveys also contribute to the ability of understanding patterns and trends of an industry. Additionally, Dr. Engle recently received NCRAC funding for two projects to allow her team to assess the status of aquaculture associations, develop strategies and recommendations to NCRAC, and create leadership training opportunities for interested farmers. This proposed project PI will work closely with established and new/interested state aquaculture associations, NCRAC, and Extension to attempt to implement many of the recommendations found in Dr. Engle’s termination report (Engle 2017c). Smith was heavily involved in Dr. Engle’s projects. Examples of recommendations from Dr. Engle’s group this project will attempt to address include: 1) creating a network in which an annual or bi-annual contact list of aquaculture/aquaponic producers and baitfish harvesters can be updated; 2) developing infographic(s) for distribution to the general public regarding species, farm-gate value, and overall positive impacts of aquaculture in the NCR; 3) assisting state associations in getting information to the general public and their members; 4) assisting state associations with feed-back surveys for implementation; 5) expanding support for Extension in the NCR; and 6) assisting NCRAC in the development of an Aquaculture/Aquaponic Young Farmer Program. While Dr. Engle’s recommendations are large in nature, we believe this Extension project could serve as a way to begin to create solutions to the problems identified and it is important to note that the recommendations need long-term assistance and management not just short-term assistance.

PI Smith will also work with the NCRAC community to build on the highly-successful co-sponsored Aquaculture Webinar Series to develop at least three more webinars that are beneficial to the NCR industry. OSU will lead all of the work for the webinars (registration, facilitation, advertisement, etc.). Smith is also working with the United States Aquaculture Society (USAS) to develop a webinar sub-committee that's already been approved by the Board and they have decided to lead 2-3 webinars per year. If USAS is in agreement, this project will team up with this sub-committee when webinar topics are scheduled that are also pertinent to the NCR.

Objective 2 & 3: With a substantial rise in interest from consumers regarding local-foods, the continuation of an almost \$7 billion trade deficit with East Asia alone in the United States (U.S.) (NOAA NMFS 2017), a steady desire for chefs to utilize sustainably produced seafood (Bender 2016; National Restaurant Association 2016; National Restaurant Association 2017), and the overall lower financial and otherwise U.S. governmental support of aquaculture compared to many top seafood producing countries (European Commission 2016; Engle 2017b; Love et al. 2017), it is important to retain and sustain support which can help bridge the gap between research and industry. Extension has a role that enhances partnerships (a liaison locally, regionally, and nationally) that co-creates answers for the industry, and this project intends to expand upon the successes of prior successful Extension and outreach projects to help co-create better and more-effective answers for the NCR industry. The stabilized success of aquaculture in Ohio makes Ohio a prime location to lead a regional Extension and outreach project. Ohio was one of two Midwest states to show positive growth in both the farm-gate sales and number of aquaculture farms in the Midwest between 2005 and 2013 (USDA NASS 2014).

For the last several years, the perception of aquaculture in Ohio has been very positive from the Land-Grant Universities (The Ohio State University and Central State University) and state/federal agencies (e.g. USDA-Animal and Plant Health Inspection Service, Ohio Department of Agriculture, Ohio Division of Wildlife); which improves the Specialists' ability to adequately do their job. Ohio also currently has at least four universities with aquaculture proposals/projects out, a two-year College with an aquaculture track that conducts research and education, and a very active aquaculture state association with approximately 100 members. In 2018 alone, PI Smith assisted the Ohio Aquaculture Association (OAA) in bringing in speakers from six different states (including private consultants, universities, and the USDA Agriculture Research Service) to educate the members on various aquaculture topics at their annual aquaculture association conference. Utilizing resources from within the region as well as outside the region will be necessary as open dialog and communication remains of importance to the industry.

Minnesota is also a location where controlled environmental agriculture systems are gaining in popularity and there is also a community interested in a vibrant Minnesota Aquaculture Association. While Ohio still undoubtedly has a large percentage of farmers who produce outdoors, Primus' experience with salmonids and Minnesota's increase in indoor facilities will allow for transfer of technology to some of the region that is higher in latitude or stricter on production practices. Partnerships with UMN and extending into the Sea Grants of the Midwest will help assist in our desire to create a more open dialogue regarding critical issues and concerns. In early 2018, Minnesota Department of Natural Resources (DNR) published a report entitled, "Minnow Importation Risk Report: Assessing the risk of importing golden shiners into Minnesota from Arkansas" (Gunderson 2018). One of the recommendations of this report stated a need to develop golden shiner culture strategies for Minnesota. Quality discussion with the Minnesota DNR as part of Objective 3 will allow us to discuss more with them about how they will envision increasing farm-raised bait production in their state, what steps we could possibly take to address their vision, and if there could be financial support to conduct research to see if it is biologically and economically feasible to raise certain baitfish within the state to help meet their needs. In addition to baitfish production, a significant amount of effort has been put into understanding the hurdles and potentials of foodfish aquaculture in Minnesota with a [Minnesota Sea Grant Aquaculture Workshop in 2017](#), and Liaison Primus and Smith of this proposed project are already educating on aquaculture in our respective states and are poised to help extend education throughout the region.

Objective 4: PI Smith of this proposed project will offer their assistance to be the Extension Liaison on any full proposal submitted to NCRAC. Regardless, Smith will propose that NCRAC highly encourage for every funded project team (liaisons and PIs) to work with the PIs of this project to create an Extension specific presentation or at least an Extension poster that will be available at the next NCRAC meeting following completion of the termination report. We believe high-quality posters, with a research project PI present for a specified period of time to answer questions and relay information, will contribute positively to the information exchange and give researchers the opportunity to showcase their research directly to the farmers. If applicable, a streaming device (e.g., iPad or computer) can and should be utilized at the poster event to show the research systems, species of fish, novel diets, specific equipment, etc.

As NCRAC votes new Extension members in every other year, many of whom have little to no formal Extension appointment, Smith will encourage NCRAC to dedicate a small time-frame for seasoned Extension members to discuss with newer members on the importance of Extension and industry within NCRAC. During this same time-frame, IAC and TC-R and will educate their newer members on the importance of the IAC and TC-R within NCRAC. The Director of NCRAC always gives an overview on the history of NCRAC and this will complement that presentation. As the Extension representative on the Board for NCRAC, Smith will coordinate with NCRAC for this formal informational session regarding the expectations with each specific committee to ensure we are all on the same page and hopefully increases discussions between all involved in the research project.

Objective 5: Currently, Smith was involved on the 2018 National Oceanic and Atmospheric Administration (NOAA) National Sea Grant College Program 2018 Ocean, Coastal, and Great Lakes National Aquaculture Initiative Review Panel, a member on the Board of Directors as Chair of the Extension Technical Committee within NCRAC, an Aquatic Nuisance Species committee member for the National Aquaculture Association, an Ohio Fish Health Group member, a member of the USAS and member of the Aquaculture Webinar Series sub-committee, and an active member and ex-officio board member in the OAA. Smith will continue to connect researchers with other specialists and researchers in and out of NCRAC and potential funding sources. Special importance will be put on interdisciplinary research to tackle important complex industry problems as they arise (Engle 2017a). As funds for a variety of disciplines contract, it is more important than ever to bring in experts with a wide variety of expertise, beyond fisheries and aquaculture, to more thoroughly answer the NCR's industry problems.

USDA National Institute of Food and Agriculture's (NIFA's) aquaculture office already distributes information regarding a multitude of funding opportunities for aquaculture researchers and Extension from a wide range of funding agencies. With NCRAC's permission, PI Smith will assess the current NCR Listserv that former Regional Aquaculture Extension Specialist Weeks maintained. If the NCR Listserv appeared to be primarily consistent of farmers, Smith will work with NCRAC to develop a NCR Listserv explicitly for Midwest researchers and Extension, both within aquaculture and beyond. This concept will ideally increase communication between all involved in aquaculture research so that when funding opportunities arise, multiple universities can better coordinate to increase chances of success. Smith will forward information from potential funding opportunities to this Listserv and will take the opportunity to attempt to link universities and researchers, both within the Midwest and beyond, together based on Smith's experience in the Midwest.

Funding opportunities to extend this project beyond the initial 2-year NCRAC project will be sought from non-NCRAC sources. Partnerships with other state Extension programs as well as regional sources will be enhanced by the successful completion of the previously described Extension NCRAC Extension programs; this will allow for improved potential to seek outside funds for the program. The short term goal for seeking non-NCRAC funding beyond this 2-year project entails seeking alternative funding for projects that also heavily involve Extension and allow for project-specific Extension appointments to assist with transferring technology and educating stakeholders. The long term goal for aquaculture Extension in the Midwest should be for the PI to work with Universities to attempt to convince them of the need for full-time permanent aquaculture Extension FTEs with recently funded Extension projects the catalysts for starting the conversations.

OUTREACH AND EVALUATION PLAN

The proposed objectives, goals, and deliverables all have a strict focus on increasing the rate of technology transfer, improving customer perception of NCR cultured products, increasing Midwest Extension aquaculture capacity through educating educators, and assisting the NCRAC in understanding/answering the industry's needs. Expected

deliverables for this proposed project include but are not limited to the following:

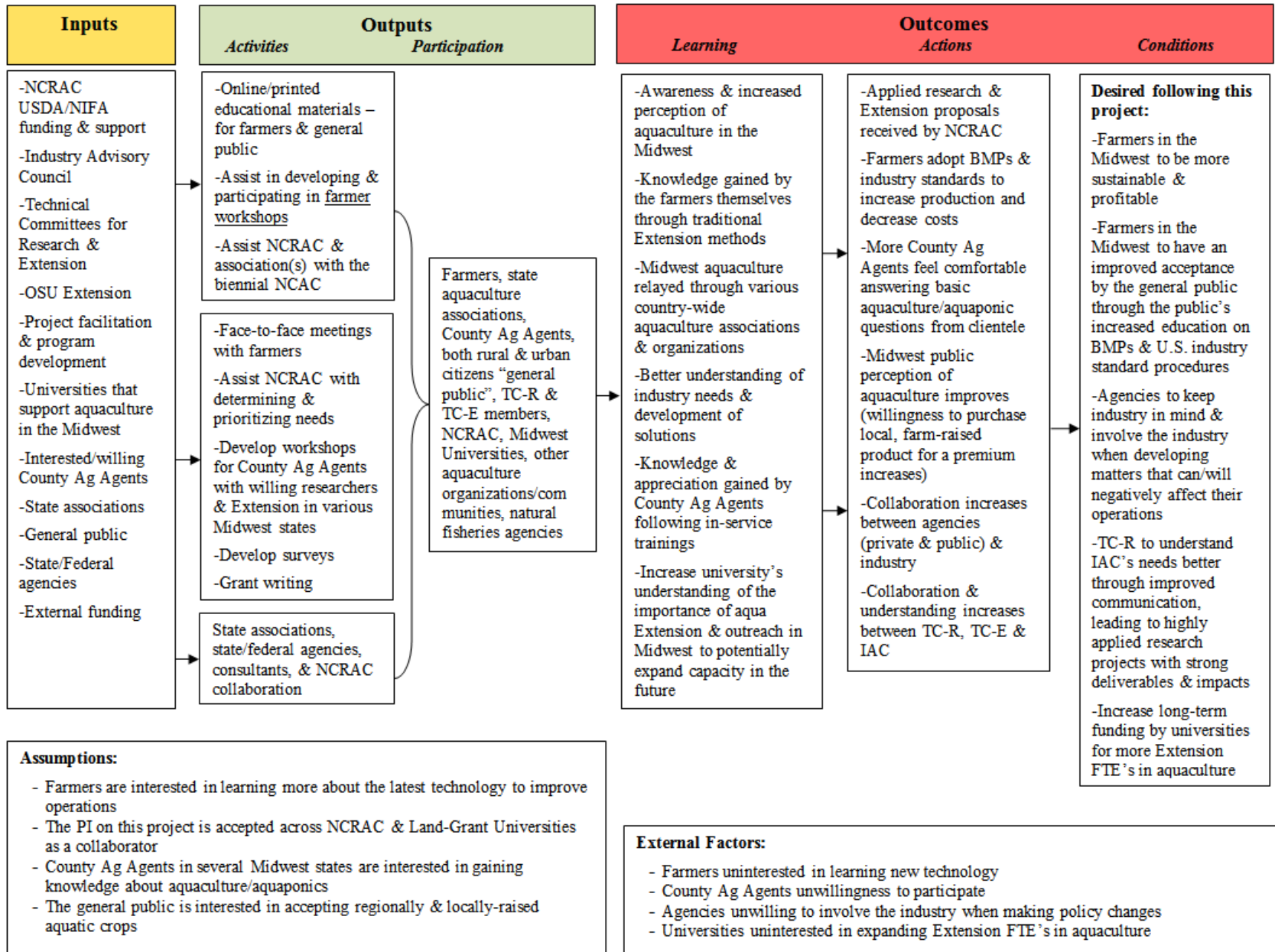
- In-service training for County Agriculture Agents
- Technology transfer of NCRAC funded projects through liaison capacity
- Facilitate the dialogue necessary between NCRAC, state associations, and individuals farmers to start addressing the recommendations put forth in the termination report of the NCRAC project “Assessing the Status of State Aquaculture Associations in the North Central Region”
- Development of an online network to bring together researchers interested in pursuing aquaculture funding from other grant-supporting resources
- Work with Midwest researchers, Extension, and Sea Grant, and Land-Grant administrators in seeking regional extension funding beyond the scope and timeframe of this project
- Regional aquaculture needs survey in 2019
- Assist the Director’s office in coordinating the next North Central Aquaculture Conference (NCAC)
- Revitalize the NCR Fish Culture Listserv and NCRAC’s Fin Clips Newsletter
- Assist new/revitalized aquaculture associations with displaying their value to their membership; attendance at three or more state association meetings, regional, and/or national conferences per year
- Continue information outlet and topical news on the NCR fish culture list-serve, OSU’s four list-serves, OSU’s social media pages, eXtension Ask-an-Expert
- Annual updates to the NCRAC regulation website and regional updates on a public social media account
- Establish partnerships for NCR aquaculture industry development, submitting at least one grant proposal per year as a team member for NCR industry support
- Dialogue/information exchange on policy issues (e.g. Federal Register posts, legislation, and regulation)
- Create a network in which an annual or bi-annual contact list of aquaculture/aquaponic producers and baitfish harvesters can be updated

Media (online print materials, webinars, and overall NCR aquaculture information exchanged online and in hard copies) can be generally considered as successful activities if those who are involved in NCRAC in some way have significantly more science-based information in their hands to distribute and educate the general public. This also includes the training of current Extension Agents by NCRAC members and equipping them with information that will allow them to educate new/beginner farmers as well as those just interested in learning about aquaculture as a consumer.

Results that are generated for NCRAC’s use in understanding the Midwest industry, either through information learned by working with state associations, NCRAC members, or the NCRAC Needs Survey can be considered as successful activities as this allows for NCRAC to better understand how to become more effective to increase their ability to improve aquaculture in the region. Results and information generated for NCRAC and the industry through coordinating with NCRAC to address Dr. Engle’s Work Group’s recommendations should also consist of strong deliverables which are directly transferable in an outreach fashion to members and non-members.

Metrics for a successful project include total number and quality of aquaculture in-service workshops in the Midwest in addition to surveys of these participants. A successful attempt at additional aquaculture Extension funding following the 2-year project includes a summation of aquaculture/aquaponic proposals submitted over a period of 5 years; although that survey of proposals submitted will be outside the constraints of this project. In terms of Dr. Engle’s final report, success of this project will be measured based upon how many of the recommendations the PI was able to address, as well as how thorough the recommendation was able to be addressed (e.g., assisting state associations with feed-back surveys for implementation or the creation of a Young Farmer Program)

SUPPORTING AND EXPANDING AQUACULTURE IN THE MIDWEST THROUGH EXTENSION AND OUTREACH



FACILITIES AVAILABLE

OSU is a Land-Grant University with the necessary office space and equipment required. The OSU PI can be in Indiana, Michigan, Illinois, Wisconsin, or Missouri in less than eight driving hours. Smith will also contact farmers in their respective states if an on-farm workshop was to be desired by the industry and will leverage Extension collaborators throughout the Midwest to facilitate farm tours and/or workshops. UMN is also a Land-Grant University and Primus can be in at least six states in less than eight driving hours.

REFERENCES

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- National Restaurant Association. 2016. <http://www.restaurant.org/News-Research/News/Whats-Hot-Top-10-food-trends-in-2017>. Accessed April 2018.
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- Weeks, C. 2016. Regional aquaculture extension specialist project. North Central Regional Aquaculture Center, USDA-NIFA. Funded Full Proposal. Funded Project #24.
- Weeks, C. 2016. Regional aquaculture extension specialist project. North Central Regional Aquaculture Center, USDA-NIFA. Termination Report. Funded Project #23.

PROJECT LEADERS

State	Name/Institution	Specialization
Matthew A. Smith	The Ohio State University	Culture Ponds, Water Quality, Extension

UNITED STATES DEPARTMENT OF AGRICULTURE OMB Approved 0524-0039
 COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
BUDGET

ORGANIZATION AND ADDRESS The Ohio State University 1864 Shyville Road Piketon, OH 45661			USDA AWARD NO. Years 1: Objectives 1-5			
PROJECT DIRECTOR(S) Matthew A. Smith			Duration Proposed Months: <u>12</u>	Duration Proposed Months: _____	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)
			Total Funds Requested by Proposer	Funds Approved by CSREES (If different)		
A. Salaries and Wages			CSREES FUNDED WORK MONTHS			
1. No. of Senior Personnel a. ___ (Co)-PD(s) b. ___ Senior Associates			Calendar	Academic	Summer	
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates . . . b. <u>1</u> Other Professionals						
			6			\$30,000
c. ___ Paraprofessionals..... d. ___ Graduate Students e. ___ Prebaccalaureate Students f. ___ Secretarial-Clerical g. ___ Technical, Shop and Other..... Total Salaries and Wages <input type="checkbox"/>						\$30,000
B. Fringe Benefits (If charged as Direct Costs)						\$9,480
C. Total Salaries, Wages, and Fringe Benefits (A plus B)..... <input type="checkbox"/>						\$39,480
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)						
E. Materials and Supplies						\$3,500
F. Travel						\$9,600
G. Publication Costs/Page Charges						
H. Computer (ADPE) Costs						
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)						
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)						\$10,744
K. Total Direct Costs (C through I)..... <input type="checkbox"/>						\$63,324
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)..... <input type="checkbox"/>						
N. Other..... <input type="checkbox"/>						
O. Total Amount of This Request <input type="checkbox"/>						\$63,324
P. Carryover -- (If Applicable) Federal Funds: \$ Non-Federal funds: \$ Total \$						
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						
Cash (both Applicant and Third Party) <input type="checkbox"/>						
Non-Cash Contributions (both Applicant and Third Party) <input type="checkbox"/>						
NAME AND TITLE (Type or print)			SIGNATURE (required for revised budget only)			DATE
Project Director						
Authorized Organizational Representative						

UNITED STATES DEPARTMENT OF AGRICULTURE OMB Approved 0524-0039
 COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
BUDGET

ORGANIZATION AND ADDRESS The Ohio State University 1864 Shyville Road Piketon, OH 45661				USDA AWARD NO. Years 2: Objectives 1-5			
PROJECT DIRECTOR(S) Matthew A. Smith				Duration Proposed Months: <u>12</u> Total Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)
A. Salaries and Wages	CSREES FUNDED WORK						
1. No. of Senior Personnel	Calendar	Academi	Summer				
a. ___ (Co)-PD(s)							
b. ___ Senior Associates							
2. No. of Other Personnel (Non-Faculty)							
a. _ Research Associates-Postdoctorates . . .							
b. _1_ Other Professionals	6			\$30,900			
c. ___ Paraprofessionals							
d. ___ Graduate Students							
e. _ Prebaccalaureate Students							
f. ___ Secretarial-Clerical							
g. ___ Technical, Shop and Other							
Total Salaries and Wages				\$30,900			
B. Fringe Benefits (If charged as Direct Costs)				\$9,764			
C. Total Salaries, Wages, and Fringe Benefits (A plus B)				\$40,664			
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies				\$5,100			
F. Travel				\$9,600			
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs							
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)				\$12,744			
K. Total Direct Costs (C through I)				\$68,108			
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				\$68,108			
P. Carryover -- (If Applicable)	Federal Funds: \$	Non-Federal funds: \$	Total \$				
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							
Cash (both Applicant and Third Party)							
Non-Cash Contributions (both Applicant and Third Party)							
NAME AND TITLE (Type or print)	SIGNATURE (required for revised budget only)			DATE			
Project Director							
Authorized Organizational Representative							

UNITED STATES DEPARTMENT OF AGRICULTURE OMB Approved 0524-0039
 COOPERATIVE STATE RESEARCH, EDUCATION, AND EXTENSION SERVICE
BUDGET

ORGANIZATION AND ADDRESS The Ohio State University 1864 Shyville Road Piketon, OH 45661				USDA AWARD NO. Years 1&2: Objectives 1-5					
				Duration Proposed Months: <u>24</u> Total Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)		
PROJECT DIRECTOR(S) Matthew A. Smith									
A. Salaries and Wages		CSREES FUNDED WORK							
1. No. of Senior Personnel a. ___ (Co)-PD(s) b. ___ Senior Associates		Calendar	Academi	Summer					
2. No. of Other Personnel (Non-Faculty) a. ___ Research Associates-Postdoctorates ... b. <u>1</u> Other Professionals		12			\$60,900				
c. ___ Paraprofessionals d. ___ Graduate Students e. ___ Prebaccalaureate Students f. ___ Secretarial-Clerical g. ___ Technical, Shop and Other Total Salaries and Wages <input type="checkbox"/>					\$60,900				
B. Fringe Benefits (If charged as Direct Costs)				\$19,244					
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>				\$80,144					
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies				\$8,600					
F. Travel				\$19,200					
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.)				\$23,488					
K. Total Direct Costs (C through I)..... <input type="checkbox"/>				\$131,432					
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)..... <input type="checkbox"/>									
N. Other..... <input type="checkbox"/>									
O. Total Amount of This Request..... <input type="checkbox"/>				\$131,432					
P. Carryover -- (If Applicable)		Federal Funds: \$		Non-Federal funds: \$		Total \$			
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)									
Cash (both Applicant and Third Party) <input type="checkbox"/>									
Non-Cash Contributions (both Applicant and Third Party) <input type="checkbox"/>									
NAME AND TITLE (Type or print)				SIGNATURE (required for revised budget only)				DATE	
Project Director									

BUDGET EXPLANATION FOR THE OHIO STATE UNIVERSITY

(Smith)

Objectives 1 – 5 (Year 1 & 2 combined)

A. Salaries, Wages, and Fringe Benefits (\$80,144)

Salary is request for 0.5 FTE (6 calendar months) for Smith in Year 1 (\$30,000) and Year 2 (\$30,900 [3% annual merit raise]) for capacity as PI. Smith will lead all objectives and will collaborator as much as possible with outside sources to increase efficacy of deliverables. OSU fringe rate for staff is 31.60% which equates to \$9,480 for Year 1 and \$9,764 for Year 2.

B. Nonexpendable Equipment (\$0)

N/A

C. Materials and Supplies (\$8,600)

General office supplies and materials (e.g. printings and mailing of infographics, regional newsletter inserts, poster printings, and Extension articles for distribution to farmers, Extension, and the general public) as well as supplies to enhance workshops throughout the Midwest that Smith is involved in (e.g., water quality kits for education/Extension duties, microscope for Extension and outreach duties, manuals/books for professional development and/or education, fish, plants, etc.). Depending on usage of printings/mailings, Smith may at his discretion mail out hard copies of NCRAC logoed information generated in this project to some Departments of Extension in the Midwest. Annual purchase of software for development of aquaculture infographics and NCRAC's Fin Clip. Software also includes Turning Point Technology software for interactive surveys.

D. Travel (\$19,200)

Years 1 and 2 (per year basis): travel, lodging, and meals for PI Smith to attend up to 3 states aquaculture association or development meetings (\$1,000 per meeting estimated), NCRAC Annual Program Planning Meeting (\$900 estimated), 1 - 3 regional meetings in representation of NCR industry members per year (\$500 estimated), and partial (50%) to attend National aquaculture conferences and meetings (\$1,200 estimated). Travel, lodging, and meals for PI Smith to travel to individual farms throughout the Midwest to learn more about current standards, assist with any troubleshooting, and build personal connections with the industry (\$600 estimated per trip; multiple farms each trip; nothing charged for Ohio farm travel). Travel for Smith to lead at least 3 in-service trainings during the project in Midwest states (e.g. Minnesota, Nebraska, Kansas) (\$900 estimated per trip). Smith will lead an in-service training in Ohio during this project but will not charge this grant. In-service trainings, individual farm visits, and other meetings will be scheduled jointly whenever feasible to reduce cost and time committed.

E. Other Direct Costs (\$23,488)

Years 1 and 2 (per year basis): cell phone service (\$800) for GPS use throughout the Midwest, as well as other Internet and work related (calls, texts, e-mails) situations; membership fees for the PI to maintain connections and memberships with organizations within and outside the NCR for aquaculture development (\$300); workshops and/or meeting facilitation (\$1,500) including space rentals (in-service and regular workshops conducted in the Midwest); and travel, lodging, and meals for outside speakers (assist in presentations/workshops/tours), honorarium to a visiting farm involved in workshops/in-service trainings (\$200*3 = \$600 over two years), and/or meals for in-service attendees (estimated at \$15 per person*40 people*3 in-service trainings = \$1,800 over two years). The PI will attempt to work with Extension in the state the in-service training will be taking place to see if they will sponsor the events; limiting the project's cost for the in-service training.

Webinars: The PI of this proposed project is currently involved with the USAS Webinar Committee. OSU will work closely with NCRAC to develop at least three more webinars that are directly applicable to the NCR industry. OSU charges \$1,000 per one hour long webinar (advertisement, flyers, registration set up, facilitation of the trial run and live event) (\$3,000 over two years and expected that there will be one webinar in Year 1 and two webinars in Year 2).

As a subawardee, Extension Liaison Primus has salary requested for 4.3% (one half month) of Extension Liaison Primus' time (\$4,032) for his assistance of Smith's development, coordination, and implementation of one in-service training workshop in Year 1 and fringe benefits for Primus is calculated at 33.5% (\$1,351). Extension Liaison Primus will also coordinate with similar duties for an additional in-service training workshop

in Year 2 (\$4,153 salary and \$1,391 fringe benefits; including an assumed 3% annual merit raise). Travel for Extension Liaison Primus to travel to at least 2 in-service trainings (one per year at an estimated \$1,061 for year 1 and \$900 for year 2). Total subaward amount requested for Dr. Primus for the two year project is \$12,888.

SCHEDULE FOR COMPLETION OF OBJECTIVES

Objectives 1 – 5:

As this proposed project incorporates researchers, Extension, industry, agencies, state associations, and others in a cohesive manner that involves building trust and relationships, the objectives and deliverables are addressed continuously throughout the project. Considerable amounts of the deliverables mentioned in this proposal are in response to Objective 1; which involves the recommendations from Dr. Engle’s Work Groups and will be completed according to the PIs discussions with the Director of NCRAC and the NCRAC committees (IAC, TC-R, and TC-E) to determine priorities.

Objectives, Tasks, and Deliverables	Year 1						Year 2					
	S O	N D	J F	M A	M J	J A	S O	N D	J F	M A	M J	J A
Objective 1: Build upon previously successful Extension and outreach programs to enhance the established North Central Region (NCR) industry by assisting farmers, educating educators, and assessing and prioritizing the needs of the NCR industry in ways that will not be probable at this time without NCRAC support.												
Objective 2: Act in a liaison capacity on a variety of collegiate, state, regional, and national committees to ensure the NCR is well-represented when issues or opportunities that can or will affect the NCR aquaculture/aquaponic industry arises.												
Objective 3: Develop and strengthen partnerships from within the NCR and outside the region among regulatory agencies, industry, academia, and other relevant entities to foster open, meaningful dialog on critical issues and build support for the NCR aquaculture/aquaponic industry.												
Objective 4: Work closely with the liaisons of every NCRAC funded project to assist in developing and achieving strong deliverables to the industry.												
Objective 5: Coordinate efforts for seeking non-NCRAC support for NCR aquaculture development; including consumer perception of aquaculture/aquaponics and technology transfer.												

LIST OF PRINCIPAL INVESTIGATORS

The Ohio State University

Smith, Matthew A.

VITA

Matthew A. Smith
The Ohio State University
1864 Shyville Road
Piketon, OH 45661

Phone: 740.289.2071
FAX: 740.289.4591
E-mail: smith.11460@osu.edu

Education

MS University of Arkansas at Pine Bluff, 2015, Aquaculture & Fisheries
BS Auburn University, 2012, Fisheries Management

Positions

2016 – Current Extension Aquaculture Specialist, Ohio State University
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

North Central Regional Aquaculture Center, *Chair of the Extension Technical Committee and Board member* (2018 – Current)
North Central Regional Aquaculture Center, *Technical Committee member/Extension and Executive Committee member/Extension* (2016 – 2018)
Ohio Aquaculture Association, *Active member and Ex-officio Board member* (2016 – Current)
United States Aquaculture Society (2012 – Current)
World Aquaculture Society (2012 – Current)

Selected Publications

Smith MA and Stone NM. 2018. Split ponds effectively overwinter Golden Shiners. *Journal of the World Aquaculture Society*. 48 (5):760-769.

Smith MA. 2018. Industry and researcher round table on the future of food fish/shrimp production in Ohio. *OSU South Centers Connections Newsletter Achievements Edition*. Winter. 3.

Smith MA. 2018. Comprehensive outreach and training program to expand development of north central region aquaculture. *OSU South Centers Connections Newsletter Achievements Edition*. Winter. 4.

Smith MA. 2017. Temperature effects on growth and metabolism of fishes. *Buckeye Aquafarming*. 2(2) 5-6.

Smith MA and Roy LA. 2016. Growing largemouth bass for food. *Arkansas Aquafarming*. 33(3): 3-4.

Smith MA. 2016. Largemouth bass: not just for your hook. *Ohio Aquaculture Association Summer Newsletter*. 4&7.

Smith MA. 2016. Testing your water quality and maintaining good records. *Buckeye Aquafarming*. 1(1): 7-9.

Smith MA and Stone NM. 2016. Winter Golden Shiner production in a split-pond system. *Arkansas Aquafarming*. 33(1): 1-2.

Roy LA, Kearby M, Kelly AM, Smith MA, and Hoy M. 2016. Lesser scaup predation on Arkansas sportfish farms. *Arkansas Aquafarming*. 33(2): 3-4.

Publications in Preparation

Smith MA, Roy LA, Kelly AM, Quintero H, Park J, and Lochmann R. Feeding regimes for Largemouth Bass at high summer temperatures.