

Development of consumer educational materials on seafood and aquaculture

Targeted Extension Area 2C: Consumer Education

Chairperson:	Amy Schrank, University of Minnesota/Minnesota Sea Grant
Co-Investigators:	Barbara Evans, Lake Superior State University Lauren Jescovitch, Michigan State University/Michigan Sea Grant Elliot Nelson, Michigan State University/Michigan Sea Grant
Industry Liaison:	Paul Damhof, Simply Shrimp LLC
Extension Liaison:	Lauren Jescovitch, Michigan State University/Michigan Sea Grant
Funding Request:	\$ 225,505
Duration:	2 Years (9/01/21 - 8/31/23)

Objectives:

1. Compile and evaluate readily available resources related to (1) adult consumer education and (2) youth engagement in US aquaculture.
2. Develop, facilitate, and disseminate adult consumer education materials and programming on seafood and aquaculture.
3. Develop, facilitate, and disseminate youth educational materials and programming on seafood and aquaculture.

Deliverables:

1. Report of comprehensive list of web-based aquaculture educational materials currently available with an evaluation of some of the most relevant and/or visible of these resources.
2. Results of a survey designed to develop a better understanding of some of the barriers to educating the public about aquaculture based on the opinions of aquaculture professionals.
3. Several short educational videos and online educational modules about aquaculture and wild fisheries, information relevant to identifying and selecting responsible seafood products, and how to prepare seafood at home.
4. Several in-person (or virtual, if necessary) workshops to teach adults proper selection, handling, and cooking of aquaculture products to reduce barriers to individuals cooking fish at home.
5. Expansion of the NCRAC Youth Education in Aquaculture website to increase scope and school involvement throughout the NCR which will include workshops for teachers interested in including these experiences in their curriculum.
6. Expansion and development of a formal lesson plan designed to empower youth through education about aquaculture and teaching them to harvest fish from classroom aquaponics units, clean them, and cook them; this will include several in-person (or virtual, if necessary) demonstrations for youth.
7. Delivery of several in-person fish preservation, cooking and cleaning workshops in partnership with Native American and rural organizations to help re-engage their youth in traditional uses of fish; these activities will be accompanied by appropriate educational materials about fish as a healthy food source and production of short videos to highlight the collaborations.

Proposed Budgets:

Institution	Primary Investigator	Objective	Year 1	Year 2	Total
University of Minnesota Sea Grant	Amy Schrank	1, 2, 3	74,356	76,375	150,731
Lake Superior State University	Barbara I. Evans	3	17,435	17,435	34,870
Michigan State University	Lauren Jescovitch, Elliot Nelson	1, 2, 3	19,952	19,952	39,904
Totals			111,743	113,762	225,505

Non-funded Collaborators:

Facility	Collaborators
Sault Ste. Marie Tribe of Chippewa Indians	Laura Collins-Downwind
Portage Health Foundation	Michelle Seguin
LSSU Native American Center	Stephanie Sabatine
Chippewa and Mackinac County MI 4-H	Susan Kirkman & Maggie Merchberge

Project Summary

Fish is recognized as a healthy source of protein, beneficial fats, and micronutrients leading the FDA to recommend that adults eat fish up to three times a week. Americans, however, are eating roughly half the recommended amount of seafood. This deficit could be filled by sustainable aquaculture production, reducing our dependence on dwindling wild fisheries. There is, however, substantial consumer confusion surrounding aquaculture and its sustainability, the health benefits of consuming farm-raised fish, and how to prepare and cook fish at home. The overarching goal of this project is to educate the general public about aquaculture and increase the ability of consumers to make informed decisions about aquaculture products through the development of clear, objective, and evidence-based educational materials and engagement activities for both adults and youth (addressing a need repeatedly identified at the 2020 NCRAC listening sessions). We will engage communities through online educational content (e.g., videos), high school and community education curricula, and outreach workshops that educate communities about the health and sustainability of aquaculture. The majority of these materials (as well as detailed templates and protocols for engagement activities) will be made available for future use by educators and extension personnel throughout the NRC.

Justification

Consumers increasingly want to know where their food comes from, if it was sustainably raised, and who produced it (Bir et al., 2019). While the beef, pork, and poultry producers in the US have well-established and influential advocacy groups promoting, marketing, and advertising their industries, aquaculture does not (at least not on the scale of these other industries). Consequently, the US general public seems to have negative views of farmed fish. Consumer misconceptions about farmed fish are likely based on several factors including a general lack of knowledge about aquaculture, the different types of aquaculture practices, and the sustainability of these practices, presenting a barrier to more objective views about aquaculture. In an effort to promote sustainable aquaculture practices and inform the public about sustainable fish farming, we plan to introduce, engage and educate the public about the value of aquaculture as a form of sustainable protein production.

Lack of consumer education in aquaculture has been expressed as a barrier to growth of the industry and is strongly needed in the Midwest region (Moen et al. 2017). For example, the availability of unbiased consumer information to help consumers make decisions as they purchase fish at the point of sale emerged as an important information gap during a 2017 aquaculture workshop hosted by Minnesota Sea Grant (Moen et al. 2017). Furthermore, through the Great Lakes Aquaculture Collaborative (GLAC), a partnership among the seven Great Lakes Sea Grant programs, advisory groups composed of aquaculture industry members, extension educators, and researchers, were convened to help the collaborative understand the needs of the industry. Based on a survey of our GLAC regional advisory group, consumer education, particularly focused on how to purchase and cook seafood, was rated among the top two topics producers expressed as needs in the region. In addition, the 2020 NCRAC meeting in Columbus, OH held a listening session encompassing producers from across the NCRAC region to determine priorities for future RFPs. Consumer education was identified as a theme throughout the listening session with a strong need pertaining to aquaculture economics and marketing, and in opportunities to advance aquaculture.

Related Current and Previous Work

US Consumer Studies

Currently, few studies have been conducted to assess consumers' opinions about wild-caught and farm-raised seafood in the US (Atlantic Corporation, 2019; Kecinski et al., 2017, Runge et al. 2020, Shaw et al. 2019). However, these few studies have served as important steps toward learning how to more effectively consider consumers preferences toward aquaculture products. Prior research has identified that consumers value seafood from local sources (Kecinski et al. 2017). A survey sampling 5,000 residents about oysters in the Northern US Atlantic regions found safety inspections, taste, and information about the source of the food were consumers' priorities (Kecinski et al., 2017). Researchers also found that producers will likely benefit from emphasizing to frequent product consumers, that their product is grown using aquaculture.

Despite the vast number of educational materials and the consumer preference studies, there has been little to no effort to understand the impact of the interconnectivity and dissemination of that information. This project will be both assessment-centered and community-centered as we will focus our materials on understanding, not memorization, to encourage feedback opportunities for meaningful learning. Utilizing the "How People Learn" framework by the National Research Council (National Academies of Sciences, Engineering, and Medicine) (NRC

2018), we will address learning across the life span by focusing on addressing consumers' understanding of aquaculture, its products, and its consumption.

Aquaculture Education in NCRAC - Adults

Development of adult learning materials and programs is difficult, as motivation needs to be almost intrinsically driven. For instance, students have extrinsic motivation to earn a grade for a class, but adults need motivation to learn based on their job or general curiosity in a subject. However, the objective information about aquaculture is not regularly presented to the general public, and typical consumers may not actively seek it out. Considerable aquaculture education materials already exist, such as that provided by the North Central Regional Aquaculture Center (NCRAC), the World Aquaculture Society, the US Aquaculture Society, and others. However, continuing education to the general public can be enriched from these platforms by contextualizing the content to a specific community. This is especially important as adult learners have formed mental models of their knowledge and values, and can have difficulty in the acceptance and understanding of new information. For these reasons, assessment-based and community-based approaches will be used to guide the development of aquaculture education activities and implementation.

Our current NCRAC proposal has been informed by and will complement other aquaculture efforts in the region for full integration into local markets. For example, though GLAC does not specifically address consumer education, consumer research funded as part of GLAC is relevant to this proposal. Specifically, GLAC researchers aim to determine what price consumers are willing to pay and what attributes consumers' value from farm-raised fish from both the Midwest region and elsewhere. The University of Wisconsin and Wisconsin Sea Grant have also recently conducted research on social license and consumer attitudes towards farmed fish (Runge et al. 2020, Shaw et al. 2019). When supported by consumer research data from concurrent research efforts and a better educated public as a result of our current NCRAC proposal, producers will be able to effectively target their products and advertising to a public better able to judge the value of locally farmed fish for themselves.

There are also two ongoing, public facing consumer education projects occurring in the Midwest region that would benefit from the outcomes of our proposal. The first is a website "Eat Midwest Fish" (EMF) being developed in a collaboration between NCRAC and Illinois-Indiana Sea Grant. The second is a similar website project that grew out of GLAC and has a slightly larger scope, including all Great Lakes producers of fish for food and other products (bait, stocking, etc.) called "Great Lakes Fresh Fish Finder," (GLFFF) and coordinated by co-PI Schrank. Both of these venues would be ideal locations to host the outputs from this project as the goals of these websites are to both connect producers with consumers, and educate consumers about sustainable aquaculture. Amy Schambach, the lead of the EMF project, has expressed her interest in using the outputs from our current proposal for the EMF website (see attached letter of support). The timing of our proposal in combination with these ongoing web projects will ensure that our deliverables will have far reaching and long lasting effects for aquaculture producers, consumers, and extension educators throughout the north central region.

Aquaculture Education in NCRAC - Youth

Aquaculture is an ideal tool to teach science principles including agriculture, biology, engineering, nutrition, chemistry, technology, and food systems through hands-on, project based learning (Conroy et al. 2000, Correia et al. 2020, Genello et al. 2015). While adult learners have mental models based on their existing knowledge and experiences, young learners have yet to develop such a mental model, or organization method, for new information (NRC 2000). This gives teachers a great opportunity to influence young learners with almost a "blank slate" approach to informing students with correct knowledge in a well-organized matter. Although a child's inability to relate personal experiences to content can be limiting in an educational context at times, it also frees teachers from the need to break down values or strongly-held beliefs about a concept. Educating youth about aquaculture will not only teach important science principles, but also will result in future generations of aquaculture literate adults.

The Aquaculture Challenge program (<http://ncrac-yea.org/aquaculturechallenge.php>) has been implemented for six years and has delivered aquaculture education to over 500 students across 50 different high schools throughout Michigan and Wisconsin. Program evaluation of student learning outcomes discovered participants gained engineering and technology skills. However, evaluations also illustrated that teachers often felt ill-equipped to teach the content and this emphasized a need for more curriculum and support for the teachers. In addition, students did not always realize the health and taste benefits of aquaculture products. Recruitment for the Aquaculture Challenge draws new teams to the competition each year. However, repeat registrations decline after a team's first year. This

may be because the competition has changed little over the last six years. Once participants have completed the challenge, many schools do not want to tear down and rebuild their systems every year. To address this, we have been adding new components to the challenge and also plan to have different challenge levels for new and repeating teams. To help support teachers, students, and to retain classrooms in the Aquaculture Challenge program, this proposal seeks to provide support to teachers in the form of educational materials and workshops. This will enhance components of the Aquaculture Challenge and add a continuing education component to the program to increase longevity.

Our work will benefit from other K-12 aquaculture education programs such as the Maryland Sea Grant “Aquaculture in Action” program (Maryland Sea Grant 2020). In 2019, co-PI Nelson traveled to Maryland to learn more about the program and the materials and expertise he gained will benefit our current proposal. There are a variety of other K-12 aquaculture resources through state agriculture offices (FDACS 2020), 4-H programs (VT 2020), and universities (Landry 2020). Because we have made the collation of resources explicit in objective 1, we will find and build upon the best current resources available, to create updated, high quality aquaculture education relevant to the North Central Region. In addition, our project will be complemented by a new NOAA Aquaculture Education Community of Practice that is currently underway to help NOAA funded collaborators across the US (and its territories) share best practices in aquaculture education programs. By building on previous efforts and working with strategic collaborators such as Spark-Y, 4-H, Future Farmers of America, state Sea Grant programs, and Native American tribes, this proposal will increase access to high quality learning experiences for high school students across the NCRAC region. This project will create an educated and informed seafood consumer base as students learn and grow toward an understanding and accepting sustainable aquaculture into the future.

Statement Regarding Duplication of Research

The USDA Current Research Information System (CRIS or REEport) was accessed to review any related or relevant research. We confirm that the proposed work is original research and does not duplicate any previously funded projects in the CRIS. The following NOAA databases of previously funded projects were also accessed to ensure that the proposed work does not duplicate previous research: 1) the National Sea Grant Office Funding page, 2) all state Sea Grant websites, and 3) NOAA Office of Aquaculture Funding Opportunities Page. Main key words used in the search included: aquaculture, seafood, consumer education, youth education.

Anticipated Benefits

Short Term

Short term impacts include *knowledge gained* from conducting this research. These impacts include:

- Increase in access to consumer education materials related to aquaculture
- Increase in understanding of barriers to educating the public about aquaculture
- Increase in access to professional development and knowledge about aquaculture for K-12 teachers.
- Increase in student, teacher, and public knowledge and understanding about aquaculture and the sustainability of food production practices
- Increase understanding of how to properly prepare and cook fish
- Increase understanding of differences between aquaculture and wild caught fish

Medium Term

Medium term impacts include *behavior changes* from conducting this research. These impacts include:

- Increase the ability of teachers to integrate aquaculture into school curricula
- Increase the ability of consumers to relate their food systems and daily life to aquaculture
- Extend workshop and in-class learning to peers and families
- Increase acceptance and use of aquaculture products by the public

Long Term

Long term impacts include *conditions changed* from conducting this research. These impacts include:

- Increase and support the capacity for teachers and extension educators to provide hands-on education about aquaculture
- Create an educated public with a clear, informed understanding of aquaculture
- Strengthen connection of communities to cultural aspects of fish preparation and consumption

- Develop assessment and community driven models to design future aquaculture education and outreach programs
- Increase development and growth in consumer demand and aquaculture markets
- Expand sustainable food production capacity in the US.

Objectives

The goal of this project is to develop intervention methods that can be used to educate adult and youth consumers. Specific objectives include:

1. Compile and evaluate readily available resources related to (1) adult consumer education and (2) youth engagement in US aquaculture.
2. Develop, facilitate, and disseminate adult consumer education materials and programming on seafood and aquaculture.
3. Develop, facilitate, and disseminate youth educational materials and programming on seafood and aquaculture.

Deliverables

1. Report of comprehensive list of web-based aquaculture educational materials currently available with an evaluation of some of the most relevant and/or visible of these resources.
2. Results of a survey designed to develop a better understanding of some of the barriers to educating the public about aquaculture based on the opinions of aquaculture professionals.
3. Several short educational videos and online educational modules about aquaculture and wild fisheries, information relevant to identifying and selecting responsible seafood products, and how to prepare seafood at home.
4. Several in-person (or virtual, if necessary) workshops to teach adults proper selection, handling, and cooking of aquaculture products to reduce barriers to individuals cooking fish at home.
5. Expansion of the NCRAC Youth Education in Aquaculture website to increase scope and school involvement throughout the NCR which will include workshops for teachers interested in including these experiences in their curriculum.
6. Expansion and development of a formal lesson plan designed to empower youth through education about aquaculture and teaching them to harvest fish from classroom aquaponics units, clean them, and cook them; this will include several in-person (or virtual, if necessary) demonstrations for youth.
7. Delivery of several in-person fish preservation, cooking and cleaning workshops in partnership with Native American and rural organizations to help re-engage their youth in traditional uses of fish; these activities will be accompanied by appropriate educational materials about fish as a healthy food source and production of short videos to highlight the collaborations.

Procedures

Objective 1. — We will address this objective with a two-pronged approach. First, we will conduct web-based searches (using the most common search engines, e.g. Google, Bing, Yahoo, YouTube, etc.) for all of the aquaculture educational materials available on the internet, compile these resources and make them available to the NCRAC community on the NCRAC website. We will evaluate at least 25 of the best and/or most accessed web-based resources for quality of information, quality of presentation, and accessibility. These evaluations will be conducted to identify the best approaches for building on and improving consumer education materials created in Objectives 2 and 3 below.

Second, we will assess the industry's current knowledge – including that of producers, researchers, extension agents, and governmental employees – of consumer resources pertaining to aquaculture. To do this, we will develop an incentivized survey and disseminate it broadly via listservs to individuals who work with the US aquaculture industry. Questions will be oriented around existing consumer educational content, perceptions of the general public's understanding of aquaculture, and personal experience with barriers and challenges of communicating aquaculture to the public. Survey participants will also be encouraged to share contact information with the project team to stay up to date on project developments and form partnerships with the project team. All human data will be kept confidential and secure following approved university IRB protocols at each relevant university. Survey results will be distributed in aggregate and used to fill gaps and needs in consumer education.

Outputs of Objective 1 will guide the development of educational materials in Objectives 2 and 3 of this project. Modules will be developed for two audiences: adults (Obj. 2) and youth (Obj. 3). These audiences will have different outreach activities because research shows that adults and youth have different motivations and values for learning (NRC, 2000). Adult learners are motivated by using their established vast skills, helping others, preserving their resources, and sense of competence (NASEM, 2018). Choices, motivations, and capacity for self-regulation, as well as adults' circumstances, influence how much and how well adults learn and transfer their learning to new situations. Youth learners, on the other hand, are motivated by improving their skills and a sense of growth and accomplishment. Without previous knowledge and/or stigmas about aquaculture, youth are more flexible in learning new information (NRC, 2001). Awareness of these differences will allow the project team to develop, facilitate, and disseminate educational materials in a manner that is most effective for all learners in aquaculture. Educational materials developed in Objectives 2 and 3 will focus on three general aspects of aquaculture: 1) fish sources (i.e., what is aquaculture?); 2) fish grow-out (i.e., what does sustainable aquaculture mean and how does it look?); and, 3) fish consumption (i.e., how do you prepare and cook fish in healthful, delicious ways?). Participant learning goals and content will be aligned to these modules and can be found in Table 1.

Table 1. Anticipated aquaculture consumer education modules with aligned participant learning goals and content.

Module	Participant Learning Goals	Content
1. Fish Sources	<ol style="list-style-type: none"> 1. Understand sustainable aquaculture and how it differs from wild harvest of fish 2. Identify and differentiate among aquaculture systems and identify common species 	<p><u>“Aquaculture 101” for the consumer:</u></p> <ul style="list-style-type: none"> • What is aquaculture? • Production system types and species • US and global production statistics
2. Fish Grow-Out	<ol style="list-style-type: none"> 1. Evaluate the sustainability and impacts of various protein sources and production systems 2. Discover how to reliably and accurately identify healthy and sustainable choices 	<p><u>Correcting misconceptions:</u></p> <ul style="list-style-type: none"> • Farmed fish vs wild caught fish vs other protein sources • Defining sustainability • General health benefits and risks of fish consumption
3. Fish Consumption	<ol style="list-style-type: none"> 1. Learn and practice proper handling, cleaning, and cooking of aquaculture products 2. Understand potential risks related to seafood safety and how to avoid risk 3. Develop seafood recipe cards and videos with details on steps, process, pictures, and ratings 	<p><u>Eating farm-raised fish:</u></p> <ul style="list-style-type: none"> • Food fish health and safety • “How to” series: how to safely handle, prepare, fillet, and cook seafood • Recipes • Chef / restaurant recommendations

Personnel: Dr. Schrank and Dr. Jescovitch will oversee project management of Objective 1 with assistance of a Program Coordinator (TBD at University of Minnesota). All Investigators will provide consultation, particularly for evaluation procedures of currently available content as well as survey design and analysis.

Objective 2. — Outputs from Objective 1 will be used to help develop educational activities for **adult consumers**. Utilizing the “How People Learn” framework by the National Academies of Sciences, Engineering, and Medicine (NASEM, 2018), we will address learning across the life span by focusing on addressing consumers’ lifelong learning. Educational materials from Modules 1-3 (Table 1) will be developed for adult public audiences and will include both synchronous and asynchronous learning strategies to maximize impact. Activities for adult learners will include short presentations, videos, and workshops that will be tailored to uncovering current mental models (i.e. preconceived stigmas, beliefs, and values based on personal, previous experiences) that may need to either be altered or supported based on the findings of Objective 1. These materials will be crafted to engage participants by focusing on building connections between new information presented and current knowledge.

Although there are already other consumer education materials available, we can use our findings from Objective 1 to highlight misconceptions in order to cater our intervention materials to specific communities. For instance, would watching a video change a practiced and ingrained behavior? Or would a more engaging, targeted approach, such as a hands-on workshop, allow for development of acceptance and learning of new information? We will use “How people learn” to guide the development of materials to engage participants with experiences they already have as their mental models in order to influence behavioral change and understanding of new or conflicting information.

Outputs from Objective 1 will be used to develop educational activities for **adults**. Highlighting current adult outreach initiatives and communities, we will engage with various partners to develop and disseminate content depending on the specific module. Module descriptions are as follows:

Module 1: We will develop four videos that show practices of aquaculture and wild fisheries. These videos and educational materials to support the videos will be posted on the GLAC, Eat Midwest Fish, and the Great Lakes Fresh Fish Finder platforms in order to directly link consumers with readily available information as they plan to buy local fish or visit local fish farms.

Module 2: We will develop workshops highlighting educational barriers and misconceptions that we discover through Objective 1. Examples of such activities include, but are not limited to: a facilitated debate to allow participants in a workshop to defend or critique aspects of aquaculture sustainability compared to the production of other protein sources, an “in the field” activity that can be used in wholesale markets for consumer education, and providing direct marketing businesses and restaurants with current information they can disseminate to consumers as they make immediate purchasing decisions at the point of sale.

Module 3: We will collaborate with the Portage Health (PH) Foundation - a 501(c)(3) charitable community organization whose mission is to support the charitable health needs of the Western Upper Peninsula of Michigan through enhanced philanthropy and community collaboration. This module will be focused on providing in-person (or virtual if necessary) workshops and/or videos to teach proper selection, handling, and cooking of aquaculture products to reduce barriers to individuals cooking fish at home. Nutritional aspects and healthy choices will also be highlighted. We will use PH Foundation’s current public cooking video series “Bibliobistro” (<https://pdl.org/bibliobistro>) as an avenue for disseminating the videos.

Dissemination will include online content both on approved websites and social media, as well as in person content (when possible after COVID-19) through extension programs, associations, and community centers. The in-person workshops will be facilitated by the project team, or with support from partnered experts, and templates for extension personnel will be developed to facilitate continuation of the program in the future. If COVID-19 policies still limit travel, in-person workshops will be facilitated through online platforms for the creation of interactive, virtual activities.

Personnel: Dr. Jescovitch will be responsible for Objective 2. The Project Coordinator will assist in management of activities and coordination of efforts between Objectives 2 and 3.

Objective 3.— Vast literature examines how attitudes influence food consumption behavior (Demartini et al., 2019). Much of the research shows that adult values, opinions, and behaviors are heavily influenced by early life experiences and the information they are exposed to and retain as children and adolescents (Hayta, 2008; Wells and Lekies, 2006). Youth aquaculture education programs are shown to not only inform future consumers about sustainable aquaculture, but also provide integrative activities that improve youth learning outcomes in the areas of science, mathematics, engineering and technology (Conroy, 2000; Horton & House, 2015; Genello et al. 2015; Hart et al., 2014). With this in mind, we plan to engage youth from both urban and rural communities in learning about aquatic organisms and ecosystems, food production systems, seafood, and aquaculture as a vehicle for learning both science and life skills. A summary of this approach is discussed in further detail below.

Outputs from Objective 1 will be used to develop educational activities for **youth**. Highlighting current youth initiatives, we will engage with various partners to develop and disseminate content depending on the specific module. Module descriptions are as follows:

Modules 1 and 2: We plan to build from the NCRAC Youth Education in Aquaculture (YEA) website (www.ncrac-yea.org) by expanding the scope and geographic coverage in the NCR. This website integrates high school aquaculture activities (i.e. the Aquaculture Challenge competition) throughout the NCRAC region. In addition, we plan to offer workshops to high school teachers for hands-on experience with aquaculture and help them develop lesson plans with curricula aligned to Next Generation Science Standards, which will be refined and disseminated for future use. Given the potential of future state lockdown policies, options for students to continue these activities

at home will be included. Activities will include online discovery exercises, live virtual presentations, recorded videos, and educational modules (i.e. Google Classroom module).

Modules 1, 2 and 3: We will work with Spark-Y Youth Action Labs (www.spark-y.org), a non-profit organization in Minneapolis, MN focused on empowering urban youth with hands-on education rooted in aquaponics, entrepreneurship, and sustainability. In the past, Spark-Y has helped students build aquaponics systems in schools across the Minneapolis/St. Paul metro area that are used to educate and empower youth. In addition, they have started teaching students how to harvest their fish, clean them, and cook them. For this project, they will expand this program and create 3-5 simple recipes involving edible fish to be made available to the general public. They will also develop a culinary demonstration lab to show youth how to fillet and cook fish. This demonstration will culminate in a lesson plan, allowing in-classroom culinary demonstrations with aquaculture species to be more accessible to educators. Finally, Spark-Y will support this project's development of educational info-graphics and videos related to aquaculture. All material will be made available through the NCRAC-YEA website as well as MNSG and GLAC.

Module 3: We will partner with Native American and rural organizations to help re-engage their youth in traditional uses of fish (smoked, pemmican, compost, etc.). The Sault Ste. Marie Tribe of Chippewa Indians has indicated there is a strong need for tribal youth education on fish consumption. We will host in-person fish preservation, cooking and cleaning sessions at the Native American Center at Lake Superior State University (LSSU). Activities will include expanding the content of youth education programs to include seafood preparation as a component of the Aquaculture Challenge competition. We will also connect with rural organizations such as 4H for fish consumption education and create short videos for online/social media.

Online materials will be disseminated via websites and social media, including websites such as ncrac-yea.org, ncrac.org, GLAC, Sea Grant, WAS/USAS and NAA. In addition, we will disseminate information to high school teachers and through community centers, Sault Tribe Traditional Medicine, and Michigan Science Teachers Association (MSTA).

Personnel: Dr. Evans, Dr. Schrank, and Mr. Nelson will be responsible for Objective 3. The Project Coordinator will assist in management of activities and coordination of efforts between Objectives 2 and 3

Data Management Plan

Expected data type: Data includes all published works, source material for data presented in published work, and raw data collected throughout the project. Data generated during the development of the project includes products (workshops, curriculums), human characteristics (demographic, beliefs and knowledge), and evaluation data (assessments).

Data produced from this project will be primarily social in nature and consist of comprehensive lists of consumer education material available on the web, survey results, lesson plans, and short videos. We will also include workshop evaluations which will include variables such as the number and demographics of individuals attending, and comments about workshop effectiveness. Formal approval from the appropriate university's Institutional Review Board (IRB) will be sought for all researchers conducting research surveys. To maximize the research potential of the data, we will store and retrieve data down to the individual, so the data cannot be stored without identifiers. The project team will implement cryptographic hashing (National Security Agency, 1994) to de-identify data for collection and storage. Data will be stored on password protected systems managed by university Information Technology Services (ITS) units. Only the project management team will have access to the de-identified data until they are prepared for sharing. All partner universities will ensure data integrity on a best-effort basis.

Data Format: The project management team will identify common data formats and metadata standards for each aspect of the project and will work to provide data in those formats for centralized collection, management, storage, and to provide access to project members. The data will include explorative (e.g., working group outcomes, marketing portfolio) to qualitative and quantitative (e.g., surveys) formats. Metadata will allow for storage and management of these data in a manner that will promote access and retrieval. We will build on existing metadata standards including the Data Documentation Initiative (DDI, <http://www.ddialliance.org/>). Building on these standards, we will identify the metadata for each dataset for centralized storage and archival at each university.

Data storage and preservation: The project team will manage and store data throughout the project's duration using a Team Google Drive which is a collaborative cloud environment in which we can maintain appropriate group sharing and editing permissions. Permissions can be adjusted to allow only the project team access to the data. Surveys will be distributed and collected electronically with digital backups. The data and metadata sets will be stored in Extensible Markup Language (XML <http://www.w3.org/XML/>), a non-proprietary format that will ensure that the data will remain readable and accessible as computing technology evolves in the future. XML provides a foundation for building a wide range of data management and access systems that can evolve after the grant.

All data will be stored throughout the duration of the project and for at least two years after the final project report. Periodic full backups of the project data will be performed automatically on a monthly basis, or immediately after project milestones (such as completion of survey). Users of cloud-based storage solutions will utilize two-factor authentication to access cloud-based data and applications and follow data security best practice recommendations published by associated University IT guidelines. Additionally, PI Schrank will retain copies of raw analysis results, meeting notes, and data backups on digital storage devices located within her office located in St. Paul, MN.

Data sharing, protection, and public access: A long-term data sharing and preservation plan will be used to store and make data publicly accessible, beyond the life of the project. This plan will include the project's website (hosted at MNSG), which will be used to deliver educational and outreach products. In addition, all data will be deposited into the Data Repository for the University of Minnesota (DRUM), <http://hdl.handle.net/11299/166578> within two years of the conclusion of the project, and will be shared with NCRAC partners.

The University of Minnesota libraries' institutional data repository is an open-access platform for dissemination and archiving of University research data. Data files in DRUM are written to an Isilon storage system with two copies, one local to each of the two geographically separated University of Minnesota Data Centers. The local Isilon cluster stores the data in such a way that the data can survive the loss of any two disks or any one node of the cluster. Within two hours of the initial write, data replication to the second Isilon cluster commences. The second cluster employs the same protections as the local cluster, and both verify with a checksum procedure that data have not altered on write. In addition, DRUM provides long-term preservation of digital data files for at least 10 years using services such as migration (limited format types), secure backup, bit-level checksums, and maintains persistent DOIs for data sets, facilitating data citations. In accordance to DRUM policies, the (de-identified, if applicable) data will be accompanied by the appropriate documentation, metadata, and code to facilitate reuse and provide the potential for interoperability with similar data sets.

Only aggregate data will be released to partners to protect the identities of respondents. Released datasets will include metadata to allow partners to draw conclusions and determine contexts to which the results of the research may be generalized. Sensitive datasets will initially be made available to the project team for internal research and publication. Upon publication, de-identified datasets used for each publication will be made available to external researchers, such as NCRAC members who wish to evaluate or replicate the results. All other non-confidential data will be available to partners during the project to facilitate planning discussions and project sustainability.

Roles and responsibilities: The project manager (Schrank) will ensure the data management plan is implemented. All project personnel will contribute to the plan and are prepared to implement the plan in case of a change in project management. There are no additional funds needed to implement the data management plan.

Products and dissemination: Products will include a comprehensive report of web-based aquaculture educational materials currently available with an evaluation of some of the most relevant and/or visible of these resources. Survey results will be summarized in a final report. We will produce several short educational videos and online educational modules about how to identify and select responsible seafood products. We will produce several in-person (or virtual, if necessary) workshops to teach adults proper selection, handling, and cooking of aquaculture products to reduce barriers to individuals cooking fish at home. We will expand the NCRAC Youth Education in Aquaculture website to increase scope and school involvement throughout the NCR. We will develop formal lesson plans designed to empower youth through education about aquaculture and fish harvest, preparation and cooking. Finally, we will deliver several in-person fish preservation, cooking and cleaning workshops in partnership with Native American and rural organizations.

Evaluation and Outreach

This project is outreach driven, with Objectives 2 and 3 exclusively working towards creating and delivering outreach materials guided by outputs from Objective 1. Assessment and evaluation of programs and activities within modules will include: pre/post surveys, website logistics (e.g., number of views), short quizzes, personal reflections, debates and scientific argumentation practices, rubric assessments, and self-reported changed behavior and values from surveys over time. All materials produced in this project (i.e. videos, online educational modules, lesson plans, recipes, etc.) will be disbursed to various aquaculture groups with an online presence to ensure they can be easily found and are openly accessible.

Development of consumer educational materials on seafood and aquaculture (Logic Model)

Situation: Consumers in the US have reservations about purchasing, consuming, and cooking aquaculture products. These concerns are likely based on a lack of knowledge about: aquaculture, sustainable benefits of responsible aquaculture, food safety related to aquaculture, how to cook seafood, and nutritional and health differences between wild and farmed seafood.

Inputs	Outputs	Outcomes		
		Short Term	Medium Term	Long Term
<ul style="list-style-type: none"> • Project Investigators • Staff and Students • Collaborators • Infrastructure • Funding • Time • Supplies • Educational materials on aquaculture • Knowledge • Expertise 	<ul style="list-style-type: none"> • Activities • Evaluate available aquaculture educational materials and barriers to further education • Develop, deliver, and distribute novel educational materials (i.e. videos, online modules, lesson plans, activities) • Facilitate workshops, trainings, and classroom activities • Collaborate with community organizations to extend reach of aquaculture education materials. • Participants • Students, Teachers, General Public, Consumers, Community organizations 	<ul style="list-style-type: none"> • Comprehensive and curated list of consumer education materials related to aquaculture • Understanding of barriers to educating the public about aquaculture • Increase in access to professional development and knowledge about aquaculture for K-12 educators • Increase in student, teacher, and public knowledge and understanding of aquaculture and the sustainability of food production practices • Increase in understanding by the general public of how to properly prepare and cook fish • Increase understanding of how to prepare and cook fish. 	<ul style="list-style-type: none"> • Increase ability of teachers to integrate aquaculture into school curricula • Increase ability of consumers to relate their food systems and daily life to aquaculture • Extend workshop and in-class learning to peers and families • Increase acceptance in and use of aquaculture products 	<ul style="list-style-type: none"> • Increase and support the capacity for teachers and extension educators to provide hands-on education about aquaculture • Create an educated public with a clear, informed understanding of aquaculture • Strengthen connection of communities to cultural aspects of fish preparation and consumption • Develop assessment and community driven models to design future aquaculture education and outreach programs • Increase development and growth in consumer demand and aquaculture markets • Expand of sustainable food production capacity in US
<p>ASSUMPTIONS</p> <ul style="list-style-type: none"> • Increasing adult and youth knowledge about aquaculture and sustainable aquaculture practices will improve aquaculture social license. 		<p>EXTERNAL FACTORS</p> <ul style="list-style-type: none"> • Consumers, educators, and youth are open to learning more about where their food comes from. 		

Facilities

University of Minnesota/Minnesota Sea Grant. Dr. Schrank has access to facilities at the University of Minnesota Twin Cities campus and MN Sea Grant facilities on the University of Minnesota at Duluth campus. These include offices, dry-labs, wet-labs, classrooms, and online educational module technical support. Most salary and fringe support is for a Program Coordinator to be hired at .62 FTE for 2 years. Most of the “Other” funds are for professional help with video, online content, and distribution material production, as well as to support a small amount of time from Spark-Y educators.

Michigan State University/Michigan Sea Grant. Dr. Jescovitch and Mr. Nelson have access to facilities through Michigan State University Extension (MSUE) and Michigan Sea Grant (SG). MSUE Product Center also has food counselors who can provide strategic contacts to plan programming and Food Summits such as Making it in Michigan and the MarketPlace Trade Show conferences. MSUE and MI SG also have communication personnel that can support development of educational materials and modules. Dr. Jescovitch has additional access to Michigan Technological University and their Great Lakes Research Center that has 27 research labs that include outreach programming rooms that provide the capacity for in-person demonstrations and workshops. Mr. Nelson also has access to facilities at LSSU described below.

Lake Superior State University. Dr. Evans has access to facilities at LSSU in Sault Ste. Marie, MI. The science building is well equipped for workshops with the Aquaponics Learning Laboratory (ALL) with two full systems, and an adjacent Fish Health Laboratory. There is also a 20’x48’ hoop house for aquaponics system experimentation and incorporation of renewable energy such as solar thermal and photovoltaic systems. The research greenhouse also has a small aquaponics system for demonstration. In addition, the LSSU Center for Freshwater Research and Education has an Atlantic salmon flow through hatchery and a recirculating tank lab (currently under construction) that will be available for tours. We will also collaborate with the LSSU campus Native American Center (Eskoonwid Endaad) that has meeting rooms and kitchen facilities for cooking demonstrations.

References

- Atlantic Corporation. 2019. Consumer attitudes and preferences about farm-raised shellfish, finfish, and sea vegetables in the Atlantic Coast states. Waterville, Maine.
- Bir, C., Lai, J., Widmar, N. O., Thompson, N., Ellett, J., and C. Crosslin. 2019. There’s no place like home: Inquiry into preferences for local foods. *Journal of Food Distribution Research* 50:29-45.
- Conroy, C.A., and N.J. Walker. 2000. An examination of integration of academic and vocational subject matter in the aquaculture classroom. *Journal of Agricultural Education* 41(2):54-64.
- Correia M., Azevedo. I.C., Peres, H., Magalhães, R., Oliva-Teles, A., Ribeiro Almeida, C.M., and L. Guimarães, 2020. Integrated multi-trophic aquaculture: A laboratory and hands-on experimental activity to promote environmental sustainability awareness and value of aquaculture products. *Frontiers in Marine Science* 7:156. <https://doi.org/10.3389/fmars.2020.00156>
- Demartini, E., Marchi, E.D., Cavaliere, A., Mattavelli, S., Gavivloi, A., Banterle, A., Richetin, J., and M. Perugini. 2019. Changing attitudes towards healthy food via self-association or nutritional information: What works best? *Appetite* 132:166-174.
- FDACS, Florida Department of Agriculture and Consumer Services. 2020. Aquaculture Educator Resources. <https://www.fdacs.gov/Education/Aquaculture-Educator-Resources>
- Genello, L., Fry, J.P., Frederick, J.A., Li, Ximin, and D.C. Love. 2015. Fish in the classroom: A survey of the use of aquaponics in education. *European Journal of Health and Biology Education* 4(2): 9-20. <http://dx.doi.org/10.20897/lectito.201502>
- Hart, E., Webb, J.B., Hollingsworth, C., and A.J. Danylchuk. 2014. Managing expectations for aquaponics in the classroom: Enhancing academic learning and teaching an appreciation for aquatic resources. *Fisheries* 39(11):525-530.
- Hayta, A.B. 2008. Socialization of the child as a consumer. *Family and Consumer Science Research Journal* 37(2): 167-184.
- Horton, R. L., and P.L. House. 2015. Fish farm challenge provides STEM design experiences for youth. *Journal of Extension* 53(4): n4.
- Kecinski, M., Messer, K.D., Knapp, L., and Y. Shirazi. 2017. Consumer preferences for oyster attributes: Field experiments on brand, locality, and growing method. *Agricultural and Resource Economics Review* 46(2): 315-337.
- Landry, S. 2020. Old MacDonald had an aquaculture farm. VA Sea 2020 Lesson Plans. Virginia Institute of Marine Science, William & Mary. doi: 10.25773/evdg-4v57

- Maryland Sea Grant 2020. K-12 Aquaculture Education. <https://www.mdsg.umd.edu/topics/k-12-aquaculture-education/k-12-aquaculture-education> Date retrieved: June 30, 2020.
- Moen, S.M., D.R. Schreiner, J. Coburn and N. Jacob. 2017. Food-fish aquaculture in Minnesota: A synthesis of the 26-27 April 2017 workshop. Minnesota Sea Grant, A26: 88 <http://www.seagrant.umn.edu/downloads/a26.pdf>. Date retrieved: July 14, 2020
- National Academies of Sciences, Engineering, and Medicine (NASEM). 2018. How people learn II: Learners, contexts, and cultures. Washington, DC: The National Academies Press. <https://doi.org/10.17226/24783>
- National Research Council (NRC). 2000. How people learn: Brain, mind, experience, and school: Expanded Edition. Washington, DC: National Academy Press.
- National Research Council (NRC). 2001. Knowing what students know: The science and design of educational assessment. Washington, DC: National Academy Press.
- Runge, K.K., Shaw, B.R., Witzling, L., Hartleb, C., Yang, S., and D. Peroff. 2020. Social license and consumer perceptions of farm-raised fish. *Aquaculture* 530. <https://doi.org/10.1016/j.aquaculture.2020.735920>
- Shaw, B., Runge, K., Yang, C., Witzling, L., Hartleb, C., and D. Peroff. 2019. Consumer attitudes toward Wisconsin farm-raised fish. University of Wisconsin Extension.
- VT 2020. Virginia Tech Extension and 4-H Virtual Farm. <https://www.sites.ext.vt.edu/virtualfarm/aquaculture/aquaculture.html> Date retrieved: June 30, 2020.
- Wells, N.M. and K.S. Lekies. 2006. Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments* 16(1): 1-24.

Project Leaders

State	Name/Institution	Area of Specialization
Minnesota	Amy Schrank University of Minnesota Minnesota Sea Grant	Fisheries and aquaculture, research and education, outreach
Michigan	Barbara I. Evans Lake Superior State University	Fish development and behavior; aquaculture education
Michigan	Lauren Jescovitch Michigan State University Michigan Sea Grant	Aquaculture, STEM education, Assessment & Evaluation, Survey Assessments
Michigan	Elliot Nelson Michigan State University Michigan Sea Grant	K-12 Aquaculture Education, STEM education, Program Evaluation

University of Minnesota– year 1

ORGANIZATION AND ADDRESS Regents of the University of Minnesota Office of Sponsored Projects Administration 450 McNamara Alumni Center 200 Oak Street SE, Minneapolis, MN 55455-2070				USDA AWARD NO. Year 1: Objective 1, 2, 3					
				Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	Funds Requested by Proposer	Funds Approved by CSREES (If different)
PROJECT DIRECTOR(S)h Amy Schrank									
A. Salaries and Wages			CSREES FUNDED WORK MONTHS						
1. No. of Senior Personnel			Calendar	Academic	Summer				
a. <u>1</u> (Co)-PD(s) . Amy Schrank			0.25			1,804			
b. ____ Senior Associates									
2. No. of Other Personnel (Non-Faculty)									
a. ____ Research Associates-Postdoctorates . . .									
b. <u>1</u> Other Professionals			7.4			31,966			
c. ____ Paraprofessionals									
d. ____ Graduate Students									
e. <u>1</u> Prebaccalaureate Students						3,014			
f. ____ Secretarial-Clerical									
g. ____ Technical, Shop and Other									
Total Salaries and Wages <input type="checkbox"/>						36,784			
B. Fringe Benefits (If charged as Direct Costs)						10,823			
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>						47,607			
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies						1,724			
F. Travel						8,000			
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.)						17,025			
K. Total Direct Costs (C through I) <input type="checkbox"/>						74,356			
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"/>						74,356			
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$				
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							Leave Blank		
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									

University of Minnesota Budget – Year 2

ORGANIZATION AND ADDRESS Regents of the University of Minnesota Office of Sponsored Projects Administration 450 McNamara Alumni Center 200 Oak Street SE, Minneapolis, MN 55455-2070				USDA AWARD NO. Year 2: Objective 1,2,3					
				Duration Proposed Months: <u> 12 </u>	Duration Proposed Months: <u> </u>	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	Funds Requested by Proposer	Funds Approved by CSREES (If different)
PROJECT DIRECTOR(S) Amy Schrank									
A. Salaries and Wages 1. No. of Senior Personnel		CSREES FUNDED WORK MONTHS			1,858				
		Calendar	Academic	Summer					
a. <u> 1 </u> (Co)-PD(s) . Amy Schrank		0.25							
b. <u> </u> Senior Associates									
2. No. of Other Personnel (Non-Faculty)									
a. <u> </u> Research Associates-Postdoctorates . . .		7.4			32,924				
b. <u> 1 </u> Other Professionals									
c. <u> </u> Paraprofessionals									
d. <u> </u> Graduate Students									
e. <u> 1 </u> Prebaccalaureate Students					2,986				
f. <u> </u> Secretarial-Clerical									
g. <u> </u> Technical, Shop and Other									
Total Salaries and Wages <input type="checkbox"/>					37,768				
B. Fringe Benefits (If charged as Direct Costs)					11,148				
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>					48,916				
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies					1,776				
F. Travel					8,000				
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.)					17,683				
K. Total Direct Costs (C through I) <input type="checkbox"/>					76,375				
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"/>					76,375				
P. Carryover -- (If Applicable)		Federal Funds: \$	Non-Federal funds: \$	Total \$					
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							Leave Blank		
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									

University of Minnesota Budget – Summary (Year 1 & Year 2)

ORGANIZATION AND ADDRESS Regents of the University of Minnesota Office of Sponsored Projects Administration 450 McNamara Alumni Center 200 Oak Street SE, Minneapolis, MN 55455-2070				USDA AWARD NO. Year 1&2: Objective 1,2,3			
				Duration Proposed Months: <u>24</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)
PROJECT DIRECTOR(S) Amy Schrank							
A. Salaries and Wages		CSREES FUNDED WORK MONTHS					
1. No. of Senior Personnel		Calendar	Academic	Summer			
a. <u>1</u> (Co)-PD(s) . Amy Schrank		0.5			3,662		
b. ____ Senior Associates							
2. No. of Other Personnel (Non-Faculty)							
a. ____ Research Associates-Postdoctorates . . .							
b. <u>1</u> Other Professionals		14.8			64,890		
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. <u>1</u> Prebaccalaureate Students					6,000		
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages <input type="checkbox"/>					74,552		
B. Fringe Benefits (If charged as Direct Costs)					21,971		
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>					96,523		
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies					3,500		
F. Travel					16,000		
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.)					34,708		
K. Total Direct Costs (C through I) <input type="checkbox"/>					150,731		
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"/>					150,731		
P. Carryover -- (If Applicable)		Federal Funds: \$	Non-Federal funds: \$	Total \$			
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)						Leave Blank	
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							

Budget Explanation for University of Minnesota (Schrank Year 1)

A. Salaries and Wages: (\$36,784)

- Amy Schrank, Extension Assistant Professor at Minnesota Sea Grant (MNSG), with an annual salary of \$83,000 and 0.25 person months assigned to this project (2.1% effort): \$1,804 is requested. Schrank will oversee the project and contribute to Objectives 1 and 3 of the proposal. She will help gather and synthesize existing consumer education material and help develop, facilitate, and disseminate youth educational programming on seafood and aquaculture. She will oversee the Program Coordinator and one undergraduate student intern during the project. Dr. Schrank's position is not hard funded. Sea Grant positions are funded through a cooperative agreement with NOAA National Sea Grant Program through omnibus research grants and through other sponsored projects. If work is to be completed on this USDA NCRAC grant, appropriate funds to cover salary and fringe are needed to achieve project activities for this project.
- Program Coordinator (TBD), with an annual salary of \$50,000 and 7.41 person months assigned to this project (62% effort), \$31,966 is requested. This person will support project coordination that includes a variety of activities, outputs, and investigators/collaborators. This person will manage day-to-day operations, coordinate efforts among the many investigators/collaborators, help prepare and analyze survey materials, and contribute to the development of lesson plans, activities, workshops, and educational materials (online videos and educational modules). The Program Coordinator will be supervised by Schrank.
- Undergraduate Student Intern (TBD), with a salary of \$29,120 and 1.2 person months assigned to this project: \$3,014 is requested. This student intern will be supervised by Schrank and will help develop and deliver new youth programming.

B. Fringe Benefits: (\$10,823)

- Academic fringe rate calculated at 36.5%, \$658 is requested.
- Civil service fringe rate calculated at 31.8%, \$10,165 is requested.

E. Materials and Supplies: (\$1,724)

- A total of \$1,724 is requested for all materials and supplies. Materials and supplies will include printing and postage for outreach materials and lesson plans. Additional materials will be used to support implementation of workshops, development of videos and online educational modules, and classroom activities. These supplies will include laboratory supplies, fish, cooking materials, and other miscellaneous supplies needed for activities for classrooms and workshops.

F. Travel: (\$8,000)

- Travel costs are expenses related to three to four in-person workshops throughout the North Central Region for PI Schrank and the Program Coordinator. We have requested \$1,080 for rental/mileage (\$0.56 per mile x 1,929 miles), \$3,600 for lodging (~\$150 per night x 12 nights x 2 people), and \$1,320 for per diem meal expenses (12 days x \$55 per diem x 2 people): \$6,000 is requested.
- Travel for PI Schrank to attend a national professional meeting (e.g. Aquaculture America, National Aquaculture Extension Workshop/Conference, other), to formally present the project, conduct surveys, and engage stakeholders and potential future collaborators (meeting registration at \$400 + plane ticket at \$575 + hotel at \$150 x 5 nights + per diem meals at \$55 x 5 days): \$2,000 is requested.

J. Other direct costs: (\$17,025)

- Other costs include contracts for video and video editing services to create outreach and education videos and demonstrations: \$9,000 is requested. We will produce several short videos and/or online educational modules with either a production team within the University of Minnesota system, or a private contractor. The number of videos/modules produced, as well as their length, will be dependent on the outputs of all objectives. Production of even short (5 minute) high quality videos can cost in the area of \$2,000-\$3,000. A slight compromise on quality would allow for the production of more videos/modules. We envision being able to produce 3-6 short (~5 minutes) videos/modules in support of consumer and youth education about aquaculture that can be posted online and marketed for widespread viewership.
- Other costs include a services contract for Spark-Y Youth Action Labs (www.spark-y.org), a non-profit organization in Minneapolis, MN focused on empowering urban youth with hands-on education rooted in aquaponics, entrepreneurship, and sustainability. Spark-Y and the University of Minnesota have collaborated on many successful projects in the past. These projects have worked to co-support youth, students, interns, and the greater community. Projects have resulted in: aquaponic system builds for youth education; research on the efficiency of recirculating aquaculture systems (RAS); improved pest management techniques in RAS systems; and more.

Spark-Y will develop 3-5 simple recipes involving edible fish to be made available to the general public. They will develop a culinary demonstration lab to show youth how to fillet and cook edible fish species. This demonstration will culminate in a lesson plan, allowing in-classroom culinary demonstrations with aquaculture species to be more accessible to educators. Finally, Spark-Y will support the project's development of educational infographics and videos related to aquaculture. \$8,025 is requested in year 1 for 125 hours at \$24/hr; 199 hours at \$21.5/hour and \$750 for supplies for demonstration labs (cutlery, cutting boards, cooking tools, food) and for educational graphics.

Budget Explanation for University of Minnesota (Schrank Year 2)

A. Salaries and Wages: (\$37,768)

- Amy Schrank, Extension Assistant Professor at Minnesota Sea Grant (MNSG), with an annual salary of \$83,000 and 0.25 person months assigned to this project (2.1% effort): \$1,858 is requested. Schrank will oversee the project and contribute to Objectives 1 and 3 of the proposal. She will help gather and synthesize existing consumer education material and help develop, facilitate, and disseminate youth educational programming on seafood and aquaculture. She will oversee the Program Coordinator and one undergraduate student intern during the project. Dr. Schrank's position is not hard funded. Sea Grant positions are funded through a cooperative agreement with NOAA National Sea Grant Program through omnibus research grants and through other sponsored projects. If work is to be completed on this USDA NCRAC grant, appropriate funds to cover salary and fringe are needed to achieve project activities for this project.
- Program Coordinator (TBD), with an annual salary of \$50,000 and 7.41 person months assigned to this project (62% effort), \$32,924 is requested. This person will support project coordination that includes a variety of activities, outputs, and investigators/collaborators. This person will manage day-to-day operations, coordinate efforts among the many investigators/collaborators, help prepare and analyze survey materials, and contribute to the development of lesson plans, activities, workshops, and educational materials (online videos and educational modules). The Program Coordinator will be supervised by Schrank.
- Undergraduate Student Intern (TBD), with a salary of \$29,120 and 1.2 person months assigned to this project: \$2,986 is requested. This student intern will be supervised by Schrank and will help develop and deliver new youth programming.

B. Fringe Benefits: (\$11,148)

- Academic fringe rate calculated at 36.5%, \$678 is requested.
- Civil service fringe rate calculated at 31.8%, \$10,470 is requested.

E. Materials and Supplies: (\$1,776)

- A total of \$1,776 is requested for all materials and supplies. Materials and supplies will include printing and postage for outreach materials and lesson plans. Additional materials will be used to support implementation of workshops, development of videos and online educational modules, and classroom activities. These supplies will include laboratory supplies, fish, cooking materials, and other miscellaneous supplies needed for activities for classrooms and workshops.

F. Travel: (\$8,000)

- Travel costs are expenses related to three to four in-person workshops throughout the north central region for PI Schrank and the Program Coordinator. We have requested \$1,080 for rental/mileage (\$0.56 per mile x 1929 miles), \$3600 for lodging (~\$150 per night x 12 nights x 2 people), and \$1320 for per diem meal expenses (12 days x \$55 per diem x 2 people): \$6,000 is requested.
- Travel for PI Schrank to attend a national professional meeting (e.g. Aquaculture America, National Aquaculture Extension Workshop/Conference, other), to formally present the project, conduct surveys, and engage stakeholders and potential future collaborators (meeting registration at \$400 + plane ticket at \$575 + hotel at \$150 x 5 nights + per diem meals at \$55 x 5 days): \$2,000 is requested.

J. Other costs: (\$17,683)

- Other costs include contracts for video and video editing services to create outreach and education videos and demonstrations: \$9,000 is requested. We will produce several short videos and/or online educational modules with either a production team within the University of Minnesota system, or a private contractor. The number of videos/modules produced, as well as their length, will be dependent on the outputs of all objectives. Production of even short (5 minute) high quality videos can cost in the area of \$2,000-\$3,000. A slight compromise on quality would allow for the production of more videos/modules. We envision being able to produce 3-6 short (~5 minutes) videos/modules in support of consumer and youth education about aquaculture that can be posted online and marketed for widespread viewership.
- Other costs will go to Spark-Y Youth Action Labs (www.spark-y.org), a non-profit organization in Minneapolis, MN focused on empowering urban youth with hands-on education rooted in aquaponics, entrepreneurship, and sustainability. Spark-Y and the University of Minnesota have collaborated on many successful projects in the past. These projects have worked to co-support youth, students, interns, and the greater community. Projects have resulted in: aquaponic system builds for youth education; research on the efficiency of recirculating aquaculture systems (RAS); improved pest management techniques in RAS systems; and more.

Spark-Y will develop 3-5 simple recipes involving edible fish to be made available to the general public. They will develop a culinary demonstration lab to show youth how to fillet and cook edible fish species. This demonstration will culminate in a lesson plan, allowing in-classroom culinary demonstrations with aquaculture species to be more accessible to educators. Finally, Spark-Y will support the project's development of educational infographics and videos related to aquaculture. \$8,683 is requested in year 2 for 62.5 hours at \$24/hr; 282.5 hours at \$21.5/hour, 6 hours at \$50 for culinary consultant, \$750 for supplies for demonstration labs (cutlery, cutting boards, cooking tools, food) and for educational graphics, and mileage reimbursement for up to ~103 miles of travel to and from cooking demonstrations and supply purchasing locations at the federal reimbursement rate of \$0.56 per mile (\$58.00)

Lake Superior State University Budget – Year 1

ORGANIZATION AND ADDRESS Lake Superior State University 650 West Easterday Ave Sault Ste Marie MI 49783			USDA AWARD NO. Year: 1		Objective: 3		
PROJECT DIRECTOR(S) Barbara I. Evans			Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS			Funds Requested by Proposer	Funds Approved by CSREES (If different)
			Calendar	Academic	Summer		
a. <u>1</u> (Co)-PD(s) .Barbara I. Evans b. ____25		
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates b. ____ Other Professionals							
c. ____ Paraprofessionals d. ____ Graduate Students e. <u>2</u> Prebaccalaureate Students f. ____ Secretarial-Clerical g. ____ Technical, Shop and Other						6000	
Total Salaries and Wages <input type="checkbox"/>						7500	
B. Fringe Benefits (If charged as Direct Costs)						435	
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>						7935	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						5500	
F. Travel						1000	
G. Publication Costs/Page Charges							
H. Computer (ADPE) Costs (web support)						3000	
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)							
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)							
K. Total Direct Costs (C through I) <input type="checkbox"/>							
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"/>						17435	
P. Carryover -- (If Applicable)			Federal Funds: \$	Non-Federal funds: \$	Total \$		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)					Leave Blank		
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 Dr. Barbara I. Evans							
Authorized Organizational Representative							

Lake Superior State University Budget – Year 2

ORGANIZATION AND ADDRESS Lake Superior State University 650 West Easterday Ave Sault Ste Marie MI 49783				USDA AWARD NO.		Year: 2	Objective: 3				
PROJECT DIRECTOR(S) Barbara I. Evans				Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)				
A. Salaries and Wages 1. No. of Senior Personnel				CSREES FUNDED WORK MONTHS				Funds Requested by Proposer			
				Calendar	Academic	Summer	Funds Approved by CSREES (If different)				
a. <u>1</u> (Co)-PD(s) .Barbara I. Evans											
b. ____											
2. No. of Other Personnel (Non-Faculty)											
a. ____ Research Associates-Postdoctorates . . .											
b. ____ Other Professionals											
c. ____ Paraprofessionals											
d. ____ Graduate Students											
e. <u>2</u> Prebaccalaureate Students										6000	
f. ____ Secretarial-Clerical											
g. ____ Technical, Shop and Other											
Total Salaries and Wages <input type="checkbox"/>										7500	
B. Fringe Benefits (If charged as Direct Costs)										435	
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>										7935	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)											
E. Materials and Supplies										5500	
F. Travel										1000	
G. Publication Costs/Page Charges											
H. Computer (ADPE) Costs (web support)										3000	
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)											
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)											
K. Total Direct Costs (C through I) <input type="checkbox"/>											
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"/>										17435	
P. Carryover -- (If Applicable)				Federal Funds: \$		Non-Federal funds: \$		Total \$			
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)								Leave Blank			
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 Dr. Barbara I. Evans											
Authorized Organizational Representative											

Lake Superior State University Budget Summary (Year 1 & Year 2)

ORGANIZATION AND ADDRESS Lake Superior State University 650 West Easterday Ave Sault Ste Marie MI 49783				USDA AWARD NO. Year: 1 & 2		Objective: 3			
PROJECT DIRECTOR(S) Barbara I. Evans				Duration Proposed Months: <u>12</u>	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)		
A. Salaries and Wages 1. No. of Senior Personnel				CSREES FUNDED WORK MONTHS					
				Calendar	Academic	Summer			
a. <u>1</u> (Co)-PD(s) . Barbara I. Evans.5	3000		
b. ____									
2. No. of Other Personnel (Non-Faculty) a. ____ Research Associates-Postdoctorates b. ____ Other Professionals									
c. ____ Paraprofessionals									
d. ____ Graduate Students									
e. <u>2</u> Prebaccalaureate Students							12000		
f. ____ Secretarial-Clerical									
g. ____ Technical, Shop and Other									
Total Salaries and Wages <input type="checkbox"/>									
B. Fringe Benefits (If charged as Direct Costs)							870		
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>									
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)									
E. Materials and Supplies							11000		
F. Travel							2000		
G. Publication Costs/Page Charges									
H. Computer (ADPE) Costs (web support)							6000		
I. Student Assistance/Support (Scholarships/fellowships, stipends/tuition, cost of education, etc. Attach list of items and dollar amounts for each item.)									
J. All Other Direct Costs (In budget narrative, list items and dollar amounts and provide supporting data for each item.)									
K. Total Direct Costs (C through I) <input type="checkbox"/>									
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"/>							34870		
P. Carryover -- (If Applicable) Federal Funds: \$				Non-Federal funds: \$		Total \$			
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)							Leave Blank		
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									

**Budget Explanation Lake Superior State University
(Evans)**

A. Salaries & Benefits- (\$15,870) \$7,500 each year to cover 2 undergraduate student interns (300 hrs ea @\$10/hr + .0725 FICA), plus 1 week salary each year for Evans (\$1500).

Dr. Evans will oversee the student workers and collaborate with the other Pi's on all aspects of Objective 3. Student workers will act as liaisons with the high school teams for the Aquaculture Challenge. They will also assist in operation of the aquaponics facility and help with workshop preparation and delivery for high school teachers. They will also be involved with the cooking demonstrations and assist with livestreaming these activities and creating videos. Students will be working five hours per week on average throughout the academic year.

B. Materials and Supplies (\$11,000) \$5,500 each year-

i) Youth activities from classrooms to markets (\$1,000) includes:

Postage (\$0.55) and printing (\$0.09) 500 fliers: \$320

Social media boosts (FB and Instagram): \$100

Cooking demos (\$60-70 monthly during academic year): fish and ingredients: \$580

ii) Two 2-day workshops for ten high school teachers (\$1,000) includes:

Meals (breakfast and lunch): 2 x \$200: \$400

Lab equipment and office supplies (fish, fish food, nets): 2 x \$300: \$600

iii) Small stipend for teachers' travel and lodging to attend the workshops

We will limit attendance to ten participants. \$150 x 10: \$1,500.

iv) Aquaculture Challenge to be updated per social distancing guidelines including possibly having 20-25 teams start their projects at home (\$2,000) includes:

Data base access (\$3.99/monthly/team):

Arduinos, sensors and other competition supplies: \$70-90/team

C. Travel- (\$2,000) \$1,000 per year, for in-person programing and outreach events throughout MI, WI and MN.

Year 1	Miles	Cost	Airfare	per diem	lodging	Total
i) Local travel	116	64.96		14		78.96
ii) Culinary school	70	39.2		14		53.2
iii) MAA meeting	400	224		41.3	96	361.3
iv) Spark Y			256	137.5	192	585.5

i) local travel to schools in Pickford, Cedarville, Detour to market activities

ii) travel to Les Chenaux Culinary school for best practices in fish cooking.

iii) attend Michigan Aquaculture Association (MAA) meeting to share progress on project

iv) travel to meet with Spark Y in Minneapolis for urban approaches underway

	Miles	Cost	per diem	lodging	Total
Year 2					
Regional travel	132	73.92	82.6	96	253
WAA meeting	575	322	137.6	288	747

- i) Regional travel to schools in the Escanaba MI area, to market project activities
- ii) Attend Wisconsin Aquaculture Association (MAA) meeting to share progress on project

D. Other – (\$6,000) \$3,000 each year: Web Consultant for webmaster updating and forum oversight of www.ncrac-yea.org. The website will be modified to include the new cooking component of the Aquaculture Challenge, as well as include links to information on sourcing and cooking farmed fish.

Michigan State University Budget – Year 1

ORGANIZATION AND ADDRESS Michigan State University Address: Justin S. Morrill Hall of Agriculture 446 West Circle Drive East Lansing, MI, 48824 PROJECT DIRECTOR(S) Lauren Jescovitch/Elliot Nelson			USDA AWARD NO. Year: 1		Objective:		
			Duration Proposed Months: _12_	Duration Proposed Months: ____	Non-Federal Proposed Cost-Sharing/Matching Funds (If required)	Non-federal Cost-Sharing/Matching Funds Approved by CSREES (If Different)	
			Funds Requested by Proposer	Funds Approved by CSREES (If different)			
A. Salaries and Wages 1. No. of Senior Personnel a. <u> 1 </u> (Co)-PD(s) Jescovitch. . b. <u> 1 </u> (Co)-PD(s) Nelson			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
			.6			3,528.53	
			.6			2,642.87	
2. No. of Other Personnel (Non-Faculty) a. <u> </u> Research Associates-Postdoctorates . . . b. <u> </u> Other Professionals							
c. <u> </u> Paraprofessionals d. <u> </u> Graduate Students e. <u> </u> Prebaccalaureate Students f. <u> </u> Secretarial-Clerical g. <u> </u> Technical, Shop and Other							
Total Salaries and Wages <input type="checkbox"/>						6,171.40	
B. Fringe Benefits (If charged as Direct Costs)						2,851.87	
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>						9,023.27	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						4,929.00	
F. Travel						6,000.00	
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.)						0.00	
K. Total Direct Costs (C through I) <input type="checkbox"/>						19,952.27	
L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)						0.00	
M. Total Direct and F&A/Indirect Costs (J plus K) <input type="checkbox"/>						19,952.27	
N. Other <input type="checkbox"/>						0.00	
O. Total Amount of This Request <input type="checkbox"/>						19,952.27	
P. Carryover -- (If Applicable) Federal Funds: \$			Non-Federal funds: \$		Total \$		
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)					Leave Blank		
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							

Michigan State University Budget – Year 2

ORGANIZATION AND ADDRESS Michigan State University Address: Justin S. Morrill Hall of Agriculture 446 West Circle Drive East Lansing, MI, 48824			USDA AWARD NO. Year: 1		Objective:		
PROJECT DIRECTOR(S) Lauren Jescovitch/Elliot Nelson			Duration Proposed Months: _ 12 _ Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
a. __ 1 __ (Co)-PD(s) Jescovitch. .			.6		3,599.10		
b. __ 1 __ (Co)-PD(s) Nelson			.6		2,695.73		
2. No. of Other Personnel (Non-Faculty)							
a. ____ Research Associates-Postdoctorates . . .							
b. ____ Other Professionals							
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. ____ Prebaccalaureate Students							
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages <input type="checkbox"/>					6,294.83		
B. Fringe Benefits (If charged as Direct Costs)					2,957.28		
C. Total Salaries, Wages, and Fringe Benefits (A plus B) <input type="checkbox"/>					9,252.11		
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies					4,900.00		
F. Travel					5,800.00		
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.)					0.00		
K. Total Direct Costs (C through I) <input type="checkbox"/>					19,952.11		
L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)					0.00		
M. Total Direct and F&A/Indirect Costs (J plus K) <input type="checkbox"/>					19,952.11		
N. Other <input type="checkbox"/>					0.00		
O. Total Amount of This Request <input type="checkbox"/>					19,952.11		
P. Carryover -- (If Applicable)			Federal Funds: \$		Non-Federal funds: \$		Total \$
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)					Leave Blank		
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							

Michigan State University Budget – Summary (Year 1 & Year 2)

ORGANIZATION AND ADDRESS Michigan State University Address: Justin S. Morrill Hall of Agriculture 446 West Circle Drive East Lansing, MI, 48824			USDA AWARD NO. Year: 1		Objective:		
PROJECT DIRECTOR(S) Lauren Jescovitch/Elliot Nelson			Duration Proposed Months: _ 12 _ Funds Requested by Proposer	Duration Proposed Months: ____ Funds Approved by CSREES (If different)	Non-Federal Proposed Cost-Sharing/ Matching Funds (If required)	Non-federal Cost-Sharing/ Matching Funds Approved by CSREES (If Different)	
A. Salaries and Wages 1. No. of Senior Personnel			CSREES FUNDED WORK MONTHS				
			Calendar	Academic	Summer		
a. __ 1 __ (Co)-PD(s) Jescovitch. .			.6			7,127.63	
b. __ 1 __ (Co)-PD(s) Nelson			.6			5,338.60	
2. No. of Other Personnel (Non-Faculty)							
a. ____ Research Associates-Postdoctorates . . .							
b. ____ Other Professionals							
c. ____ Paraprofessionals							
d. ____ Graduate Students							
e. ____ Prebaccalaureate Students							
f. ____ Secretarial-Clerical							
g. ____ Technical, Shop and Other							
Total Salaries and Wages						12,466.23	
B. Fringe Benefits (If charged as Direct Costs)						5,809.15	
C. Total Salaries, Wages, and Fringe Benefits (A plus B)						18,275.38	
D. Nonexpendable Equipment (Attach supporting data. List items and dollar amounts for each item.)							
E. Materials and Supplies						9,829.00	
F. Travel						11,800.000	
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.)						0.00	
K. Total Direct Costs (C through I)						39,904.38	
L. F&A/Indirect Costs. (If applicable, specify rate(s) and base(s) for on/off campus activity. Where both are involved, identify itemized costs in on/off campus bases.)						0.00	
M. Total Direct and F&A/Indirect Costs (J plus K)						39,904.38	
N. Other						0.00	
O. Total Amount of This Request						39,904.38	
P. Carryover -- (If Applicable)			Federal Funds: \$		Non-Federal funds: \$		Total \$
Q. Cost Sharing/Matching (Breakdown of total amounts shown in line O)					Leave Blank		
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							

**Budget Explanation for Michigan State University
(Jescovitch, Nelson)**

Objectives 1-4

• **Salaries and Wages**

Year 1 (\$6,171.40):

L. Jescovitch (MSU Extension Educator-Fixed) at 5% for 12 months of the project.

E. Nelson (MSU Extension Educator-Fixed) at 5% for 12 months of the project.

Year 2 (\$6,294.83):

L. Jescovitch (MSU Extension Educator-Fixed) at 5% for 12 months of the project.

E. Nelson (MSU Extension Educator-Fixed) at 5% for 12 months of the project.

This project in its entirety will not be feasible unless Dr. Jescovitch and Mr. Nelson receive salary in order to buy-out time in order to complete this project as their positions are not hard funded. Sea Grant positions are funded through a cooperative agreement with NOAA National Sea Grant Program through omnibus research grants. If work is to be completed on a USDA NCRAC grant, appropriate funds to cover salary, fringe, and other expenses are needed to achieve project activities for this proposal to USDA NCRAC. Dr. Jescovitch and Mr. Nelson will need to certify effort appropriate for their levels on any of the projects for the up to 100% of grant funds (or required match) that fund their positions.

• **Fringe Benefits**

Year 1 (\$2,851.87)

Year 2 (\$2,957.28)

Michigan State University assesses fringe via specific identification method. Fringe is charged in direct percentage to the amount of salary-effort charged to the project. Fringe is inclusive of employer FICA, employer Medicare, health care, retirement contribution, if participating, and other miscellaneous costs (dental, etc.). Please reference the Michigan State University Sponsored Programs link: <https://u.search.msu.edu/index.php?client=MSU+Sponsored+Programs+Administration&analytics=26150426-1&site=search=cga.msu.edu&q=fringe>.

• **Materials and Supplies**

Items	Year 1	Year 2	Total
Instructional and meeting materials, publications, printing costs, digital media/video editing	3,929	3,900	7,829
Cooking Supplies (fish, ingredients, etc.)	1,000	1,000	2,000
Total	\$4,929	\$4,900	\$9,829

• **Travel (Domestic)**

Year 1 (\$6,000): Domestic travel is estimated and calculated for 2 individuals for in-person meetings and outreach events

- Mileage at \$0.57/mile
- Lodging ~\$140.00/night
- Per diem meals ~\$55.00/day

Year 2 (\$5,800): Domestic travel is estimated and calculated for 2 individuals for in-person meetings and outreach events

- Mileage at \$0.57/mile
- Lodging ~\$140.00/night
- Per diem meals ~\$55.00/day

**Budget Summary
Year 1**

	University of Minnesota (Schrank)	Lake Superior State University (Evans)	Michigan State University (Jescovitch, Nelson)	Total
Salaries	36,784	7,500	6,171	50,455
Benefits	10,823	435	2,852	14,110
Supplies	1,724	5,500	4,929	12,153
Equipment	0	0	0	0
Travel	8,000	1,000	6,000	15,000
Other	17,025	3,000	0	20,025
Total	74,356	17,435	19,952	111,743

Year 2

	University of Minnesota (Schrank)	Lake Superior State University (Evans)	Michigan State University (Jescovitch, Nelson)	Total
Salaries	37,768	7,500	6,295	51,563
Benefits	11,148	435	2,957	14,540
Supplies	1,776	5,500	4,900	12,176
Equipment	0	0	0	0
Travel	8,000	1,000	5,800	14,800
Other	17,683	3,000	0	20,683
Total	76,375	17,435	19,952	113,762

Schedule for Completion of Objectives

Start date: 9/01/21
 Completion date: 8/31/23

Objectives and Tasks	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
<i>Objective 1</i>												
<i>Lit Review & Survey Development</i>	■	■										
<i>Survey Dissemination</i>			■	■								
<i>Survey Analysis and Findings</i>				■	■							
<i>Objective 2</i>												
<i>Development of Materials</i>				■	■	■	■					
<i>Activities</i>								■	■	■	■	■
<i>Evaluation of Activities</i>								■	■	■	■	■
<i>Objective 3</i>												
<i>Development of Materials</i>				■	■	■	■					
<i>Activities</i>		■		■				■	■	■	■	■
<i>Evaluation of Activities</i>			■		■			■	■	■	■	■
<i>Delivery</i>												
<i>Workshops</i>						■	■					■
<i>Extension Articles (MSU, Sea Grant, GLAC)</i>					■					■	■	■
<i>Peer-reviewed Publications</i>											■	■
<i>Presentations (MAA, MNAA, NCRAC, USAS)</i>								■	■			
<i>Final Report to NCRAC</i>												■

Participating Institutions and Co-Principal Investigators

University of Minnesota

Amy J. Schrank

Lake Superior State University

Barbara I. Evans

Michigan State University

Lauren N. Jescovitch

Elliot Nelson

VITA

Amy J. Schrank
Minnesota Sea Grant College Program
University of Minnesota – Twin Cities
Saint Paul, MN 55108

Phone: (612) 626-1843
Email: aschrank@umn.edu

Education

B.S. (University of Michigan, 1995, Biology and Spanish)
M.S. (University of Michigan, 1997, Resource Ecology and Management: Aquatic Ecology)
Ph.D. (University of Wyoming, 2002, Zoology and Physiology, Minor: Statistics)

Positions

2020 – present Assistant Extension Professor, University of Minnesota Sea Grant, St. Paul, MN
2017 – present Adjunct Assistant Professor, Department of Fisheries, Wildlife and Conservation Biology (FWCB), University of Minnesota, St. Paul, MN
2004 – present Lecturer, University of Michigan Biological Station (UMBS), Pellston, MI
2017 – 2018 Researcher 6, Teaching Specialist – FWCB, University of Minnesota, St. Paul, MN
2013 – 2017 Research Assistant Professor – School of Forest Resources and Environmental Science (SFRES), Michigan Technological University, Houghton, MI
2004 – 2013 Adjunct Assistant Professor - SFRES, Michigan Technological University, Houghton, MI
2002 – 2003 Visiting Assistant Professor: Ecology Department, Montana State University, Bozeman, MT

Scientific and Professional Organizations

American Fisheries Society

Selected Publications

Schrank, A.J. and Lishawa, S.C. 2019. Invasive cattail reduces fish diversity and abundance in the emergent zone of a Great Lakes coastal wetland. *Journal of Great Lakes Research* 45: 1251-1259.

Bansal, S., Lishawa, S., Newman, S., Tangen, B.A., Wilcox, D., Albert, D., Anteau, M.J., Chimney, M.J., Cressey, R.L., DeKeyser, E., Elgersma, K.J., Finkelstein, S.A., Freeland, J., Grosshans, R., Klug, P.E., Larkin, D.J., Lawrence, B.A., Linz, G., Marburger, J., Noe, G., Otto, C., Reo, N., Richards, J., Richardson, C., Rodgers, L., Schrank, A.J., Svedarsky, D., Travis, S., Tuchman, N., Windham-Myers, L. 2019. *Typha* (cattail) Invasion in North American Wetlands: Biology, Regional Problems, Impacts, Ecosystem Services, and Management. *Wetlands* 39: 645-684.

Bump, J., Bergman, B., Schrank, A., Macarelli, A., Kane, E., Risch, A., Scheutz, M. 2017. Nutrient release from moose bioturbation in aquatic ecosystems. *Oikos*. 126: 389-397.

Schrank, A.J., Resh, S.C., Previant, W.J., and R.A. Chinmer. 2015. Characterization and classification of vernal pool vegetation, soil, and amphibians of Pictured Rocks National Lakeshore. *The American Midland Naturalist*. 174: 161-179.

Bump, J., Tischler, K., Schrank, A.J., Peterson, R., and Vucetich, J. 2009. Large herbivores and aquatic-terrestrial links in southern boreal forests. *Journal of Animal Ecology* 78: 3888-345.

Lowe, R., Pilsbury, R., Schrank, A.J. 2009. Aquatic Ecosystems of Northern Michigan. In: Hogg, A., Nadelhoffer, K. and Hazlett, B. editors. *The changing environment of Northern Michigan*. University of Michigan Press, Ann Arbor, MI.

Schrank, A.J. and F.J. Rahel. 2006. Factors influencing summer movement patterns of cutthroat trout, *Oncorhynchus clarki utah*. *Canadian Journal of Fisheries and Aquatic Sciences* 63: 660-669.

Schrank, A.J. and Rahel, F.J. 2004. Movement patterns in inland cutthroat trout (*Oncorhynchus clarki utah*): management and conservation implications. *Canadian Journal of Fisheries and Aquatic Sciences* 61: 1528-1537.

Schrank, A.J., H.C. Johnstone, and F.J. Rahel. 2003. Field response of trout to thermal maxima derived from lab experiments. *Transactions of the American Fisheries Society* 132(1): 100-109.

VITA

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Education

B.Sc. (University of Ottawa, Canada, 1980, Biology (cum laude))
Ph.D. (University of Kansas, Lawrence KS, 1986, Biology (Systematics and Ecology))

Positions

1994 – pres. Professor of Biology, School of Science and Medicine, Sciences, LSSU
2005-2006 Acting Co-director Aquatic Research Laboratory, LSSU
1996- 2000 Department Chair, Department of Biology, LSSU
1991-1993 Postdoctoral Scholar (NRSA/NIH) Stanford University, Neurosciences Program
1987-1991 Post-doctoral Fellow (NSERC) University of Oregon, Neuroscience Institute
1990-1991 Guest Investigator, Woods Hole Oceanographic Inst. Environmental Systems Lab
1988 Visiting Assistant Professor of Biology, University of Oregon

Scientific and Professional Organizations

USDA Technical Committee /Research Subcommittee of NCRAC through Dec 31, 2021
American Fisheries Society (2001-present)
 Early Life History Section
 Fish Health Section
 Fish Culture Section
Michigan Aquaculture Association
The Aquaponics Association

Selected Publications

Caroffino, D., A. Mwai, and B. I. Evans. 2011. Population genetics of walleye and yellow perch in the St. Marys river. *Journal of Great Lakes Research* 37(supplement 2):28-34.

Turschak, B., A. Moerke, and B. I. Evans. 2011. Spatial and seasonal changes in the zooplankton community of the St. Marys River. *Journal of Great Lakes Research* 37(supplement 2):21-27.

Kirkpatrick, N. S., D. Everitt and B. I. Evans. 2007. Asymmetric hybridization of pink (*Oncorhynchus gorbuscha*) and chinook (*O. tshawytscha*) Salmon in the St. Marys River, Michigan. *Journal of Great Lakes Research* 33:358-365.

Hoke, K. L., B. I. Evans, and R. D. Fernald 2006 Remodeling of the cone photoreceptor mosaic during metamorphosis of flounder (*Pseudopleuronectes americanus*) *Brain Behavior & Evolution* 68:241–254.

Evans, B. I. 2004. A fish's eye view of habitat change. In: von der Emde G., Mogdans J., and Kapoor B. G. (eds) *The Senses of fish: Adaptations for the reception of natural stimuli*. Narosa Publishing House, New Delhi, pp 1-30.

Evans, B. I., and H. I. Browman. 2004 Variation in the development of the fish retina. In: *The development of form and function in fishes and the question of larval adaptation* (Ed. J. J. Govoni) *AFS Symposium*. 40: 145-166.

VITA

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Education

BS Fisheries Biology; Environmental Science; Minor in Chemistry, Mansfield University of Pennsylvania, 2012
MS Fisheries and Allied Aquacultures, Auburn University, 2014
Graduate Certificate College/University Teaching, Auburn University, 2016
PhD Fisheries and Allied Aquacultures, Auburn University, 2017

Positions

2019 – Present **Extension Educator**, Michigan Sea Grant & Michigan State University Extension, Michigan State University, East Lansing, MI
2018-2020 **Research Associate**, CREATE for STEM Institute, College of Education, Michigan State University, East Lansing, MI
2017-2019 **Distance Learning Course Designer**, Certificate for Aquaculture Professionals (CAPS), Auburn University, Auburn, AL
2017-2018 **Postdoctoral Research Associate – Water Quality and Aquatic Ecology**, College of Agriculture & Related Sciences, Delaware State University, Dover, DE
2012-2017 **Graduate Research Assistant**, E.W. Shell Fisheries Center, School of Fisheries, Aquaculture and Aquatic Sciences, Auburn University, Auburn, AL
2010 **Intern**, The Conservation Fund Freshwater Institute, Shepherdstown, WV

Scientific and Professional Organizations

Aquacultural Engineering Society (Director, 2018-2020)
Michigan Aquaculture Association
North Central Regional Aquaculture Society, *Technical Committee – Extension* (2020-Present)
World Aquaculture Society (WAS)
United States Aquaculture Society (USAS), Chapter of WAS (Director, 2019-2021)

Selected Publications

Jescovitch, L.N., E.E. Scott, J.A. Cerchiara, J.H. Doherty, J. Merrill, M. Urban-Lurain, and K.C. Haudek. 2020. Comparison of machine learning performance using analytic and holistic coding approaches across constructed response assessments aligned to a science learning progression. *Journal of Science Education and Technology. Special Issue: Machine Learning in Science Assessment*. <http://doi.org/10.1007/s10956-020-09858-0>
Jescovitch, L.N., E.E. Scott, J.A. Cerchiara, J.H. Doherty, M.P. Wenderoth, J. Merrill, M. Urban-Lurain, and K.C. Haudek. 2019. Deconstruction of holistic rubrics into analytic rubrics for large-scale assessments of students' reasoning of complex science concepts. *Practical Assessment, Research & Evaluation*, 24(7) <https://doi.org/10.7275/9h7f-mp76>
Jescovitch, L.N., C. Ullman, M. Rhodes, and D.A. Davis. 2018. Effects of different feed management treatments on water quality for pacific white shrimp *Litopenaeus vannamei*. *Aquaculture Research* 49:526-531 <https://doi.org/10.1111/are.13483>
Jescovitch, L.N., C.E. Boyd, and G.N. Whitis. 2017. Effects of mechanical aeration in the waste-treatment cells of split-pond systems on water quality. *Aquaculture* 480:32-41 <https://doi.org/10.1016/j.aquaculture.2017.08.001>

Extension Articles

Nelson, E., and L.N. Jescovitch. (2020, Sept 22). Collaborative to enhance aquaculture education in the Great Lakes region. *Michigan State University Extension*. Available: <https://www.canr.msu.edu/news/>
Jescovitch, LN. (2020, May 29). Challenges and resources for fish producers in Michigan during COVID-19. *Michigan State University Extension*. Available: <https://www.canr.msu.edu/news/>

VITA

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Education

BS Michigan State University, 2010, Biology, Integrated Science Endorsement
Graduate Michigan State University, 2011, Secondary Science Education
Certificate
MS University of Michigan, 2016. Natural Resources and the Environment; Behavior, Education and Communications and Conservation Biology

Positions

2016 – Present **Extension Educator**, Michigan Sea Grant and Michigan State University Extension, Michigan State University, Sault Ste Marie, MI
2014-2016 **Research Associate**, Graham Sustainability Institute's Water Center, University of Michigan, Ann Arbor, MI
2014-2016 **Project Co-Coordinator**, Tipp of the Mitt Watershed Council, Petoskey, MI
2011-2014 **High School Science Teacher**, Grand River Preparatory High School, Grand Rapids, MI
2011 **Research Assistant**, Department of Plant, Soil, and Microbial Sciences, College of Agriculture and Natural Resources, Michigan State University, East Lansing, MI

Scientific and Professional Organizations

Michigan Aquaculture Association
Michigan Science Teachers Association
World Aquaculture Society (WAS)

Selected Publications

Nelson, E.K., and R. Kinnunen. 2018. What is aquaculture. Michigan Sea Grant – University of Michigan. Available: <http://www.miseagrant.umich.edu/wp-content/blogs.dir/1/files/2018/08/18-701-What-is-Aquaculture.pdf> (July 2021)
Nelson, E.K., R. Kinnunen, and C. Weeks. 2018. Site selection plans for new and expanding aquaculture facilities in Michigan. Michigan Sea Grant – University of Michigan. Available: <http://www.miseagrant.umich.edu/wp-content/blogs.dir/1/files/2018/12/Aquaculture-Site-Plan-Guide-for-Michigan.pdf> (July 2021)
Nelson, E.K.. 2017. Getting started with aquaculture. Michigan State University Extension. Available: https://www.canr.msu.edu/resources/getting_started_with_aquaculture_webinar (July 2021)
Nelson, E.K.. 2017. High school aquaculture challenge program. Michigan State University Extension. Available: https://www.canr.msu.edu/news/high_school_aquaculture_challenge_program_kicks_off_msg17_nelson17 (July 2021)
Nelson, E. K., and L.N. Jescovitch. (2020, Sept 22). Collaborative to enhance aquaculture education in the Great Lakes region. Michigan State University Extension. Available: <https://www.canr.msu.edu/news/> (July 2020)

Checklist for Submission of Full Proposals

Follow guidelines with the exception of the budget sheets.

- Format manuscripts for 22 x 28 cm (8½ x 11 inch).
- Number *all* pages sequentially.
- All references in text and VITA are correctly format per NCRAC guidelines.
- Use 10-12 font; Times New Roman. Do not justify right margins.
- Format headings appropriately.
- Leave at least a 2.5-cm (1-inch) margin on all sides.
- Use metric units of measurement with English units in parenthesis, e.g. 2.54 cm (1 inch).
- Define all abbreviations the first time they are used.
- Express ratios by using a slant line (e.g. mg/L).
- Scientific names should accompany common names in the title and when they are first mentioned in the abstract and in the text. Authority for scientific names need not accompany the genus and species unless needed for clarity.
- Spell out one to ten unless followed by a unit of measurement (e.g. four fish, 4 kg, 14 fish). Do not begin a sentence with a numeral. Use 1,000 instead of 1000; 0.13 instead of .13; and % instead of percent.
- Use the 24-hour clock for dial time: 0830, not 8:30 a.m. The calendar date should be day month year (7 August 1990).
- Include signed Letters of Intent for identified Extension and Industry Liaisons.
- Signed Authorized Organization Representative (AOR) form from each funded PI's institution are required at this time.
- Include the required three (3) Letters of Support from Industry members who are not directly involved in the proposed project.
- Assemble the full proposal in this order: Title Page, Project Summary, Justification, Related Current and Previous Work, Statement Regarding Duplication of Research, Anticipated Benefits, Objective(s), Deliverables, Procedures, Project Deliverables, Evaluation and Outreach (Logic Model included), Facilities, References, Project Leaders, Budget, Budget Explanation per Institution, Budget Summary, Schedule for Completion of Objectives. References, Participating Institutions and Principal Investigators, Curriculum Vitae for Principal Investigators (PIs).
- All identified co-PIs have been provided a final draft of the full proposal.
- Submit proposal (including all required documentation) in single MS Word document.

If the NCRAC Administrative Office cannot verify inclusion of any element, the Full Proposal will not be accepted.

Principal Investigator Signature

Date



24 May 2021